Appendix outline

Notes ... 3
Appendix 1: Existing typologies of hubs in current policy documents ... 4
Appendix 2: How many shared vehicles are needed to sufficiently supply the inhabitants? ... 10
Appendix 3: Description of the potential indicators for the selection of a location for a neighborhood hub ... 13
Appendix 4: Literature Review Strategy ... 25
Appendix 5: Literature Search Protocol ... 30
Appendix 6: Literature Screening Protocol ... 39
Appendix 7: Presentation for the expert interviews ... 41
Appendix 8: Interview guide mobility expert ... 44
Appendix 9: Interview guide energy expert ... 49
Appendix 10: Interview guide society expert ... 54
Appendix 11: The case study neighborhoods Assendorp and Kamperpoort of Zwolle ... 59
Appendix 12: Expert Interview Report Expert 1 ... 1
Appendix 13: Expert Interview MURAL board Expert 1 ... 17
Appendix 14: Expert Interview Report Expert 2 ... 1
Appendix 15: Expert Interview MURAL board Expert 2 ... 14
Appendix 16: Expert Interview Report Expert 3 ... 1
Appendix 17: Expert Interview MURAL board Expert 3 ... 17
Appendix 18: Expert Interview Report Expert 4 ... 1
Appendix 19: Expert Interview MURAL board Expert 4 ... 19
Appendix 20: Expert Interview Report Expert 5 ... 1
Appendix 21: Expert Interview MURAL board Expert 5 ... 19
Appendix 22: Expert Interview Report Expert 6 ... 1
Appendix 23: Expert Interview MURAL board Expert 6 ... 15
Appendix 24: Expert Interview Report Expert 7 ... 1
Appendix 25: Expert Interview MURAL board Expert 7 ... 18
Appendix 26: Expert Interview Report Expert 8 ... 1
Appendix 27: Expert Interview MURAL board Expert 8 ... 19
Appendix 28: Expert Interview Report Expert 9 ... 1
Appendix 29: Expert Interview MURAL board Expert 9 ... 24
Appendix 30: Expert Interview Report Expert 10 ... 1
Appendix 31: Expert Interview MURAL board Expert 10 ... 18
Appendix 32: Expert Interview Report Expert 11 ... 1
Appendix 33: Expert Interview MURAL board Expert 11 ... 10
Appendix 34: Expert Interview Report Expert 12 ... 1

Appendix 35: Expert Interview MURAL board Expert 12 19
Appendix 36: Expert Interview Adjustment Log 20
Appendix 37: Expert Interview Coding Scheme 26
Appendix 38: Final list of indicators after expert interviews 30
Appendix 39: Results on the open questions of the expert interviews: the three functions of a neighborhood hub 32
Appendix 40: Results of the ranking on the other indicators 41
Appendix 41: Parking pressure in Assendorp and Kamperpoort – Data from the municipality 44
Appendix 42: Indicator (social) amenities: The meaning of the functions from the BAG 46
Appendix 43: Indicator (social) amenities: Discussion about the inclusion of the functions from the BAG 47
Appendix 44: Strategic routes (and public transport stops) for all modes of transportation in the two case neighborhoods 49
Appendix 45: Buffer areas around the strategic routes for the single modes of transportation 50
Appendix 46: Amount of parking pressure in the two case neighborhoods 51
Appendix 47: Mixed use index in the two case neighborhoods 52
Appendix 48: Different types and sizes of amenities in the case neighborhoods 53
Appendix 49: Population density (inhabitants per square kilometer) in the two case neighborhoods 54
Appendix 50: Cultural historical value of the areas with high potential 55
Appendix 51: Zoning plan for the areas with high potential 56
Appendix 52: Segment of the energy network plan of the municipality of Zwolle 57
References 58

Notes

In this Appendix file, the tables and figures that are embedded in a written text are numbered, while the standalone figures in the single Appendices are not numbered. This was done in order to be able to point to a figure in the written text in the respective Appendix.

Moreover, the page numbers of this document are not chronologically following, but repeatedly start again with one. This is the case because for the typed down expert interviews, it was important to refer to the page where the expert said the respective thing.

Appendix 1: Existing typologies of hubs in current policy documents

In the Netherlands, the concept of hubs is embedded in the bigger aim of reducing individual car use and increase the use of other modes of transport (Goudappel Coffeng, 2019, p. 4; Rijksoverheid, 2019). With more and more people wanting to live in the cities in the Netherlands, space is becoming rare in an already densely populated country. More and more building projects are initiated, as the cities try to provide enough living space within their boundaries (Gemeente Nijmegen, 2019, p. 43; Gemeente Zwolle, 2020l, p. 46; Government of the Netherlands, 2019, p. 107). In this context, one of the most important directive in almost all mobility plans is to favor the pedestrian, then the bicycle, then Public Transportation, often Shared Mobility and only after that the individual car (the STOP principle) (Gemeente Nijmegen, 2019, p. 24; Gemeente Zwolle, 2020k, p. 44). Cities are initiating programs to reduce the distances for inhabitants between home, work, shopping and other functions, while also trying to increase the livability (Gemeente Nijmegen, 2019, p. 47; Gemeente Utrecht, 2020; Government of the Netherlands, 2019, p. 107). The concept of "walkable neighborhoods" and car-free neighborhoods ("autoluw") is becoming popular (Gemeente Nijmegen, 2019, p. 39; Gemeente Zwolle, 2020l, pp. 37–38). Considering the coming of the Environmental Act ("Omgevingswet") in the beginning of 2022, the new legislation system with the aim of simplifying regulations in the area of a safe and healthy physical environment, these concepts are becoming more important in the current policy documents (Government of the Netherlands, 2019; Rijksoverheid, 2020). In 2019 / 2020, the introduction of the Environmental Vision Documents ("Omgevingsvisie"), each municipality, province and the country as a whole have to make, is an important factor driving this development (Gemeente Zwolle, 2020l). Moreover, the concept of chain mobility is central to a lot of policy plans (Government of the Netherlands, 2019, p. 116; Provincie Overijssel, 2017).

Moreover, a popular topic in Dutch policy on planning is the topic of "knooppunten" and hubs. In the Netherlands, the concept has spread both as hubs and as "knooppunten", whereas they are sometimes understood as synonyms and sometimes as names for different levels of the mobility network (Provincie Groningen en Drenthe, 2020d; Provincie Noord-Brabant, 2018, p. 21). Generally, "knooppunten" are conceptualized as central and important nodes in the train network, while "knooppuntontwikkeling" is focusing on the development and improvement of major transit stations and the connectivity of the rail network. The concept has spread in the Dutch policy context, however, until now, more as a conceptual model than with actual development happening. Those projects that were implemented, have been marked with some failures (Pojani & Stead, 2014; Tan, 2009; Thomas et al., 2018, p. 1202). The Dutch version of TOD shares some of the basic TOD design principles laid out in the international literature, however, a lot of specific design aspects are or still need to be adjusted to "national cultural predilections and practices" in the Netherlands (Pojani & Stead, 2015, p. 3). Moreover, Thomas et al. (2018, p. 1201) argue that especially "'softer' transferable lessons (e.g., good actor relationships, information sharing) are much more difficult to transfer than 'harder' technical tools". The major differences between the international concept of TOD and the dutch "knooppunten" can be found in Pojani and Stead (2015, pp. 10–19).

A lot of policy in recent years has focused on the definition, categorization, and structural overview of "knooppunten" in the Netherlands (CROW, 2020). Only to name a few, examples of this are the knooppuntenboek of the Province of Noord-Brabant (Provincie Noord-Brabant, 2015, 2018) and Noord-Holland (Provincie Noord-Holland, 2015), the discussion in the NOVI (Government of the Netherlands, 2019, p. 116) and the further discussion of the potentials by the central government (Rijksoverheid, 2019). These discussions however mainly focus on the big scale nodes in the rail network, the "knooppunten". For example, the smallest levels of the "knooppunten" ("lokale knoop") of the categorization of the Province of Noord-Brabant are those functioning as access points to small cores, e.g. city centers (Provincie Noord-Brabant, 2018, p. 21). However, there is potential and (societal) demand for even smaller nodes to get to these "local knots" (compare to chapter 1.3. and 2.2.).

For the term hub, there is no commonly agreed definition in the policy context. The NOVI, the national strategy on spatial planning and the environment, displays "transport hubs" as "strategic points at the periphery of our cities and regions", where the transport modalities are linked together (Government of the Netherlands, 2019, p. 116). Major functions of these transport hubs are the integration of transport systems and developing "not only efficient transfer points but also attractive destinations" (Government of the Netherlands, 2019, p. 116) with the aim of reducing the demands on mobility and transfer numbers. The NOVI is thus using the term hub as a synonym for describing "knooppunten".

Mobipunten in Flanders

In the Mobipunt initiative for Flanders, a hub is conceptualized as a place where different mobility networks come together, collective / public transport and shared vehicles are accessible and the user can easily choose between the different modes of transport (BUUR, 2019, p. 14; Government of Flanders, 2018, 2019, p. 1). It is noted that mobipunten are very diverse, as they can range from interregional node to a small neighborhood hubs and therefore the specific function and amenities differ from place to place (BUUR, 2019, p. 14). There are currently about 50 hubs implemented in the region of Flanders (Government of Flanders, 2018). The Vlaamse Beleidsvisie on Mobipunten defines four levels of transport (Interregional, Regional, Local and Neighborhood) and eight types of spatial context (City center, Peripheral / Agglomeration, Large center, Small center, Industrial node, Visitor node, Peripheral area, Rural area), which can then be combined to define 32 types of mobility hubs (BUUR, 2019, pp. 19–21). For these types of hubs, two logics are applied according to the different types of transport potential: the network logic and the proximity logic. The network logic describes the potential to which the hub has a network effect, which is higher for the higher-scale hubs, while the proximity logic describes to which degree the hub lies at the center of its transport potential, which is more important for the smaller-scale hubs (BUUR, 2019, p. 29). In this conceptualization, the smallest scale of hubs are the neighborhood hubs, for which the proximity towards the users is of great importance but which provide less functions than the higher-scale hubs (BUUR, 2019, 29, 48). There are different functions connected to the hubs, which can be divided into mobility-related (regular public transport, demand-oriented collective transport, shared cars, parking spots, taxi services, K&R facilities, shared bicycles and bicycle parking) and society-related functions (information facilities, waiting accommodation, grocery store, café, meeting rooms, lockers, distribution point for pushchairs, package lockers, ATM, childcare, post office (BUUR, 2019, 34-42, 44-48).

Mobil.Punkte in Bremen, Germany

In Germany, the city of Bremen is the pioneer in the topic of mobility hubs, with their Mobil.Punkte being implemented since 2005 (City of Bremen, 2020b). Mobil.Punkte are spots within the city, which at least offer shared (electric) cars, a bike stand and access to public transport (City of Bremen, 2020a). Bremen has also introduced a smaller version of their hubs, the Mobil.Pünktchen, where only two or three shared (electric) cars are standing on regular parking spots (Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Kessler, S., Möser, G., 2018, 8, 12). However, no additional amenities (such as shops or a kindergarten) are connected to the shared vehicles in Bremen. The city is currently trying to improve the bicycle and pedestrian infrastructure in the surrounding of the hubs (Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Kessler, S., Möser, G., 2018, p. 12).

Province of Noord-Brabant

The province of Noord-Brabant conceptualizes "knooppunten" as "transport nodes located on the public transport backbone of rail and HOV" and that have "a function for accessing important residential and working areas" (Provincie Noord-Brabant, 2015, p. 11). The major aims connected to the development

of “knooppunten” in Noord-Brabant are to accelerate the connection of public transport within the province, linking the train and HOV network with the networks of cycling and the car, densification around the junctions by making spatial development at railway stations more attractive and making the journey more pleasant, for example by improving the travel information and increasing the experience (Provincie Noord-Brabant, 2018, p. 5).

The knooppuntenboek of the Province of Noord-Brabant categorizes “knooppunten” into five types: the international “knoop” (nodes that are quickly connected to the (economic core) regions around Brabant and can develop into locations for international companies and facilities), the national “knoop” (nodes which, given their concentration of facilities and employment, should be easily accessible from all over Brabant and the regions around Brabant), the Brabant “knoop” (nodes that are located in the city or a large core close to economic core locations and have a high spatial density and good connections from the rest of Brabant), the regional “knoop” (nodes that have a nurturing function on their own core and the surrounding villages and a good connection with good public transport, bicycle and car) and the local “knoop” (nodes that have a limited area of influence and are served by sprinters or HOV buses and are easily accessible by bicycle and car) (Provincie Noord-Brabant, 2015, p. 6).

Province of Noord-Holland

In the policy documents of the province of Noord-Holland, “knooppunten” are described as “the entrances to inner cities and surrounding neighborhoods or gateways to nature or recreational areas” (Provincie Noord-Holland, 2020). They mainly describe train stations as well as four major bus stations. The focus of the “knooppuntontwikkeling” in Noord-Holand currently lies on several chosen corridors, such as the Zaancorridor, a highly used track between Amsterdam and Heerhugowaard (Provincie Noord-Holland, 2015, p. 8). The focus is on improving the public transport connection between the two cities and the residential areas in the cities in between, in order to foster the economic development of the Amsterdam region and reduce the pressure on the road system, but also to support the cultural and touristic development of the region (Provincie Noord-Holland, 2015, p. 12).

The Maak Plaats! conceptualization of Noord-Holland categorizes “knooppunten” into 12 “node environments”, based on the node-place model of Bertolini (1999): metropolis, metropolitan center, big city, regional center, city center, modern city, harbor area, public transport area, hub village, center village, outer city, outside gate (Provincie Noord-Holland & Vereniging Deltametropool, 2013, p. 105). There are six aspects that influence the characterization of a node: in terms of node, the existence of slow traffic (infrastructure) within 300 meters, the existence, frequency and destination direction of public transport, and the existence of and connection to highways, regional roads and parking facilities are important (Provincie Noord-Holland & Vereniging Deltametropool, 2013, p. 84). In terms of the place, the proximity to uses within the surrounding 300 meters, intensity and density (e.g. residential, commercial, touristic) and the mix of uses (relation between residents towards employees) are important aspects (Provincie Noord-Holland & Vereniging Deltametropool, 2013, p. 84).

Provinces of Drenthe and Groningen

The provinces of Drenthe and Groningen are currently working on a joint implementation of hubs, the so called mobihubs (Provincie Groningen en Drenthe, 2020a). These hubs are small-scale multi-use developments, where different amenities are provided and several transportation modes are integrated (Provincie Groningen en Drenthe, 2020a). The aim is to provide the inhabitants of the two provinces with hubs that are easily accessible and are situated in close proximity to their place of residence. Mobihubs are supposed to function both as mobility hubs and as socioeconomic hubs of the neighborhood, village or region and try to integrate aspects such as atmosphere, recognizability, information, time saving, positive surprise and integration with the environment (Provincie Groningen

en Drenthe, 2020b). A connection is made between public transport, cycling, car driving and walking in order to support chain mobility and encourage more people to use more sustainable modes of transportation. There are currently 55 mobihubs distributed over the two provinces (Provincie Groningen en Drenthe, 2020a). The conceptualization of the provinces Groningen and Drenthe resonates with what is conceptualized as a neighborhood hub in this research.

Province of Overijssel

In the current policy documents on spatial planning of the province of Overijssel, the topics of chain mobility, mobility mix, improvement of infrastructure for public transport and bicycles as well as using multimodal "knooppunten" as preferred locations for development are important aspects (Provincie Overijssel, 2017). The focus is here on the big nodes in the rail network, the main stations of the main cities in the province, and some important bus stations, which together form the core network (Provincie Overijssel, 2018, p. 25) (Provincie Overijssel, 2016, p. 4). The goal is thereby to reduce the need to use private cars, the emission of climate-damaging gasses, parking pressure, and thereby improving the economic stability and livability of the region, while designing the "knooppunten" flexible and customer-friendly (Provincie Overijssel, 2016, p. 2, 2017, 2019, p. 5). A main aspect is moreover the commitment to energy-efficient spatial planning, which is done firstly by reducing mobility by coordinating land use in a smart way with mobility hubs, secondly by the transition towards electric mobility and thirdly by changing the mobility behavior towards more sustainable modes of transport (e.g. cycling) (Provincie Overijssel, 2016, p. 2, 2017, 2018, p. 17, 2019, pp. 9–10). Although the Province of Overijssel itself does not include precise conceptualizations of small-scale hubs in its documents, these can be linked to the big-scale nodes in the conceptualization. Schutte, for example, in his recommendations for the further development of "knooppuntontwikkeling" and chain mobility in Overijssel, makes suggestions for the category of local hubs. He categorizes hubs in Overijssel into regional hubs, local hubs and sub-local nodes (Schutte, 2019, p. 46)(Schutte, 2019, p. 46). The sub-local nodes are described as the places where chain mobility starts or ends, for example an attraction or an office, and which can be bigger or smaller in scale (e.g. bigger bus stop or smaller station vs. smaller bus stops in a residential area or industrial site) (Schutte, 2019, p. 46)(Schutte, 2019, p. 46). It is also noted that sub-local nodes have the highest potential for sharing concepts, because they are most close to the place of residence of the users (Schutte, 2019, p. 47)(Schutte, 2019, p. 47).

Municipality of Zwolle

Hubs are conceptualized as a combination of mobility, societal and energy uses, in order to form an integral part of the city infrastructure and change the way how the public space within neighborhoods is used (Gemeente Zwolle, 2020k, 44, 80).

Application in current planning practice

Having discussed the conceptualization of "knooppunten" and hubs in current policy documents of provinces and cities, it is also important to note that these concepts are widely used and applied in current planning practice. The concept can for example be found in the planning for the pedestrian and cycling friendly neighborhood Strandeiland of Amsterdam, which is going to be developed in the coming 20 years (Gemeente Amsterdam, p. 9). Mobility hubs form an integral part of the planning; they are used in the plan to supply inhabitants and visitors with short-distance mobility in the form of shared vehicles, as well as several amenities (e.g. a parcel delivery spot, shared use of (electric) vehicles such as cars and bicycles) (Gemeente Amsterdam, 41, 78-79). They are discussed as bigger and smaller versions (mobility hubs and mini hubs) (Bartsen, 2019, p. 29). The hubs are thereby embedded in a neighborhood-wide network of pedestrian and bicycle routes, that guide inhabitants and visitors and

make these hubs more accessible (Gemeente Amsterdam, pp. 79–81). Hubs like these are currently typically proposed for densely populated inner-city areas close to the central city, where the possession of cars is difficult because of their space usage and relatively strict parking restrictions Having discussed the conceptualization of "knooppunten" and hubs in current policy documents of provinces and cities, it is also important to note that these concepts are widely used and applied in current planning practice. The concept can for example be found in the planning for the pedestrian and cycling friendly neighborhood Strandeiland of Amsterdam, which is going to be developed in the coming 20 years (Gemeente Amsterdam, p. 9). Mobility hubs form an integral part of the planning; they are used in the plan to supply inhabitants and visitors with short-distance mobility in the form of shared vehicles, as well as several amenities (e.g. a parcel delivery spot, shared use of (electric) vehicles such as cars and bicycles) (Gemeente Amsterdam, 41, 78-79). They are discussed as bigger and smaller versions (mobility hubs and mini hubs) (Bartsen, 2019, p. 29). The hubs are thereby embedded in a neighborhood-wide network of pedestrian and bicycle routes, that guide inhabitants and visitors and make these hubs more accessible (Gemeente Amsterdam, pp. 79–81). Hubs like these are currently typically proposed for densely populated inner-city areas close to the central city, where the possession of cars is difficult because of their space usage and relatively strict parking restrictions and the distance to transit is short (&morgen, 2020a; Gemeente Breda, 2020, p. 8; Natuur & Milieu, 2020; Strijp S, 2020). Alternatively, they are proposed in combination with attractive walking and cycling routes and good public transport in the planning for future developments of expanding big cities, such as the example in Amsterdam.

Moreover, advisory offices, such as Goudappel Coffeng, &morgen, Synchroon and Movares or mobility networks such as the Future Mobility Network are busy with exploring the topic of hubs for cities and developing conceptualizations and categorizations of hubs (&morgen, 2020a, 2020b; Future Mobility Network, 2020; Goudappel Coffeng, 2019; Movares, 2019, 2020a, 2020b; Reinink, 2019; Synchroon, 2019). Goudappel Coffeng (2019, pp. 9–10) for example distinguish three different ranges (Center, mixed area within the city, suburb / outside of the city) and four different scales (neighborhood / village, urban, (inter)regional, (inter)national) in categorizing mobility hubs: the outcome is a pattern of 13 different types, that range from neighborhood-village hub, city development hub, center edge hub to international train stations. Movares and &morgen for example include the topics of the energy transition and charging of electric vehicles in their exploration of hubs (&morgen, 2020a; Movares, 2019, p. 1).

Conclusion

To conclude the analysis of the policy literature, it can be said that there are a lot of different functions connected to hubs in the different existing conceptualizations (Koedood, 2020, p. 5; Provincie Noord-Brabant, 2018). Depending on the scale level of the conceptualization in the policy documents, the bigger stations typically provide more and sometimes different functions than the small-scale functions (BUUR, 2019, pp. 44–48). Small scale nodes of the network are conceptualized as the spokes serving the big hubs (e.g. the main station) (BUUR, 2019, p. 29). Correspondingly, the functions at small scale nodes are more focused on the accessibility of the nodes themselves (e.g. parking facilities for bicycles and cars) (Provincie Noord-Brabant, 2015, p. 6). It is clearly pointed out that the functions implemented at a specific place always depend on the surrounding area and the specific needs of the place (BUUR, 2019, p. 14; Government of Flanders, 2019, p. 2; Matthys, 2018, p. 23). Functions can be distinguished into transit functions and functions connected to staying at the node (Dutch: *verblijfsfunctie*) (BUUR, 2019, 34-42, 44-48). Transit functions include parking of vehicles such as bicycles or cars (P&R and K&R), charging infrastructure of electric vehicles, accessibility for all modes of transportation (e.g. connection to public transport, good pedestrian and bicycle routes) and infrastructure for parking (and charging) of (electric) vehicles (BUUR, 2019, pp. 34–42; Provincie Groningen en Drenthe, 2020e). Staying functions include all kinds of functions connected to the stay of the user at the hub, such as the

availability of shops, information, fitness infrastructure, shelter, a water tab, toilets and wifi (BUUR, 2019, pp. 34–42; Movares, 2019; Provincie Groningen en Drenthe, 2020e; Urban Design Studio, 2016). Moreover, often societal functions are named as future functions to be implemented at hubs, such as a school or general medical practice office (BUUR, 2019, pp. 47–48; Provincie Groningen en Drenthe, 2020d).

As can be seen from the discussion above, the concepts of mobility and social hubs are widely discussed in the policy literature. There is consensus among those who promote the concept of hubs that they can have significant advantages for the regions and cities where it is applied. Policies in the Netherlands have mainly focused on expanding and interconnecting the mobility network on a country- and province-wide scale. Moreover, there have been a lot of policy initiatives, trying to organize and define mobility hubs for their specific region, e.g. province or city, and assign functions to the different levels (Provincie Groningen en Drenthe, 2020a; Provincie Noord-Brabant, 2015, 2018; Provincie Noord-Holland, 2015, 2019; Provincie Overijssel, 2018). However, what is lacking in most of the conceptualizations is the energy side of the conceptualization used in this research. Only in some of the discussed conceptualization, such as the conceptualization of &morgen, Movares and the Omgevingsvisie Overijssel, there was a connection at hubs discussed between the topics mobility and energy (e.g. in terms of energy-efficient mobility) (Provincie Overijssel, 2016, p. 2). The municipality of Zwolle has included the idea of combining these two topics in their current version of the Omgevingsvisie (Gemeente Zwolle, 2020k, p. 80). The conceptualization of neighborhood hubs in this research is both based on the conceptualization of the municipality of Zwolle and of the mobility advisory office &morgen.

Appendix 2: How many shared vehicles are needed to sufficiently supply the inhabitants?

For estimating the space, the parked vehicles will need, it is necessary to know how many vehicles will be needed for sufficiently supplying the residents in the neighborhoods. It is at this point calculated with a full change of movement patters towards the neighborhood hub, meaning that for example for the shared cars it is calculated which amounts of shared cars are needed to substitute private cars completely. This if of course not expected to be the outcome of the hubs in the near future, and it is not possible to estimate whether it will be the outcome in the far future. These estimations are used in order to get an overview of the volumes of shared vehicles needed for the ideal-vision of the neighborhood hubs' success.

Cars

On average, most cars are parked 90 percent of the time (Fagnant & Kockelman, 2014). This already shows that private cars are not efficiently used. Sharing cars can be an alternative; however, there is no commonly agreed ratio with which one could easily calculate how many private cars are replaced by a shared car, because the research has until now brought many different results. The ratios used range from 1 to 4 until 1 to 23 private cars (compare table 1).

Table 1: Research on the amount of private cars that can be replaced by shared cars. Own presentation based on the sources in the first column.

Author	1 shared car replaces…	Spatial context
&morgen	4 private cars	The Netherlands
Taxistop, cambio 2009, in MOMO Carsharing, pp. 77[1]	4.5 to 7.5 private cars	Brussels, Belgium
MOMO Car-Sharing, 2010, 79, 89	4 to 8 private cars	Great Britain, Switzerland
Mobility Services for Urban Sustainability [MOSES], 2005, p. 22 in Baptista et al., 2014, p. 30	7 to 10 private cars, 4 to 6 private cars	Belgium, Germany
Iacobucci et al., 2018, pp. 156–157 about AEVs	7 to 10 private cars	Tokyo, Japan
Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Kessler, S., Möser, G., 2018, 6, 12, 37	7 to 16 private cars	Bremen, Germany
Greenblatt & Shaheen, 2015, p. 78; Martin, E. W. & Shaheen, S. A., 2011	9 to 13 private cars	USA
Myers & Cairns, 2009, p. 24	14 to 22 private cars	Great Britain
Lane, 2005, p. 166	23 private cars	Philadelphia, USA

There are many authors who have researched the impact of carsharing on private car ownership as well as on the CO2 emissions of the transport sector (Martin, E. W. & Shaheen, S. A., 2011; Namazu & Dowlatabadi, 2018). Some of the numbers displayed above count as well the cars that were not bought because of the people using carsharing (Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Kessler, S., Möser, G., 2018, p. 6). For example in Bremen, seven of the 16 vehicles were no longer owned and nine vehicles were not purchased (Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Kessler, S., Möser, G., 2018, p. 6). Namazu and Dowlatabadi (2018, p. 49) found out that only station-based carsharing system replace private vehicles, while free-floating system are seen as an additional mobility option by the users. Other authors show on the other side that free-floating systems can also reduce the car ownership, but at lower rates (Giesel & Nobis, 2016, p. 215). Additionally, it is increasingly researched in how far

[1] The source used in Momo Car-Sharing could not be found. It is therefore questionable whether the information provided by this source is reliable.

carsharing reduced the vehicle miles / kilometers travelled (Baptista et al., 2014, p. 30; Lane, 2005; Martin, E. W. & Shaheen, S. A., 2011, p. 1075). As for the results available until now, the VMT / VKT seem to decrease, although the numbers are sometimes varying (Lane, 2005, 158, 165-166). Moreover, it is argued by several authors, that a shift towards more sustainable mobility with carsharing will only happen, if the shared cars become more and more sustainable themselves, by shifting to hybrid or electric cars (Baptista et al., 2014, pp. 34–35). It has to be noted that the average carsharing users is relatively young and well-educated, while owning less private cars than the average (Martin, E. W. & Shaheen, S. A., 2011, p. 1077; MOMO Car-Sharing, 2010, p. 84). This implies that carsharing customers self-select the mode of transportation, as it is embedded in their lifestyle choices. This is important, as it explains the different ratios as well as carsharing models functioning in some places and in others not. Apart from that, it was found out that the average number of vehicle per household was 0.55 for the respondents before using carsharing, and it was reduced to 0.29 vehicle per household (Clewlow, 2016, p. 159; Martin et al., 2010; Martin, E. & Shaheen, S., 2011).

In the research, sometimes the ratio is displayed of how many customers make use of one shared car. In the different countries and projects, the numbers varied significantly, accounting for ratios between 65 (Austria), 59 (Finland), 44 (Great Britain), 30 (Sweden), 22 (Denmark) to 15 (the Netherlands) (MOMO Car-Sharing, 2010, p. 91). These numbers can also be used as a basis for defining how many shared cars will be needed at the neighborhood hubs.

The average of the collected ratios in table 1 is 8 to 12. However, the studies from the table done specifically in the European context more equally show a ratio between 1 to 7.3 and 1 to 12.7. Therefore, although it is based on different results, it can be expected that each shared car replaces on average between 7.3 and 12.7 private cars in Europe and in the Netherlands.

Bicycles (and other lighter vehicles)

Although the Netherlands is a country of bike-owners, there is nevertheless demand for shared bicycles (Hendriks, 2016, p. 12). Sharing a bicycle can have all kinds of functions, such as picking up a shared bike at a station and cycling the last part of a journey, or not having to take ones' bike for example in the train (Zessen & van P. C., 2017, p. 6). Moreover, the sharing of electric bicycles is especially interesting to residents who want to ride wider distances in a more sustainable way than car driving, but who are hesitant to buy an e-bike themselves, as well as for groups of people who are physically not able to use a normal bike (Expert 11, 2020, p. 4; van Heijningen, 2016, p. 5; Zessen & van P. C., 2017, p. 24). Also, shared bicycles can provide a wider variety of bicycles, such as cargo bikes, or mountain bikes, that the residents might otherwise have no access to (Zessen & van P. C., 2017, p. 6). It is argued by Zessen and van P. C. (2017, p. 6), that if the bike sharing possibilities become more flexible than the OV-fiets, there will be more interest in using shared bicycles for all kinds of purposes.

It has to be noted here that both on the topic of the cars as well as on the bicycles, there exists the problem of balancing the offered vehicles after the usage. It might be that one hub is mainly used as a destination, and one rather as a starting point by many residents, and therefore the shared vehicles need to be redistributed to serve the demand at the origin spots. There are models applied to calculate the best spots to put the most vehicles, and how many vehicles are needed in the whole system and how many should be put at the specific locations (Melkikh & Sutormina, 2011; Nair & Miller-Hooks, 2011, 2016; Raviv & Kolka, 2013; Zuo et al., 2020). However, it is beyond the scope of this research to include these calculations. It is expected that if the neighborhood hubs are implemented in the city of Zwolle, that the provider of the shared vehicles will test and adjust the amount of vehicles needed, based on the preliminary business case seen in it and afterwards on the results from the first pilots.

Based on policy documents and results of recent collection of information by municipalities, it is tried to get a better picture of how many shared bicycles might be needed at a neighborhood hub. According to national data, there are on average 1.3 bicycles per person in the Netherlands (Fietsersbond, no year).

In cities such as Amsterdam, which is famous for its' high number of bicycles, there are on average 1.91 bicycles for every household (Gemeente Amsterdam, 2017, p. 10). The proportion of shared bicycles in relation to private bicycles is today still relatively low (Gemeente Amsterdam, 2017, p. 40). Therefore, it is not counted with exchange rates, but rather with rates that represent the status of the shared bicycle of being an additional way of movement. The ratio of 1.3 bicycles per person or 1.91 per household can therefore not directly be taken to calculate the number of shared vehicles needed, as it is visible from different policy documents, that the reasons of people using the shared bicycles are very varied, including aspects such as touristic activities, commuter traffic and other things. Moreover, it is visible that the people mostly also have a personal bike, but choose to use the shared bikes on special occasions, such as one-way trips (Alfen, 2020, p. 2).

Appendix 3: Description of the potential indicators for the selection of a location for a neighborhood hub

In this Appendix, the 10 potential indicators that were derived from literature are described and discussed in detail. The summary of this Appendix can be found in chapter 2.3.

For each of the indicators, it is discussed based on the literature review what is meant with the aspect, why it is important for the functioning of a neighborhood hub, in what way it can be useful for the hub and how important it is for a hub. Especially in the section on in what way the indicator can be useful to the hub, it is not always clear from the literature what would be the most beneficial for the hub. These aspects were therefore discussed with the experts and the results about this can be found in chapter 4.2.

(Social) Amenities

What does it mean?

Social amenities describe all types of services that inhabitants of an area need on a regular or irregular basis and that have potential to increase the social cohesion (Gieling et al., 2019, p. 66; Moussa, 2011, p. 14). Potential amenities are (grocery) stores, pharmacies, cafés / restaurants, package drop-off, fitness, meeting / conference rooms, community centers, other recreative functions, daycare, elderly care, schools and cultural functions such as a cinema, a church, theatre or a concert building (Flap & Völker, 2004, 43, 48-49; Gieling et al., 2019, p. 66; Iseki et al., 2007, p. 13; Litman, 2020, p. 30; Moussa, 2011, p. 15). The literature reviewed on this topic is partly based on TOD literature. Using Litman (2020, p. 30) as an example, it is shown that the existence of commonly used services in the surrounding area of a TOD is common in TOD literature and thus can be understood as being beneficial to smaller nodes in the network as well.

Why is it important for a hub?

The existence of (social) amenities in a neighborhood is described as having a positive influence on the social climate, the social inclusion among different age and ethnic groups, the connection among the inhabitants of the neighborhood due to the possibilities for spontaneous interactions they create, as well as on the livability of a neighborhood and the feeling of security (Ball & van der Kooij, 2004, 6, 7; Blijham, 2009, p. 71; Flap & Völker, 2004, 53, 56; Gehl & Koch, 2006, 13, 23; Gemeente Zwolle, 2008, p. 36; Kaal, 2011, 534, 537; Oldenburg, 1991, 72, 80, 83; Scholte, 2006, p. 15).

The effect of an amenity on the social climate is dependent on the type of amenity; amenities that involve more social contact and joint activities generally have more effect than those which do involve individual activities (Ball & van der Kooij, 2004, p. 5; Flap & Völker, 2004, p. 56; Gieling et al., 2019, p. 70). The amenities listed above can be categorized according to their space usage, their frequency of usage (e.g. daily, weekly, monthly) and their duration and intimacy of usage (Blijham, 2009, p. 57). Bovenhoff and Meier (2015, p. 6) discuss that especially sport facilities, libraries and community centers are important for the social interaction and participation of inhabitants, while Flap and Völker (2004, p. 56) argue that restaurants and recreational amenities are especially important for the development of a community feeling in the neighborhood. However, there are also authors who did not find a positive correlation between the existence of amenities and the social cohesion, which leads them to question the necessity of amenities in their function of a social infrastructure (Bovenhoff & Meier, 2015, p. 19; Steenbekkers & Vermeij, 2013). Gieling et al. (2019, p. 66) conclude that for rural areas, cafes and restaurants do matter for the social attachment of residents, while community centers, primary schools and sports facilities do not enhance social place attachment.

In what way can it be useful to the hub?

In the current conceptualizations of hubs, the idea of adding new social functions that are missing at the points where the mobility hubs will be placed is very common. Moreover, it is argued, that more existing amenities in the surrounding area of a central point or hub can have a significant influence on the usability of the places (Blijham, 2009, p. 71; Litman, 2020, p. 30). Thus, those amenities can be additionally placed at the hub, which are missing in the urban structure, but it is also important to look at the already existing amenities in the neighborhood. On the topic of this, it can be argued that it is useful to place a neighborhood hub where there are already a lot of amenities, because these places are already visited by the residents, and it increases the usability of the hub additionally (Flap & Völker, 2004, p. 43; Gemeente Nijmegen, 2019, p. 44). On the other hand, it can be argued that a hub might have more impact if it is placed in a part of the neighborhood where there are little existing amenities, because it can then supply this part of the neighborhood with amenities. Which of these two directions is chosen for in the case study must be decided on the basis of the expert interviews.

How important is it for a hub?

It is moreover important to understand how important the indicator amenities is for the neighborhood hub from the users perspective. In the research of Iseki et al. (2007, p. 47), amenities are placed at fifth place of five aspects in the importance ranking for transit stops and stations in the American context, showing that the respondents did not generally consider amenities as important as other attributes at transit stops and stations. In the Dutch planning policy on the other hand, the allocation of amenities seems to play an important role in improving the supply of inhabitants as well as the social inclusion (Gemeente Amsterdam, pp. 39–43; Gemeente Nijmegen, 2019, 24, 28, 44; Gemeente Zwolle, 2017, p. 22). In the Structuurplan of the municipality of Zwolle for example, amenities are seen as the "social cement" of the city and the neighborhoods, which can support the living environment in the neighborhoods as well as the regional function in the areas of education, care and culture (Gemeente Zwolle, 2008, p. 34).

Mixed use

What does it mean?

Mixed use development describes a type of urban planning that blends residential, commercial, cultural, institutional or entertainment uses into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian and cycling connections (Atlanta Regional Commission, 2011, p. 2; Huang & Wey, 2019, p. 4; Raman & Roy, 2019, p. 104102; Thrall, 2002, p. 216). In contrast to monofunctional residential areas, mixed use areas are typically densely built and inhabited and provide the inhabitants with access to a lot of different functions in short distances (Raman & Roy, 2019, p. 104102). Mixed use areas can currently most often be found in city centers, where all the above-mentioned functions come together in an area. Mixed use is often included as an indicator for measuring the walkability, pedestrian or cyclist friendliness of an area, as more functions are understood to increase the attractiveness of an area (Gehl & Koch, 2006, 13, 23; Martinez & Rakha, 2017, p. 7; Monteiro & Campos, 2012, pp. 639–640). In TOD, the placement of different functions in a dense area is supposed to support the development of the area to a node within the urban or regional framework (Litman, 2020, p. 30; Loo & Du Verle, 2017, 58, 65). Mixed use development is thus closely connected to the amenities discussed before, as these form a part of the uses that can be analyzed (Litman, 2020, p. 30). Moreover, mixed use is closely connected to the density of the area in question; typically, the more dense the area is, the more uses can be found in it (Litman, 2020, p. 16).

Why is it important for a hub?

Similar to the amenities, an existing mix of functions in the surrounding area of a potential location for a hub can have significant benefits for the suitability of the location. Mixed use areas attract a lot of

different groups of people, as these want to make use of the different functions, easily visible for example in inner city areas. For the users, a mixed use area has increased accessibility to functions, because a lot of different functions are clustered in a small areal, increasing the possibilities for usage (Hine & Grieco, 2003; Litman, 2019, 2, 5, 11, 2020, p. 16; Monteiro & Campos, 2012, p. 643). Moreover, transport options can be improved by shorter distances between different uses, especially walking or cycling (Ball & van der Kooij, 2004, p. 4; Litman, 2020, p. 16).

In what way can it be useful to a hub?

It can be argued that a hub should be placed in an already existing mixed-use area, as the reputation and the existing use of the area might influence more inhabitants of the neighborhood to make use of the hub. The hub could therefore be placed in close proximity to existing highly mixed-use areas.

On the other hand, it can be argued that the positive effects a hub can have on its surrounding area should be used to bring more mix of functions into a part of the neighborhood that is lacking it. The hub would attract people on a daily basis, which would increase the interest in the specific area surrounding the hub and potentially lead to investments into that part of the neighborhood (Bartholomew & Ewing, 2011; Bowes & Ihlanfeldt, 2001; Carpentieri, 2019, p. 316; Yu et al., 2018, p. 1391).

How important is it for the hub?

The indicator mixed use or diversity of uses is measured in a lot of ways and is included in almost every analysis concerning TOD, walkability, attractiveness of an area (Litman, 2020, p. 30) and is part of the seven D's of Cervero that form the most important influence factors on these types of developments (Ewing & Cervero, 2010, p. 267). It is a tool nowadays commonly used in urban planning practice, as it provides a good picture of the nature of the place (Atlanta Regional Commission, 2011; Raman & Roy, 2019; Rowley, 1996). Concluding from this, it can be said that the indicator is probably of high importance for the selection of a suitable location of a neighborhood hub.

Spatial Density

What does it mean?

Density is defined as the quantity of something per unit measure, especially per unit length, area or volume (Merriam-Webster, 2020). Spatial density in the context of spatial planning is referred to as the quantity of buildings within a certain measuring area (Ewing, 1996, p. 5; Ewing & Cervero, 2010, p. 266).

Why is it important for a hub?

A high density in a part of a neighborhood can have different potentials for the hub: a high density of buildings almost always implies a high density of inhabitants. If there are more inhabitants living within the specific accessibility area of the neighborhood hub, then there are more potential users for the hub. The hub has thus a higher potential to be functioning, both in economic terms (e.g. by agglomeration effects of clustering) and in terms of serving the demand of the users (Levingson & Wynn, 1963; Litman, 2020, p. 19). Another argument is that due to the higher density, more uses are situated within proximity of the users, meaning that besides the hub there are more other functions available to the users than in a less dense area (Monteiro & Campos, 2012, p. 643; Noland & DiPetrillo, 2015, p. 43). According to Monteiro and Campos (2012, p. 643), "higher residential and employment buildings density, in a particular region, especially near the stations of public transportation, favors the inclination of people to reach their final destinations or to the transport stations either by foot or bicycle". This shows that a higher density might increase the interest of the inhabitants in making use of the mobility services the hub offers.

It has to be noted however, that the relationship between density and accessibility is a difficult one; increased density and the described effects can lead to more automobile traffic, which can on the long run reduce accessibility (Litman, 2020, p. 19). As on the other hand, other modes of transport, such as cycling and walking, do not require as much space as cars, and are provided with more opportunities in a denser area, higher density for a neighborhood hub can have significant benefits for the functioning of the hub. The importance of higher densities for the reduction of car ownership and usage has been established for a long time already; as Voet (1995, p. 30) argues, the reasons for this are the shorter travel distances due to the proximity of offices and amenities, the wider availability of public transport as well as congestion and parking problems, that make car usage and ownership less attractive.

In what way can it be useful to a hub?

In favor of choosing already dense areas as the locations of neighborhood hubs is the discussion of the benefits it might have from above. Moreover, in already very dense areas, the space for parking cars is the most scarce, which implies that these areas are the most suitable for vehicle sharing services, and that these services can have big effects in these areas (Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Kessler, S., Möser, G., 2018, pp. 4–5).

On the other hand, already very dense areas make it difficult to include additional functions and buildings into the area (Schreier, H., Grimm, C., Kurz, U., Schwieger, B., Kessler, S., Möser, G., 2018, p. 5). Also, it can be argued that it should be chosen for the less dense areas in order to develop these towards more density. In the course of the ongoing urbanization in the Netherlands, the efficient use of space is highly important (Goudappel Coffeng, 2019, p. 4; Government of the Netherlands, 2019, 106, 113, 115). Moreover, less dense areas might be as well the slightly neglected areas of the neighborhood, whose quality could be improved by placing the neighborhood hubs in these areas.

How important is it for the hub?

The physical density of an area is named as one of the 7 D's of Cervero and is also included in most of the analyses about TOD and it is a widely applied measure in spatial planning practice (Cervero & Kockelman, 1997, p. 201; Coolbaugh, 2016, p. 41; Huang & Wey, 2019, p. 4; Litman, 2020, p. 30; Noland & DiPetrillo, 2015, p. 22). In Green TOD planning, higher densities are applied "to make TOD stations recover their original effectiveness in order to increase the usage and passenger loading rate" (Huang & Wey, 2019, p. 4). Increased density is specifically used to develop nodes in neighborhoods or at strategic places, not only to steer the development of that area, but also to increase the attractiveness of it. The indicator physical density can therefore be considered to be highly important for the selection of a location for a neighborhood hub.

Demographic factors

What does it mean?

Demographics is defined as the "study of a population based on factors such as age, race, and sex" (Chappelow, 2019). Demographic data refers to "socio-economic information expressed statistically, also including employment, education, income, marriage rates, birth and death rates and more factors" (Chappelow, 2019). Demographic information is used to understand the structure of a group of people, such as the inhabitants of a city, and for the development of policies (Cervero & Kockelman, 1997, p. 203). Demographic information displays a lot about the composition, wishes and needs, openness to change, the tendencies towards specific modes of transportation and a lot of other aspects in the life of the inhabitants of a neighborhood, city, region or country.

Why is it important for a hub?

Demographic information about the inhabitants of a neighborhood can provide the researcher with a good picture of who the people are on an aggregated level. Taking into account demographic factors

while choosing a location for a neighborhood hub can have several important advantages: First, knowledge about the socio-economic structure can support the researcher or provider both in choosing a location that is fitting for the needs and wishes of the inhabitants and in choosing the amenities that are provided at the hub (Gemeente Amsterdam, pp. 39–43; Gemeente Nijmegen, 2019, p. 24; Provincie Noord-Brabant, 2018). If there are a lot of families living in the neighborhood in question, the placement of an additional daycare at the hub might be an improvement. For the selection of a location, the knowledge about the socio-economic structure can help to decide which demographic groups need to have the closest access to the hub and close to which of these groups the hub should therefore be located (Provincie Groningen en Drenthe, 2020b). Moreover, if demographic factors would not be taken into account, the providers of the hub might run the risk of installing a hub that is not used by the inhabitants, because it does not provide the functions that are needed.

In what way can it be useful to a hub?

Demographic information can for example be used to establish certain representative types, "persons", that represent the different groups of people living in the neighborhood, divided according to distinctive factors, such as age, income, number of people in the household and number of children (Cervero & Kockelman, 1997, p. 203; Fulda & Nimal, 2014, p. 30). On the basis of theses persons and their needs, the necessity and willingness to use a hub can be taken into account. It could then for example be decided to select locations for the neighborhood hubs in proximity to areas where people with less income live, in order to provide them with affordable means of transportation.

How important is it for the hub?

Demographic information is taken into account in all planning of municipalities and generally in spatial planning (Cervero & Kockelman, 1997, p. 201; Gemeente Leiden, 2019, p. 8; Gemeente Nijmegen, 2019, p. 24; Gemeente Zwolle, 2020k, pp. 22–23). They are very important factors that are taken into account almost for every development, because they provide information about the future users of the development. Therefore, it can be argued that demographic factors might play an important role in selecting a location for a neighborhood hub.

Population Density

What does it mean?

Population density refers to the quantity of inhabitants living within a certain measuring area (CBS, 2016, pp. 28–29; Engel-Yan & Passmore, 2013, p. 88). The indicator is typically taken into account in combination with other demographic factors when analyzing the structure and composition of an area (Cervero & Kockelman, 1997, p. 203).

Why is it important for a hub?

Similar to the physical density, which has a great influence on the population density, population density displays the amount of people that are within the range of a certain area (Noland & DiPetrillo, 2015, p. 43). The more densely populated an area is, the more people can reach the amenity or hub within the same time. Densely populated areas therefore attract a lot of investment and amenities (Bartholomew & Ewing, 2011; Hong Kong Planning Department, 2016, p. 10). The higher the spatial density is, the higher is typically also the population density, as more people can live in multi-story apartments that in single-family houses (CBS, 2016, pp. 28–29). Similar to the physical density, this is said to reduce the attractiveness of car driving and increase the attractiveness of other modes of transportation, such as walking and cycling (Monteiro & Campos, 2012, p. 643). According to Noland and DiPetrillo (2015, p. 44), there is however no statistical significance of a relation between population density and the usage of the three modes of transportation of walking, Public Transport and the car.

In what way can it be useful to a hub?

Generally, a higher population density is considered to be beneficial for the development of a neighborhood hub. As has been discussed before, this increases the amount of people within reach and therefore increases the usability for the inhabitants (Aono, 2019, p. 8).

On the other hand, it could be argued that the hub should be placed in a part of the neighborhood where the density is low, in order to increase the density with the possibly following attraction effects of the hub. However, this could also lead to a low and insufficient use of the hub, which could endanger the economic feasibility of the hub.

How important is it for the hub?

Density forms one of the 7 D's of Cervero's most important factors influencing the livability and usability of an area (Cervero & Kockelman, 1997; Ewing & Cervero, 2010). Therefore, also the population density is of high importance for the selection of a neighborhood hub. In the two case neighborhoods chosen here, the population and spatial density is however already very high in comparison with the rest of the city; Kamperpoort and Assendorp are closely connected to the inner city, which is also very dense. The two case areas were not least chosen because of their high density and position towards the city center and generally, a high density can be expected in each of areas of the neighborhoods (compare to chapter 4.2). It is however the question whether the density within the area should be nevertheless analyzed, in order to select either even more dense areas, or to select the rather less dense areas of the neighborhood.

Public Transport stops

What does it mean?

Public transport stops are smaller and larger cabins or buildings, which are situated alongside the route of a public transport line and which function typically as waiting and information places for the users of public transport (Urban Design Studio, 2016, p. 5). The accessibility of a neighborhood is determined not least by the presence of public transport stops. In TOD planning, public transport stops form the starting point of the development (Coolbaugh, 2016, p. 41; Shiravi et al., 2014). In the developments of neighborhood hubs until now, public transport stops have also played an important role in selecting the location of the future hub; often, an already existing public transport hub has been extended towards a neighborhood or area hub (Aono, 2019, p. 8; Provincie Groningen en Drenthe, 2020a; Provincie Noord-Brabant, 2018; Shared-use Mobility Center, no year, p. 2).

Why is it important for a hub?

Public transport stops in close proximity to potential location of a neighborhood hub can have several benefits for the hub and the surrounding area. First, the hub is more accessible by more modes of transport due to this (Urban Design Studio, 2016, p. 5). If there is a well-serviced public transport stop in close proximity or even at the neighborhood hub, it is easier for the users of both to also make use of the other facilities in place (Monteiro & Campos, 2012, p. 640). The combination of public transport stops and neighborhood hubs can thus increase the access of the inhabitants to more modes of transport as well as facilities (Urban Design Studio, 2016, 34-38, 40-44). Moreover, it has been shown that the closer people live to a public transport stop, the more often they walk and use public transportation, while less often using the car (Noland & DiPetrillo, 2015, p. 43). This might increase the acceptance rate for the neighborhood hub as well as making it easier to include it in the already existing pattern of walking routes.

In what way can it be useful to a hub?

The question is whether it is more useful for the functioning of the neighborhood hub, if there are public transport stops in close proximity (e.g. within 100 meters) to it, or whether it is the other way around.

Moreover, the question is whether a higher density of public transport stops in the surrounding of the hub is more useful than a lower density of stops. It can be expected that it is rather chosen for close proximity of transport stops to the hub. On the one hand, it can be said that the effectiveness of the neighborhood hub is increased if it is connected to or located in proximity to a public transport stop. The public transport stop adds another mode of transport to the offer of the neighborhood hub and increases its' connectivity (Litman, 2020, p. 33). On the other hand, it could be argued that the neighborhood hubs should be placed where there is until now a scarce coverage of public transport, because it could provide an alternative means of transportation.

How important is it for the hub?

It is questionable how important public transport stops are for the functioning of neighborhood hubs. Although they form the starting point and centers of TOD developments, the neighborhood hubs as conceptualized in this research are supposed to provide additional types of mobility, mainly in the sharing of vehicles. Whether these neighborhood hubs should rather be connected with public transport stops or not can only be decided on the basis on the expert opinions.

Real Estate prices

What does it mean?

Real estate is defined as an area of land along with any permanent improvements attached to the land, whether natural or man-made, such as water, trees, minerals, buildings, homes, fences, and bridges (Chen, 2020). Real estate prices refer to the price of real estate at a certain location and time (Sanders, 2018, p. 206; Study.com, no year). Real estate prices are used as an indicator to measure the ongoing developments and current status of a certain location (Otto & Schmid, 2018). They are taken into account when analyzing the major changes happening within a city, such as suburbanization, gentrification and redevelopment of neighborhoods (Hackworth, 2001; Revington, 2015; Vidal, 2019, p. 157). Real estate prices depend on the mechanisms of supply and demand of the real estate market, which is influenced by the interest of buyers in the area and the amount of assets to buy in the area (Evans, 2004, p. 8). There is a whole range of factors that can have an influence on the prices at a certain location, but they can be distinguished into the categories physical, environmental and accessibility factors (Bowes & Ihlanfeldt, 2001, p. 21; Debrezion et al., 2007, p. 162; Fujita, 1989). In very basic terms, real estate prices are determined in the following way: "as a location becomes more attractive, due to certain characteristics, demand increases and thus the bidding process pushes prices up" (Debrezion et al., 2007, p. 163). Moreover, access to amenities is an attractive quality of land and therefore increases property prices (Bartholomew & Ewing, 2011, p. 18; Debrezion et al., 2007, p. 163). Moreover, access to transit stations also typically increases the price of land and the effect decays with increasing distance to the station (Debrezion et al., 2007, p. 163).

Why is it important for a hub?

As discussed above, the real estate prices of an area can indicate, whether there are major changes going on and which areas are of the highest interest to investors and developers. As neighborhood hubs have the potential to change the way people move and make use of facilities in their city, they might themselves have an influence on the real estate prices (Stribling, 2007, p. 66). Moreover, the development of neighborhood hubs can be influenced by the real estate prices. It has been shown that property close to rail stations generally sells at a modest premium (Duncan, 2011, p. 101). According to Duncan (2011), the combination with a pedestrian-oriented environment can increase the prices for property (Duncan, 2011, p. 121).

According to Debrezion et al. (2007), the results on the effects of railway stations on property are mixed; the authors found out that the effect on commercial property is the highest in close proximity to the stations (Debrezion et al., 2007, p. 177). Commercial properties within the range of a quarter of a mile

are 16,4 % more expensive than outside of the range (Debrezion et al., 2007, p. 177). Also, there is an effect on the value of residential property, although this is less sharp. It however dominates at longer distances and decays with distance to the station (Debrezion et al., 2007, p. 177). Other authors verify the positive effect, the proximity to a station has on the land value (Carpentieri, 2019, p. 316; Damm, 1980, p. 331; Grass, 1992, p. 143; Kay et al., 2014, p. 131; Yu et al., 2018, p. 1375). However, as Hess and Almeida (2007, p. 1058) note, there seems to be a positive impact on the land value in high-income areas and a negative effect in low-income areas. These aspects are cautiously taken into account, keeping in mind that they are focusing on the effects of TOD and rail stations, not neighborhood hubs.

In what way can it be useful to a hub?

The question for the real estate prices is, whether it is better for the hub if the prices are high in the surrounding of the potential location or whether they are low. There are arguments for both decisions. High prices in the surrounding of the location for the neighborhood hub could indicate that it is an area where a lot of development is happening, which is changing and adapting to the people living in it. High prices can indicate that the area is of high interest and importance within the neighborhood, which could increase the attractiveness of the neighborhood hub and also draw more users to it (Debrezion et al., 2007, p. 163). Moreover, high land value in urban areas is associated with more intensive use of land (Evans, 2004, p. 7). High prices could moreover increase the interest of companies in renting store space in the hub, as the area is of high interest to users and the company hopes to earn more money at this location (Evans, 2004, 8, 78). However, high real estate prices might also increases the costs of using the amenities of the hub, because the renting or buying investment has to be paid back (Venner & Ecola, 2007, pp. 17–18). Accordingly, low real estate prices in the surrounding could make it easier to financially implement the neighborhood hub.

How important is it for the hub?

It is also the question, how important the decision for high or low real estate prices is for the functioning of the neighborhood hub. The prices might have an influence on the implementation of the hub, which is why they might be important, but for the functioning of the hub in the urban fabric and for the usability of the hub, the real estate prices might be neglectable.

Proximity to new residential housing

What does it mean?

Areas that have been built within the last years or are being built currently are understood as new residential housing areas. In Dutch cities, development projects are currently often planned in old (industrial) areas, or in other areas which are not used for their original uses anymore. According to Davidson and Lees (2005, p. 1170), this is a major form of contemporary gentrification, happening as well in most of Europe. Typically, the development is happening in very dense patterns, often connected with an attractive surrounding area, walking routes and green and water (Gemeente Amsterdam; Gemeente Rotterdam, 2020; Gemeente Zwolle, 2020k). New residential housing adds a different type of houses to a neighborhood, as well as new inhabitants (Gemeente Zwolle, 2020k, p. 12). Residential housing development is normally done by an investor in cooperation with the municipality or a combined public private partnership, developing a wider area of housing units instead of single houses (Roodbol-Mekkes et al., 2012, p. 383; van Boxmeer & van Beckhoven, 2005, pp. 1–2).

Why is it important for a hub?

The construction of new residential housing can have a significant impact on the structure, the social and demographic composition of inhabitant groups within the neighborhood (Vidal, 2019, p. 159). With new houses, new residents come into the neighborhood, who might have different demands and wishes for amenities, the social climate, activities in the neighborhood or their relationship to their neighbors (Lee, 2015; Stevenson et al., 2019, pp. 413–414). Moreover, the (re)development of a part of a

neighborhood always bears the chance of adding new structures and for example lacking amenities to the neighborhood (Boschman et al., 2013, p. 234; Gemeente Zwolle, 2020k, 33, 89). Because of this, the construction of new residential housing might be an important factor for the selection of a location for a hub, especially in already very dense areas.

In what way can it be useful to a hub?

The question is whether it is more useful for the neighborhood hub if the potential locations are situated in close proximity to newly constructed or to be constructed areas of the neighborhood, or not. Proximity to new residential housing can have several benefits for the neighborhood hub: First, the (re)building process of the part of the neighborhood makes it easier to locate the neighborhood hub at a place that is fitting and that provides enough space and connections to the specific networks (e.g. energy) (Gemeente Zwolle, 2020k, p. 89). Since the hub can be taken along in the planning, it is easier to integrate it into the new pattern of the area. Moreover, the construction in a rebuilt or newly build part of the neighborhood provides the possibility to attract a type of inhabitants, who are interested in making use of the neighborhood hub (Iyer et al., 2005). A disadvantage of a location in proximity to new residential housing is that the existing residential housing might not be serviced sufficiently by the hub, or that the amenities are adjusted to the needs of the new inhabitants, while neglecting those of the residing inhabitants ("commercial gentrification") (Cheshire, 2014, p. 23; Vidal, 2019, p. 159).

How important is it for the hub?

The indicator is rarely mentioned as a decisive factor in hub projects and in the literature, but the construction of new partly residential and partly office buildings plays a major role in TOD (City of Burlington, 2014, p. 18; Ewing & Cervero, 2010; Huang & Wey, 2019; Stribling, 2007). For neighborhood hubs it is not indicated that hubs were developed because of already existing new residential housing or because of to be constructed housing. On the other hand, it is visible that hubs are more often developed and planned in areas that are going to be rebuild in the coming years (BUUR, 2019, p. 105; City of Burlington, 2014, p. 18; Gemeente Amsterdam; Provincie Groningen en Drenthe, 2020c). Concluding from that, it can be said that hubs might be easier to implement in the course of already ongoing development of an area and that they might be strategically applied to revalue and enhance their surrounding. Due to this, it might be that the potential indicator is not that important in comparison with other aspects, but it seems to play a role in the selection of a location for a neighborhood hub.

Proximity to Heat stress

What does it mean?

Heat stress is described as the negative effects on human health and social life at high temperatures (Hatvani-Kovacs et al., 2016, p. 278; Hendel et al., 2017, p. 823). It is a phenomenon typically occurring in urban areas, where the solidification of the pavement and the houses increases the temperatures at ground level. The stones on the ground as well as the house facades reflect the sun rays and the air above the ground is heated (Government of the Netherlands, 2020). The phenomenon is further amplified by the urban heat island effect, which is the result of the small scale heating of air, that cannot escape from the urban area, and therefore the temperature within the urban area is higher than in the surrounding rural area (Li & Bou-Zeid, 2013, p. 2060; Wouters et al., 2017, p. 9003). Uncomfortable and even dangerous degrees can endanger the inhabitants of the neighborhood, especially older people, as well as the local animals and plants (Gabriel & Endlicher, 2011; Government of the Netherlands, 2020; Hatvani-Kovacs et al., 2016, p. 286; Heaton et al., 2014, p. 31; T. N.O., no year; Zipper et al., 2016). Especially densely build neighborhoods with a lot of pavement and stone are vulnerable to heat stress (Frank et al., 2005, 167, 175). The local temperature and therefore the existence of heat stress on hot days is determined by different factors of the built environment: the solidification of the ground, the openness

of an area, as well as the form of the buildings are important (Gehl & Koch, 2006, pp. 174–178; Government of the Netherlands, 2020).

Why is it important for a hub?

Heat stress can occur because of different reasons, but in present cities, it mostly occurs because of too much pavement due to parking and too little green areas, which could have a cooling effect on the surrounding or street (Ministerie van Infrastructuur en Milieu, 2020, p. 8). O'Brien et al. (2019) found out, that on average "walkable" neighborhoods have higher temperatures during a heat wave than car-dependent neighborhoods (which is mostly due to the more compact urban structure). Therefore, the author argues, that walkable neighborhoods can only have a positive effect, if measures are taken to reduce the "heat penalty" of densification (O'Brien et al., 2019, p. 432). Certain measures can be taken, such as changes on the built environment, changes on the facades or the pavement, or adding more green and water into the street (Lee & Mayer, 2018; Santamouris, 2013; Zuo et al., 2015, pp. 8–9). Green areas have a cooling effect on the surrounding area, as the trees serve as a canopy for the space beneath them (Akbari et al., 2001, p. 296; Hendel et al., 2017, p. 823; Zuo et al., 2015, p. 5).

In what way can it be useful to a hub?

Choosing a location close to streets suffering from heat stress for a neighborhood hub opens up the possibility of reducing the parking space in the streets with heat stress. If the inhabitants of the area can make use of the neighborhood hub, the necessity of a private car might be reduced, or the private is parked at the neighborhood hub making it possible to break up the solidification and include more green areas and water in the streets (Gemeente Zwolle, 2017, p. 70; MOMO Car-Sharing, 2010, p. 89). As a radius, the same distance as the walking distance to a neighborhood hub is proposed; around 250 meters in a radius can be taken into account when determining whether the potential surrounding of the hub does suffer from heat stress. The existence of a neighborhood hub can therefore be interpreted in this research as a reducing factor for heat stress, if the corresponding measures are taken.

On the other hand, it could be argued, that the additional building and infrastructure the hub needs for functioning is an additional stressor for the respective street, and that locations for hubs should therefore be chosen in relative distance to heat stress.

How important is it for the hub?

It is not completely clear from the literature, how important the proximity to heat stress is for the selection of a location for a neighborhood hub. The indicator is not among the typical indicators for TOD, and it is also not included in analyses about neighborhood hubs or hubs in general, because it is typically dealt with separately (Gemeente Zwolle, 2017, p. 29). However, in the plans of cities in the Netherlands today, the topics of heat stress, flooding by heavy rainfall and other climate effects are taken into account when planning for a new area and trying to adjust an existing one (Gemeente Amsterdam, 64, 96; Gemeente Nijmegen, 2019, 24, 32; Gemeente Zwolle, 2017, p. 70; Government of the Netherlands, 2019, 19, 108-109, 113). Therefore, it is expected that heat stress might be relatively important for the selection of a location for a hub.

Proximity to Urban green spaces

What does it mean?

UGS are referred to as green public spaces of different sizes within urban areas. They can be everything from public parks, public lawns, urban forest or playgrounds for children (Gupta et al., 2016, p. 200; Talen & Anselin, 1998). UGS can be divided into hierarchical levels, distinguished based on function and size: pocket parks / residential green, neighborhood green, quarter green, district green, city green, urban forest / countryside (Gupta et al., 2016, p. 198; van Herzele & Wiedemann, 2003, p. 111). Moreover, each of the levels of the hierarchy has an accessibility area, which shows from how far people

are willing to walk to this level of UGS. There are different numbers in use, but for the residential level they typically range from 150 to 250 meter, for neighborhood level they range from 300 to 500 meter and for the quarter level from 400 to 800 meter (Gupta et al., 2016, p. 199; Oh & Jeong, 2007, p. 26; van Herzele & Wiedemann, 2003, p. 113). The different levels normally serve different functions (Gupta et al., 2016, p. 198); while the big city park serves the needs of a wide range of people and activities, smaller neighborhood parks or pocket parks serve the needs of the local inhabitants and children playing (van Herzele & Wiedemann, 2003, p. 111). For this research, the small parks are taken into account when measuring the proximity to UGS for a neighborhood hub. UGS on the way towards or back from the neighborhood hub can make the route more attractive and invite inhabitants to spend more time outside (Bertram & Rehdanz, 2015, p. 139; van Herzele & Wiedemann, 2003, p. 110).

Why is it important for a hub?

UGS can have several benefits for the inhabitants of a neighborhood or city: UGS can reduce the local temperature by shading the area, but they also form places where water can sink into the ground in comparison to the hardened surfaces in the surrounding (Bowler et al., 2010, pp. 152–153; Oliveira, 2014; Turner-Skoff & Cavender, 2019, p. 327). Moreover, UGS provide living space for plants and animals within the city, which improves the quality of the ecosystem (Xu et al., 2016, p. 94). They increase the social interaction between the inhabitants, as they provide space for meeting each other (La Rosa, 2014, p. 122; Macedo & Haddad, 2016, p. 1097). For the social, physical and cognitive development of children, UGS are of high importance, as they provide space for playing with other children and for time spent in nature (Amoly et al., 2014, p. 1355; Dadvand et al., 2015, p. 7939; Turner-Skoff & Cavender, 2019, p. 326). The existence of UGS is moreover connected to more physical activity, as well as cleaner air and therefore less health problems for the inhabitants, as well as less mental stress (Bertram & Rehdanz, 2015, 140, 149; Kaczynski & Henderson, 2007, pp. 342–344; Kaplan & Kaplan, 1989; Lee & Maheswaran, 2011, p. 213). The closer a person is residing to an UGS, the more often this person typically makes use of the green spaces and uses slower modes of transportation, such as walking and cycling (Neuvonen et al., 2007, pp. 242–244). This could increase the share of people making use of the neighborhood hub by active modes, because they are invited to use active modes of transportation by their surrounding already.

In what way can it be useful to a hub?

There are arguments for both placing hubs in proximity and in distance to UGS. In favor of proximity, one of the arguments is that the already green area might animate people to use active modes of transportation to and from the hub (Neuvonen et al., 2007, pp. 242–244). As the people are already using these modes of transportation more often, it might be easier for them to adapt their walking patterns to the neighborhood hub. Moreover, the attractiveness of the neighborhood hub might be higher, because it is already surrounded by a green area (van Herzele & Wiedemann, 2003, pp. 113–115). Because the UGS in the case study are expected to be relatively small, and in order for them to have an effect, it is proposed that "proximity" to UGS in this research is referred to as a distance of around 100 meters from the neighborhood hub.

On the other hand, it can be argued that because of the neighborhood hub, parking space can be reduced, which can lead to more space for green and water. Therefore, it might be more useful to place the hubs in parts of the neighborhood where there is little UGS. In terms of the equitable distribution of UGS, it might be more desirable to add the neighborhood hub in a part of the neighborhood that is suffering of green space shortage (Macedo & Haddad, 2016, p. 1097; Talen & Anselin, 1998, p. 597).

How important is it for the hub?

It can be said that proximity to UGS is not one of the first indicators that are taken into account when designing TOD projects or searching for a place for a neighborhood hub in recent research and policy documents. The topic of climate change adaptation of cities is however of high importance, and the reduction of hardened pavement and the addition of more green and water in cities play an important

role in this (Government of the Netherlands, 2019, 5, 24, 29). It can therefore be argued that the proximity to urban green spaces is of middle importance for the selection of a neighborhood hub.

Appendix 4: Literature Review Strategy

Literature Review

Goal of the review:

- Find preliminary indicators for the analysis, that will be discussed in the expert interviews
- Find potential GIS methods to analyse the indicators

Review question:

- Something you are trying to answer using the existing research literature.
- Review questions:
    - How are societal, mobility-related and energy-related functions represented by indicators in the public space in western cities?
        - Meaning: which indicators are there? What values do they assume? How do the values affect the behaviour of the inhabitants?
    - What are potential GIS tools / methods that can be applied to analyse the indicators?

How long does it need to be?

- It is part of a research project write-up; thus the information about your sources, your search strategy, your inclusion criteria, your literature flow, your data abstraction strategy, and how you went about appraising studies will not be described in detail in the text.
- Approx. between 10-15 pages
- Duration: 01.04.-05.05. (about a month)

Which sections does it need?

- Introduction
    - Definitions
    - Main Concepts in the literature
- Main part
    - Results (introduce the indicators you found (like in Agampatian)
- Conclusion

Review protocol:

- A research protocol is a list of all the sources you have looked at towards a single research goal.
- Every time you do a search, record the following information:
    - The date of the search
    - What you were looking for
    - What source you looked at
    - Where the source was located
    - The results of your search

Step 2: Choosing Databases and other sources of literature

Databases / Research portals I can use:

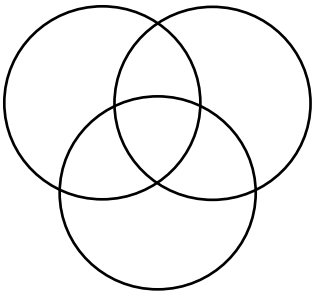
- RU Library
    - Access to all kinds of portals
    - Hardcover books
- ScienceDirect

- ResearchGate
- Google
- Google Scholar

Step 3: Developing Search strategies (Review Strategy)

Question 1: Indicators for analysis

- Venn diagram



Search terms

- Derive from Venn diagram
- Derive from theoretical framework / theories
- Functions
    - Indicators
    - Facilities
    - Amenities
    - Centralized
    - Clustered
    - Compact city
    - Connected city
    - New urbanism
    - Urban Form
    - Urban Design
    - Pedestrian environment
    - Physical structure
    - Urban typology
    - Urban morphology
    - Placemaking
    - Hubs
    - Hub selection (combine with indicators)
  - Societal
    - Green Urbanism
    - Liveability
  - Energy
    - Energy network
    - Energy transition
        - Green infrastructure
        - Low carbon city

- Mobility
  - Mobility network
  - Neighbourhood hubs
  - Mobility hubs
  - Transportation hubs
  - City hubs
  - Transit Oriented Development
    - Green TOD
    - Green infrastructure
  - Small scale hubs
  - Low level hubs
  - Intermodal mobility
  - Walkability
  - Walking routes
  - Sharing
    - Car, bike, everything?
  - MaaS
    - Bicycle car connection
  - First / last mile
  - Electric vehicle
- Public space in western cities
  - Public squares
  - Urban space
  - Public urban space
  - Built environment

- Nederlandse zoektermen
  - Voorzieningen
    - Centraliseren
    - Compact
    - Verbonden
  - Maatschappelijk
    - Voorzieningen
    -
  - Energie
    - Energienetwerk
    - Energietransitie
  - Mobiliteit
    - Knooppunten
    - Knopen
    - Hubs
    - Buurthubs
    - Kleinschalig mobiliteitsknooppunten
    - Looproutes
    - Ketenmobiliteit
  - Openbare ruimte
    - Publieke ruimte

Question 2: GIS tools

- Tools (how are they applied? Discussion of different tools for different goals)
    - Network analysis
    - Network analysis – an overview
    - How to conduct a network analysis
- Theories
    - Euclidian something
- Application (as close as possible to my question, or a discussion of different tools for different goals)
    - Applying network analysis in … Europe
    - In mobility (sector)
    - Measuring accessibility in … mobility
        - In neighbourhood
        - At neighbourhood level

Review strategy

- The search strategy aims to identify the center of the Venn diagram.

Table 2: Review strategy. Own presentation.

Phase	Time	Task – always document what you did!
Phase 1	05.-09.04.	Search for different combinations of the search terms in the different databases; search for literature reviews of the topics (use reference mining for finding more sources) and save the results in the Radboud Library lists (those that sound interesting from title, abstract and first glimpse = citation screening)
Phase 2	10.-15.04.	Use selection (inclusion and exclusion) criteria to go through the lists, read abstracts and decide whether this is useful or not (in Radboud Library, in Citavi and in favourites in Edge). Then download those that are useful to your computer and put into Citavi (or delete them from there if they are irrelevant).
Phase 3	15.-21.04.	Full-text publication screening by topic (not in full depth, but read part of intro, methods and results). During this comment on the papers in the note section and categorize them according to level (literature review, single paper), type of information (empirical data vs. opinion paper), methodological approach and as Includes, Excludes and Background (for Literature Review section).
		After completion of this, go through Includes category and sort out what is irrelevant.

Step 4: Deciding what literature to include

Selection criteria (Inclusion and exclusion criteria)

Conceptually, eligibility criteria should be understood as **"necessary information a publication needs to report**" to be of interest for the review, so the criteria describe the key variables that decide whether a study will be included or excluded from the review. Think through what would be the most informative publications that will help to answer your review question, and then formulate tight inclusion criteria.

- Type of interventions → **those that analyse one or several indicators in application**

- Type of outcomes → both positive and negative outcomes
- Type of publication
    - Level → single paper, literature review, review of reviews?
    - Type of information → empirical data or opinion paper? Grey literature?
    - Methodological approach
- Publication date → limit to specific time frame?
    - No limit; preference for newer publications
- Language
    - English and Dutch
- Location
    - No limit to a specific location; but search mainly for European, American and Australian background; especially Dutch background
    - If there is useful material from Asia, also possible

Appendix 5: Literature Search Protocol

Literature Review – Search Protocol

In this search protocol, the information collected during the search for literature was displayed. The following information was recorded for each day and search term:

- The date of the search
- What you were looking for – also overarching topic?
- What source you looked at
- Where the source was located
- The results of your search

Table 3: Literature Search Protocol. Own presentation.

Date	What were you looking for?	What sources did you look at?	Location of sources	Results of search
05.04.2020	"centralized amenities"	Mainly papers, some e-books	In RU Library system, from different websites	Two potential background papers: Eby (2012)
	"Indicators amenities centralized hubs"			One method paper: Padeiro (2018): Comparing alternative methods to measuring pedestrian access
	"Neighbourhood hubs"			Papers I found before; Energy: Fulda (2014): Node: Methodology for energy.. Method: Rakhmawati (2018): Developing a feasible neighbourhood search.. Momayezi (2018)
	"Neighbourhood hubs indicators"			Nothing
	"Mobility hubs"			Papers I found before; Mobility hubs: Bell (2019), Hadachi (2019) Background: Molinari (2018)
	"Transportation hub"			Energy: Chang (2018) Groothedde → Hochschulschrift

				GIS: Carlsson (2013), Dukkanci (2019), Neighbourhood hub: Wiss (1997) Intro: Mohammadi (2014), Sun (?), Blair (2015) Generally transportation hub seems to resonate with airports, big systems, hub and spoke stuff
	"Transportation hubs"			Intro: Carvalho (?), Fleming (?)
06.04.2020	"City hubs"	Mainly papers, some e-books	In RU Library system, from different websites	No new results; only the Heddebaut (2018) paper about Euro-Flanders
	"Small scale hubs"			No interesting results
	"Small scale hubs mobility"			No interesting results
	"Low level hubs mobility"			Intro/Background: Gatzert (2020)
	"Intermodal mobility"			Intermodal mobility: Willing (2017), Gebhardt (2016), Jarass (2017), Szyliowicz (2003), Technology roadmap (2013), Ambrosino (2016), Dacko (2014) Intro/Background: Chiara (2019), MacHaris (2007), Schröder (2014), Sagaris (2017), Buhler (2010), Attard (2015) – ebook, Gatzert (2020) Energy: Lützenberger (2014) Methods GIS: Friedrich (2017), Bärthel (2004) Electric vehicles: Mounce (2019)
	"Intermodal mobility hub"			Intermodal mobility: Gregorc (2012) Indicators: Eftihia (2018) Neighbourhood hubs: Monzón (2016), Yatskiv (2017),
	"Walkability towards mobility hub"			No interesting results (only one results anyway)
	"Walkability hub"			No interesting results
	"Walkability neighbourhood"			Walkability: Villeneuve, Azmi, Cerin, Cowie, Wang, Jaskiewicz, McCormack
	"Designing walking routes"			Walkability: Buckley (2013), Boarnet (2005), Tolley (1997) – book, Kanaka (2016), Giles-Corti (2009), Tribby (2017)
	"Walking routes"			Walkability: Gallimore (2011), Fertik (2018), Boarnet (2008), Burgoyne (2007), Morency (2011), Chidambara (2019)

07.04.2020	"Walking routes indicators"	Mainly papers, some e-books	In RU Library system, from different websites	Walkability: He (2018), Rioux (2016), Rasa Uyiä… (2006), Nasir (2014), Vich (2019), Ai (2019), Bielik (2018), Koohsari (2015), Li (2018), El-Geneidy (2014)
	"Walking routes mobility hub"			Walkability: Wei (2014); Methods GIS: Vishvanath (2015)
	"Walking routes transport hub"			Methods GIS: Liu (2018)
	"Walking routes towards transit"			No interesting results
	"First last mile transit access"			First/last mile: Zuo (2020), Intro: Hoehne (2017), Park (2019) Methods GIS: Naharudin (2017), Chandra (2013)
	"first last mile transportation neighbourhood"			Electric vehicles: Mogghadam (2018)
	"Compact city hubs"			Indicators: Hosni (2019), Energy: Perera (2019)
08.04.	"Electric vehicles"	Mainly papers, some e-books	In RU Library system, from different websites	Electric vehicles: Institution of Electrical Engineers (2000), Boagey (2015), Deng (2020), Willrett (2019), Wu (2015)
	"Electric vehicles and shared mobility"			Electric vehicles: Bi (2019), Illgen (2018), Dlugosch, Das (2020), IEEE engineering management (2019), Pereirinha (2018), Fan (2019), Iacobucci (2018)
	"Shared mobility"			Shared mobility: Laporte (2015), Laporte (2018)
	"Shared mobility hubs"			No interesting results
	"Electric vehicles and Mobility as a Service"			Electric vehicles: Croce (2019), Bünger (2018)
	"Mobility as a Service hubs"			Methods GIS: Huang (2018), Indicators: Pérez (2015); Service hub seems to be something with homeless people
	"Mobility as a Service Stations"			Shared mobility: Katzev (2003)
	"Electric vehicles neighbourhood hubs"			No interesting results
	"Electric vehicles transit"			Electric vehicles: Pevec (2019), Iliopoulou (2019), Falvo (2011); Intro: Pternea (2015)
	"Shortest walk problem"			Methods GIS: Kao (2002)
	"Mobility as a Service connectivity"			Indicators: Cheng (2015), Papaioannou (2015)

	"Transit Oriented Development"			TOD: Noland (2015), Loo (2017), Loo (2017), Papagiannakis (2020); Indicators: Deboosere (2018), Methods GIS: Kong (2017), Vale (2015)
	"Transit Oriented Development Netherlands"			TOD: Lierop (2017), Tan (2014), Papa (2015), Pojani (2014), Singh (2014); Methods GIS: Huang (2018), Indicators: Lyu (2019)
	"Transit Oriented Development neighbourhood hub"			No interesting results
	"Transit Oriented Development small scale hub"			No interesting results
	"Transit Oriented Development proximity"			Indicators: Coolbough (2016)
	"Transit Oriented Development connectivity"			Indicators: Kaplan (2014); Jeffrey (2019), Methods GIS: Sharav (2018)
	"Transit Oriented Development visibility"			No interesting results
	"Green Transit Oriented Development"			Energy: Troy (2012); TOD: Huang (2019)
	"Transit Oriented Development energy"			TOD: Zareba (2019); Energy: Berka (2020)
	"Transit Oriented Development energy network"			No interesting results
	"Transit Oriented Development hub selection"			No interesting results
	"Transit Oriented Development hub selection indicators"			No interesting results
	"Hub selection transit"			Methods GIS: Huang (2018), Yu (2013), Li (2017), Chen (2018), Noichan (2018); Intro: Piselli (2018)
	"Mobility hub place selection"			No interesting results
	"Energy transition energy nodes"			Energy: Tronchin (2018)
	"Energy transition Netherlands"			Energy: Van den Bergh (2008) – book, Martinico (2017); Milchram (2018), Astsatryan (2017)
	"Placemaking"			Placemaking: Derr (2018), Drinan (2017), Day (1992), Schneekloth (1996)

	"Placemaking transit Oriented Development"			Intro: Kloosterman (2011)
	"Placemaking neighbourhood hub"			No interesting results
	"Placemaking effects community"			Placemaking: Nouri (2017); Ellery (2019), Stupar (2019); Intro: Kwon (2019)
09.04.	"Green infrastructure"	Mainly papers, some e-books	In RU Library system, from different websites	Green Urbanism: Hagishima (2017), Salata (2016), Mejia (2015), Alexander (2007), Sandström (2002), Griffith (2010), Crnčević (2017), Marot (2015)
	"Green infrastructure energy"			Green Urbanism: Jayasooriya (2017), Parker (2019), Igor (2015)
	"Energy network"			No interesting results
	"Energy network improvement cities"			Energy: Valentine (2019); Indicators: Razmjoo (2019)
	"Energy network adaption"			Energy. Marrero (2019)
	"Energy network Transit Oriented Development"			Energy: Ausfelder (2017), Intro: Lu (2018)
	"Energy network TOD"			Green Urbanism: Huang (2019)
	"Green Urbanism"			Green Urbanism: Beatley (2000) - book, Mostafavi (2010) – book, Leinberger (2011), Hendrickson (2005), Zareba (2016), Valente (2014), Ben-Zadock (2014), Trudeau (2013), Broto (2018), Swilling (2011), Galychyn (2017)
	"Green Urbanism European cities"			Methods GIS: Silva (2018), Xiu (2017), Pertisor (2015), Koc (2017)
	"Green Urbanism Transit Oriented Development"			Methods GIS: Motieyan (2019)
10.04.	"Green Urbanism energy"	Mainly papers, some e-books	In RU Library system, from different websites	Intro: Wang (2014)
	"Green Urbanism society"			Green Urbanism: Cherry (1969)
	"Green Urbanism mobility"			No interesting results
	"Social hub"			No interesting results
	"Society hub"			Energy: Maniyali (2013)
	"Amenities hub"			No interesting results
	"Hub functions"			No interesting results

	"Connected city"			Connected city: Neal (2013), Green urbanism: Devuyst (2001) - ebook, Energy: Ma (2019)
	"Pedestrian environment"			Walkability: International Transport Forum (2012) – ebook, Guo (2013), Stoker (2015), Townsend (2010), Marchand (1974), Built environment: Glanz (2016)
	"Pedestrian environment indicators"			Indicators: Asadi-Shekari (2014), Monteiro (2012), Peiravian (2014)
	"Urban morphology indicators"			Energy: Morganti (2017), Robinson (2006), Chen (2020), Azhdari (2018), Kleerenkoper (2017), Indicators: Petralli (2014), Pereira (2013) – at library, Yow (2007), Methodology GIS: Boeing (2019)
	"Clustered city"			No interesting results
	"Clustered city indicators"			No interesting results
	"Clustered city measure"			No interesting results
	"Intermodal connectivity"			Methods GIS: Navarro (2019), Intro: automotive engineer (2013), Indicators: Welch (2013), Bärthel (2004), Mishra (2015), Methodology general: Stoilova (2019)
11.04.	"Intermodal connectivity mobility"	Mainly grey literature, some e-books	In RU Library system, from different websites	No interesting results
	"Spatial allocation services"			Methods GIS: Polo (2015), Aguilué (2017), Buzai (2011), Gret-Regarney (2017), Fredriksson (2017)
	"voorzieningen centraliseren"		In Google Scholar, saved in Favorites in Edge or downloaded to #Literature Review folder	Indicators: Van der Weide (2009) – thesis, Henny (2013), Intro: Couperus (2016), Broens (2016)
	"voorzieningen clusteren" And "buurthubs"			Indicators: Moussa (2001) – thesis, Intro: Kuiken (2012) – thesis, Kapteijns (2013) – thesis, Ontmoeten als Keuze (2015), Bousauw (????), Brands (2010), Kampen (2019), Methods GIS: Boussauw (2012) – thesis, Intro: Bendegem (2006), Blijham (2009), Blokland (2011), Shared mobility: Bartsen (2019), Neighbourhood hubs: Kodood (2020), Schutte (2019), Energy: Jablonska (2011)
	"mobiliteit hubs"			Indicators: Bras (2015), Lijnse (2012), van der Linden (2019); Intro: Koebben (1996), Ton (2019)
	"sociale hubs"			No interesting results
	"buurthubs voorzieningen"			No results

	"decentralisatie buurthubs"			No results
	"decentralisatie voorzieningen"			No interesting results
	"binnenstedelijk hub"			Intro: Carpaij (2018), Peek (2011), de Vries (2017), van Soest (2016), Indicators: Tingen (2019), Soetens (2011)
12.04.	"lokaal hub functie"	Mainly grey literature, some e-books, a lot of Master Theses	In Google Scholar, saved in Favorites in Edge or downloaded to #Literature Review folder	Intro: Manders (2015), van de Weg (0000), Teulings (2019), PBL (2015)
	"hub voorzieningen functie"			Energy: Roosma (2011), Neighbourhood hubs: Markink (2016) – thesis, Intro: van Acker (2012), Indicators: Janssen (2013) – thesis, Community: Rietveld (2018), Bovenhoff (2015)
	"bereikbaarheid buurten steden"			Indicators: Maes (2013), Meijers (2013), Methodology GIS: Degencamp (2001), van Herzele (2004), Delafontaine (2011)
13.04.	"knooppunten mobiliteit" And "knooppunten stedelijk niveau"	Mainly grey literature, some e-books, a lot of Master Theses	In Google Scholar, saved in Favorites in Edge or downloaded to #Literature Review folder	Transit Oriented Development: Rybels (2017), de Groot (1993), Kuijpers (2010), Rietveld (2006) – only citation, Intro: Bruinsma (2002), Boussauw (2016), Loris (0000), van der Graaf (2009), Methods GIS: Jansens (2018), Compact city: Snellen (2010), Indicators: van Boxtel (2010), van Bendegem (0000), van Bendegem (2005)
	"knooppunten lokaale functie"			Walkability: Vervoort (0000), Intro: van der Bijl (2010)
	"maatschappelijke voorzieningen decentral"			Energy: Kennisactie Programma Water (0000), Herder (2014)
	"maatschappelijke voorzieningen buurt"			Community: Broens (2017), de Visscher (2010), Koedoot (2005), Bovenhoff (2014), Mixed use: Schouten (2006) – thesis
	"lokale mobiliteit knopen"			Indicators: Bosch (1999)
	"Mobiliteit stad knopen"			Critical views: Hilbers (2009), Compact city: Boelens (2011)
	"mobiliteit buurt knopen"			No interesting results
	"buurtmobiliteit"			No interesting results
	"Kleinschalig mobiliteit"			No interesting results
	"deel mobiliteit kleinschalig"			No interesting results
	"Kleinschalig mobiliteitsknooppunten"			Shared mobility: van Zessen (2017)
	"Ketenmobiliteit"			Shared mobility: van de Walle (2003), Gemeente Eindhoven (2003), Malaquias Bandeira (2018), Indicators: Hoogendoorn-

				Lanser (0000), Stelling (2012), Stelling-Plantenga (2014), Methodology GIS: Verhoeven (2006)
	"ketenmobiliteit kleinschalig"			Neighbourhood hubs: Warnars (2013), Shared mobility: Baas (2017) – thesis
	"Looproutes"			Walkability: Lok (2011), Hermans (2011), van den Bosch (2019), Borgers (2018) – only citation, TOD: Schneider (1981)
	"Looproutes in de buurt"			Intro: Ettema (2013); Neighbourhood hubs: Nelissen (2011), Walkability: Duijvestijn (2010), Starremans (2015)
	"Looproutes Openbaar Vervoer"			Intro: Voet (1995), Staps (2014), Indicators: Veneberg (2008)
	"Looproutes openbare ruimte"			Intro: ANWB (2016), Indicators: Asseldonk (2010)
	"Energienetwerk knopen"			Energy: Wauters (2017)
	"Energienetwerk decentral organiseren"			Energy: Tigchelaar (2019), de Groot (2016), Rotmans (2011)
	"Energietransitie knooppunten"			TOD: Bos (2016), Energy: Spijkerboer (2017)
14.04.	"Sociale cohesie door buurt hub"	Mainly grey literature, some e-books, a lot of Master Theses	In Google Scholar, saved in Favorites in Edge or downloaded to #Literature Review folder	Intro: Fermin (2019), de Bois (2011)
15.04.	"sociale cohesie door buurt centrum"	Mainly grey literature, some e-books, a lot of Master Theses	In Google Scholar, saved in Favorites in Edge or downloaded to #Literature Review folder	Community: Kerstens (2015)
	"voor- en natransport buurt"			Compact city: Stelling (2011), Indicators: van der Blij (2010), Verschuren (2016), Intro: Schakenbos (2014), van de Lindt (2008), TOD: Eenoo (2018)
	"energie trafo huis"			Energy: van Pruissen (2010), Wakkerman (1993), van der Klauw (2017)
	"energie trafo huis koppling met andere functies"			Energy: Movares (2013), van Breukelen (2015)
	"Network Analysis"	Mainly papers, some e-books	In RU Library system, from different websites	Methods GIS: Brandes (2005)
	"Network Analysis GIS"			Methods GIS: Porta (2006), Zaynab (2018), Albrecht (2007), Comber (2008), Robinson (2004), Comber (2009), Suárez-Vega (2011), Fotheringham (2009) – book, Energy: Maciej (2019)

	"Network Analysis overview"			No interesting results
	"How to conduct a network analysis GIS"			No interesting results
	"Applying network analysis GIS in Europe"			Methods GIS: Gupta (2016), Ferchichi (2018)
	"Applying network analysis GIS in the Netherlands"			No interesting results
	"Network analysis GIS in mobility sector"			No interesting results
	"Measuring accessibility with a GIS network analysis"			Methods GIS: Alistair (2015), Park (2012), Bielik (2018), Condeco-Melhorado (2018), Okabe (2008), Langford (2012), Albacete (2017), Rabiei-Dastjerdi (2018), Haugen (2012), Miller (1999)
	"Measuring accessibility using GIS at neighbourhood level"			Methods GIS: Page (2019), Pearce (2006), Padeiro (2018), Bikdeli (2017), Li (2018), El-Geneidy (2014), Indicators: Albacete (2019)
	"Measuring accessibility using GIS in a neighbourhood Netherlands"			Methods GIS: Morales (2019), Gambaro (2016),

Appendix 6: Literature Screening Protocol

Literature Review – Screening Protocol

The following table shows the screening protocol used to document the decisions in the course of the literature review. The literature saved in the different lists in the RU library system was screened for useful information on the review question. In the column included titles, one can see which of the titles were chosen for reading in more detail.

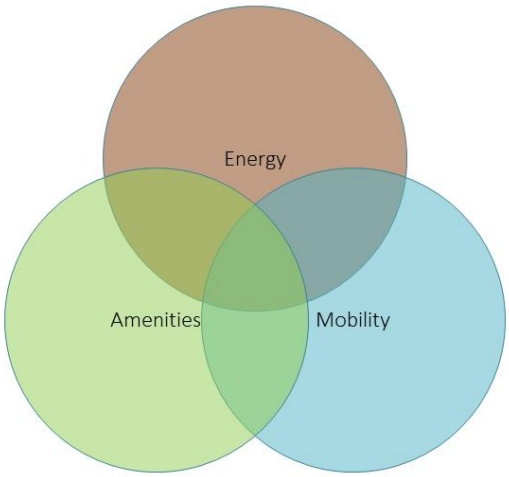
Table 4: Literature Screening Protocol. Own presentation.

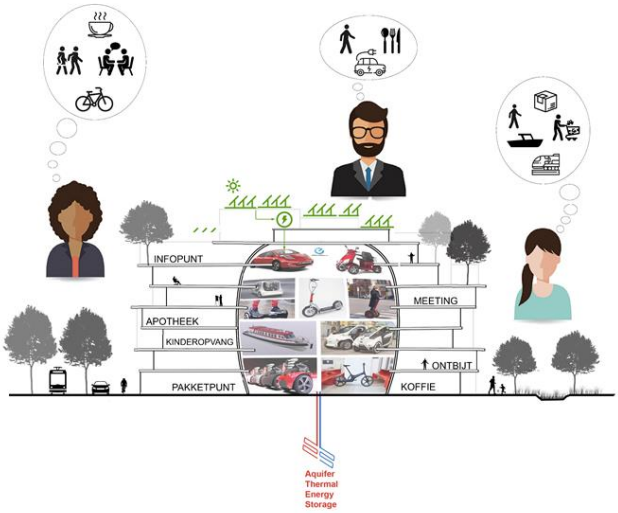
Date	Place	Title of List	Included titles
15.04.	RU library	Built environment (1)	None – list deleted
		Compact city (2)	None
		Electric vehicles (21)	Dlugosch (2020), Falvo (2011), Mounce (2019), Moghaddam (2017), Bünger (2017), Iacobucci (2018)
16.04.	RU library	Energy (22)	Fulda (2014), Lützenberger (2014), Tronchin (2018), Ausfelder (2015)
17.04.	RU library	First / last mile (1)	Zuo (2020)
		Green Urbanism (25)	Parker (2019), Huang (2019); Galychyn (2017)
18.04.	RU library	Indicators (21)	Welch (2013), Monteiro (2012), Mishra (2014), Petralli (2014), Peiravian (2014), Coolbaugh (2016), Pereira (2013), Jeffrey (2019)
19.04.	RU library	Intermodal mobility (11)	Schröder (2014), Ambrosino (2016), Dacko (2014) auch in Intro, Gregorc (2012), Gebhardt (2016)
		Introduction / Background (21)	Oostendorp (2019), Hoehne (2017), Kwon (2019), Park (2019), Fleming (1994), (Dalla) Chiara (2019), Pternea (2015), Jonuschat (2015), Baptista (2015) (last two are form ebook Attard (2015)
20.04.	RU library	MaaS (3)	Smith (2018)
		Methodology Case Studies (1)	Only printed – none
		Methodology general (8)	Gorard (2017), Stoilova (2019), the rest is print
20., 22.04.	RU library	Methodology GIS Network Analysis (64)	Suarez-Vega (2011), Motieyan (2019), Chandra (2013), Bikdeli (2017), Navarro (2019), Padeiro (2018), de Sousa Silva (2018), Carlsson (2013), Gupta (2016), Gret-Regamey (2017), Polo (2015), Liu (2018), Park (2012), Rabiei-Dastjerdi (2018), Albacete (2017), Bielik (2018), Langford (2012), Pearce (2005), Condeco-Melhorado (2018), El-Geneidy (2014), Naharudin (2017), Vale (2015), Kong (2017), Ford (2015), Kao (2011), Porta (2006), Okabe (2006), Bartesaghi Koc (2017), Yu (2013), Comber (2008), Comber (2009)
22.04.	RU library	Neighbourhood hubs (8)	Heddebaut (2018), Bell (2019), Monzon (2016), Wiss (1997)

		Placemaking (7)	Nouri (2017), Day (1992), Schneekloth (Book reviews) (1996)
		Shared mobility (6)	Laporte (2015), Laporte (2018), Katzev (2003), Sprei (2018)
		TOD (15)	Scott (2016), Papa (2015), Huang (2019), Pojani (2014), Tan (2014), Zareba (2019), van Lierop (2017)
		Walkability (35)	Yi (2018), Uspalyte-Vitkuniene (2010), Tribby (2017), Villeneuve (2017), Townsend (2010), Giles-Corti (2009), Vich (2019), Azmi (2012), Cerin (2006), Cowie (2016), Wang (2019), International Transport Forum (2012), Wei (2014), He (2018), Rioux (2016), Gallimore (2011), Morency (2011)
23.04.	Favorites in Edge	Indicators (24)	Li (2013), Blom (2015), Boussauw (0000), Kampen (2019), van der Linden (2019), Tingen (2019), Soetens (2011), Meijers (2013), van der Heijden (2006), van Bendegem (2005), Bosch (1999), Hoogendoorn-Lanser (0000), Stelling (2012), Stelling-Plantenga (2014), Veneberg (2008), van der Blij (2010)
		Intro / Background (29)	Blijham (2009), Ton (2019), Carpaij (2018), de Vries (2017), Teulings (2019), PBL (2015), van Acker (2013), Voet (1995), Staps (2014), ANWB (2016)
		Methodology GIS (6)	Boussauw (2012), Degenkamp (2001), Delafontaine (2011), Jansens (2018), Verhoeven (2006)
		Neighbourhood hubs (3)	Koedood (2020), Schutte (2019), Nelissen (2011)
		Energy (11)	Jablonska (2011), Kennisactie Programma Water (0000), **de Groot (2016)**, Rotmans (2011), van der Klauw (2017), Movares (2013)
		Community (6)	Bovenhoff (2015), Bovenhoff (2014)
		Shared mobility (6)	Hahn (2019), van Zessen (2017), Gemeente Eindhoven (2003), Malaquias Bbandeira (2018)
		Transit Oriented Development (5)	van Eenoo, E. (2018), Bos (2016), (die restlichen gingen auch, aber aktuell zu allgemein)
		Compact city (2)	Eventuell noch gebrauchbar, aber erstmal nicht
		Walkability (7)	Vervoort (2018), Lok (2011), Hermans (2011), van den Bosch (2017)
		Mixed Use (1)	Schouten (2006)
		Critical views (1)	None - Geht zu weit – eventuell noch, wenn ich darüber doch sprechen möchte
		Placemaking (1)	None – kann vielleicht noch hinzugezogen werden

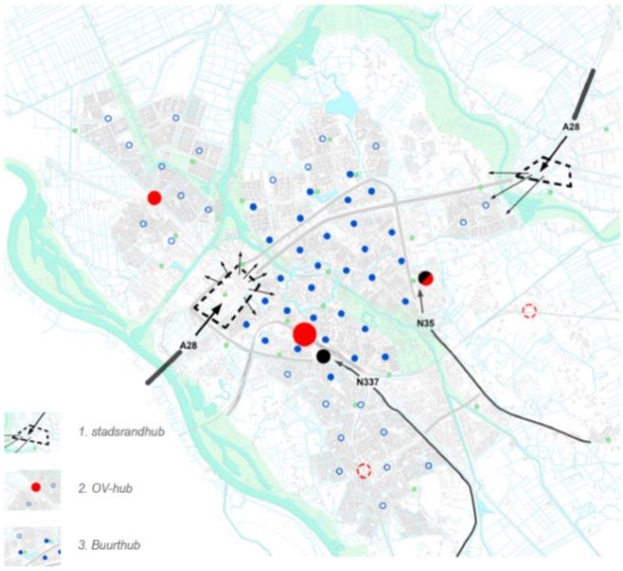
Appendix 7: Presentation for the expert interviews

&Morgen





1



Drie schaalniveau's

Zoals beschreven is feitelijk iedere hub uniek en is maatwerk nodig, maar er zijn wel drie hoofcategorieen te onderscheiden vanuit het gebruikersperspectief.

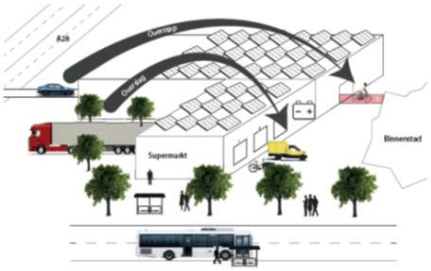
1. Stadsrandhubs
Met name functie als P+R voor binnenstad en werkgebieden. Daarnaast belangrijke functie als logistiek overslagpunt van grote vrachtwagens naar kleine elektrische voertuigen en bakfietsen.

2. OV-hubs
Met name overstapfunctie van OV (trein/ hoofdbusstation) naar bus of fiets.

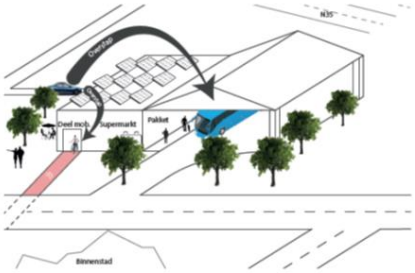
3. Buurthubs
Herkomsthubs binnen loopafstand van de woning waar gebruikers elke dag komen en het vervoermiddel van hun keuze voor die dag kiezen.

2

Stadsrandhub

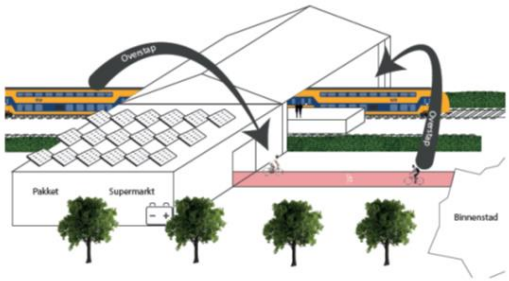


XL



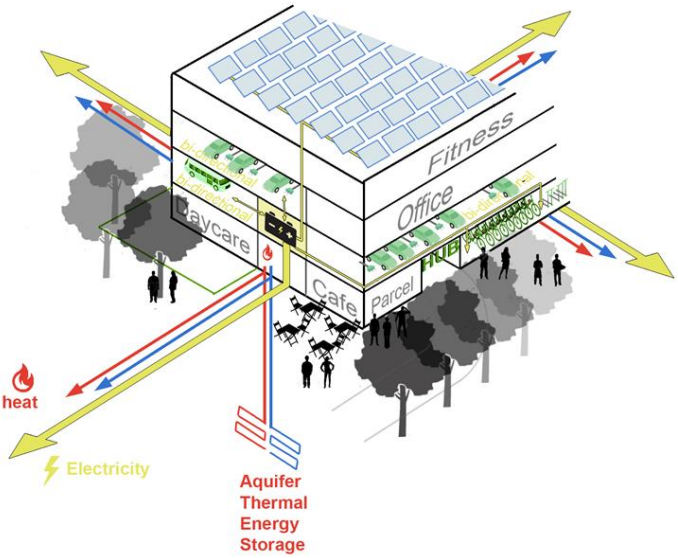
L

OV-Hub



3

Buurthub



4

Assendorp, Zwolle

5

Assendorp, Zwolle

6

Appendix 8: Interview guide mobility expert

Hello, start conversation

Ask for permission of recording (anonymity)! → start recording

Introduction of the student, explanation of the topic

Slide 1:

Master Student of Spatial Planning, Specialization Urban and Regional Mobility at Radboud University in Nijmegen

Research topic is finding a methodology for finding suitable locations for neighborhood hubs in two case neighborhoods in Zwolle

In my research, I define neighborhood hubs as a centralized mixed use place in a neighborhood where one can choose between different modes of transport, make use of (social) amenities and the energy production and supply for (a part of) the neighborhood is centralized.

Slide 2 + 3:

I use conceptualization of neighborhood hubs of the mobility advisory office &morgen from Utrecht, where I do my internship.

The concept divides hubs into three groups: city edge hubs, Public Transport hubs and neighborhood hubs, of which each have different main functions, such as logistics on the city edge and public transportation on the PT hub.

Slide 4:

Here you see a schematic conceptualization of a typical neighborhood hub.

Explain graphic:

shared mobility

amenities at the hub

charging of EVs

generation of energy using PV + storage of energy in EVs

geothermal heat production possible

Research aim is to identify suitable locations for neighborhood hubs in order to combine the societal, mobility-related and energy-related functions.

The goal of the expert interviews is to select those most important indicators from the whole list of indicators, that will be used to analyze the potential locations in the neighborhood.

Outline of the Interview

Interview counts in total 8 questions and will take about an hour.

Structured in 3 parts: first, this introduction, for which I would like to ask you to introduce yourself shortly.

In Part 2 (about 45 minutes) – general questions on the topics of mobility, energy and society in connection to the concept of neighborhood hubs.

In Part 3 (about 15 minutes) – ask you to select indicators from a list and rank them according to their importance for the selection of a location.

explain why you think these indicators are important for the concept of neighborhood hubs and why you chose to rank them this way.

Before that, do you have any questions before we start with the interview?

Introduction of the expert

Could you please explain your background in short to me?

Part 2: (about 45 min total, 5 min for each question)

Society:

1. What do you think are the potentials and problems of integrating societal functions (such as a community centre, *nl. buurtcentrum*) in the neighbourhood hubs?
2. What do you think is needed to make these hubs vital places of the neighbourhood?

Energy:

1. How does the energy network have to be adapted to deal with the neighbourhood hubs?
2. What is your opinion on using electrical substations (or local exchange stations, *nl. transformatorstations*) as locations for these neighbourhood hubs?
    a. Is it realistic?
3. What do you think about combining the local production of sustainable energy with the Vehicle-to-Grid (V2G) concept to balance out the energy network?

Mobility:

3. What do you think about **vehicle sharing** in the context of mobility planning?
    a. Where do you see the potentials and problems of vehicle sharing for mobility in cities?
    b. Where should shared vehicles be placed?
4. Where do you see the potentials and problems of **electric vehicles** for mobility in cites?
5. What do you think about the concept of neighbourhood hubs in the context of mobility? Please reflect critically.

Closing question:

4. What do you think is needed for the concept of neighbourhood hubs to prevail in the coming years?
    a. Concluding this, what is your final opinion on the concept?

Part 3: (15 min total)

Open MURAL link, orientation

Explanation of the software

Expert reads list and definitions, asks questions

Question: Which of these indicators do you find important for the selection of a location for a neighbourhood hub?

Task: **Please select 5 items from the list**. If there is something missing on the list, feel free to add it! Then please **organize** the 5 chosen indicators **in the order of their relevance** for choosing a location for a neighbourhood hub.

Expert organizes bubbles

Question: Can you please explain to me why you chose those 5 items from the list? What makes them important?

If demographic factors: Which ones do you think are especially important and worth testing?

Add. Question: Why did you choose this order / hierarchy? Why are the indicators on the top more important than those on the bottom?

Conclusion (3-5 min total)

Question: Do you have additional comments on the indicators?

Thank you!

Can I contact you in case of further questions?

Send finished research to the expert

Contact to his colleagues: Alfred Schrooten, Marieke van Brussel – email?

List of all indicators

- Amenities
    - Grocery store
    - Pharmacy
    - Café / restaurant
    - Package dropoff
    - Fitness
    - Meeting/conference rooms
    - Community centers
    - Other recreative functions
    - Daycare
    - Elderly care
    - schools
- Mixed use
- Public transport stop
- Real estate prices
- Proximity to new construction
- Proximity to heat stress
- Proximity to Urban green spaces
- Demography
- Number of inhabitants
- Density

List of definitions

- **Vehicle sharing:** refers to the shared use of a vehicle, e.g. a car or bicycle, and allows users to access transportation services on an as-needed basis.
- **Electric vehicles:** are vehicles that use electric motors powered by a battery and include, among others, different types of road and rail vehicles.
- **Vehicle-to-Grid (V2G):** describes a system in which plug-in electric vehicles (such as battery electric vehicles, plug-in hybrids or hydrogen fuel cell electric vehicles) communicate with the power grid to sell demand response services by either returning electricity to the grid or by throttling their charging rate. Through this technique, EVs can store and discharge electricity generated from renewable energy sources as well as balance out the fluctuating demand for power.

Appendix 9: Interview guide energy expert

Hello, start conversation

Ask for permission of recording (anonymity)! → start recording

Introduction of the student, explanation of the topic

Slide 1:

Master Student of Spatial Planning, Specialization Urban and Regional Mobility at Radboud University in Nijmegen

Research topic is finding a methodology for finding suitable locations for neighborhood hubs in two case neighborhoods in Zwolle

In my research, I define neighborhood hubs as a centralized mixed use place in a neighborhood where one can choose between different modes of transport, make use of (social) amenities and the energy production and supply for (a part of) the neighborhood is centralized.

Slide 2 + 3:

I use conceptualization of neighborhood hubs of the mobility advisory office &morgen from Utrecht, where I do my internship.

The concept divides hubs into three groups: city edge hubs, Public Transport hubs and neighborhood hubs, of which each have different main functions, such as logistics on the city edge and public transportation on the PT hub.

Slide 4:

Here you see a schematic conceptualization of a typical neighborhood hub.

Explain graphic:

shared mobility

amenities at the hub

charging of EVs

generation of energy using PV + storage of energy in EVs

geothermal heat production possible

Research aim is to identify suitable locations for neighborhood hubs in order to combine the societal, mobility-related and energy-related functions.

The goal of the expert interviews is to select those most important indicators from the whole list of indicators, that will be used to analyze the potential locations in the neighborhood.

➔ GIS Analysis!!

Outline of the Interview

Interview counts in total 8 questions and will take about an hour.

Structured in 3 parts: first, this introduction, for which I would like to ask you to introduce yourself shortly.

In Part 2 (about 45 minutes) – general questions on the topics of mobility, energy and society in connection to the concept of neighborhood hubs.

In Part 3 (about 15 minutes) – ask you to select indicators from a list and rank them according to their importance for the selection of a location.

explain why you think these indicators are important for the concept of neighborhood hubs and why you chose to rank them this way.

Before that, do you have any questions before we start with the interview?

Introduction of the expert

Could you please explain your background in short to me?

Part 2: (about 45 min total, 5 min for each question)

Society:

1. What do you think are the potentials and problems of integrating societal functions (such as a community centre, *nl. buurtcentrum*) in the neighbourhood hubs?
2. What do you think is needed to make these hubs vital places of the neighbourhood?
    a. Which functions are the most important for fostering a community feeling?

Mobility:

6. What do you think about **vehicle sharing** in the context of mobility planning?
    a. Where do you see the potentials and problems of vehicle sharing for mobility in cities?
    b. Where should shared vehicles be placed?
7. Where do you see the potentials and problems of **electric vehicles** for mobility in cites?
8. What do you think about the concept of neighbourhood hubs in the context of mobility? Please reflect critically.

Energy:

5. How does the energy network have to be adapted to deal with the neighbourhood hubs?
6. What is your opinion on using electrical substations (or local exchange stations, *nl. transformatorstations*) as locations for these neighbourhood hubs?
    a. How realistic is it? How suitable are they? Are they at good locations for including other functions there?
    b. What has to be done about these trafostations in order to function as charging stations for EVs and make use of PV energy?
7. Is it more useful to expand the electricity network at other places than the existing trafostations?
    a. Can the electricity network be expanded everywhere (in the city of Zwolle) or do you see problems with some places?
8. What do you think about combining the local production of sustainable energy with the Vehicle-to-Grid (V2G) concept to balance out the energy network?
9. In terms of charging: Which charging rate is needed at the neighborhood hub? Slow charging, fast charging, ultra-fast charging?
10. PV panels on the neighborhood hub: Is it realistic to supply the EVs with PV energy?
    a. How many panels are generally needed to charge a regularly used car?

Closing question:

11. What do you think is needed for the concept of neighbourhood hubs to prevail in the coming years?
    a. Concluding this, what is your final opinion on the concept?

Part 3: (15 min total)

Open MURAL link, orientation

Explanation of the software

Expert reads list and definitions, asks questions

Question: Which of these indicators do you find important for the selection of a location for a neighbourhood hub?

Task: **Please select 5 items from the list**. If there is something missing on the list, feel free to add it! Then please **organize** the 5 chosen indicators **in the order of their relevance** for choosing a location for a neighbourhood hub.

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Add. Question: Why did you choose this order / hierarchy? Why are the indicators on the top more important than those on the bottom?

Conclusion (3-5 min total)

Question: Do you have additional comments on the indicators?

Thank you!

Can I contact you in case of further questions?

Send finished research to the expert

List of all indicators

- Amenities
    - Grocery store
    - Pharmacy
    - Café / restaurant
    - Package dropoff
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    - Meeting/conference rooms
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    - Daycare
    - Elderly care
    - schools
- Mixed use
- Public transport stop
- Real estate prices
- Proximity to new construction
- Proximity to heat stress
- Proximity to Urban green spaces
- Demography
- Number of inhabitants
- Density

List of definitions

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Appendix 10: Interview guide society expert

Hello, start conversation

Ask for permission of recording (anonymity)! → start recording

Introduction of the student, explanation of the topic

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In my research, I define neighborhood hubs as a centralized mixed use place in a neighborhood where one can choose between different modes of transport, make use of (social) amenities and the energy production and supply for (a part of) the neighborhood is centralized.

Slide 2 + 3:

I use conceptualization of neighborhood hubs of the mobility advisory office &morgen from Utrecht, where I do my internship.

The concept divides hubs into three groups: city edge hubs, Public Transport hubs and neighborhood hubs, of which each have different main functions, such as logistics on the city edge and public transportation on the PT hub.

Slide 4:

Here you see a schematic conceptualization of a typical neighborhood hub.

Explain graphic:

shared mobility

amenities at the hub

charging of EVs

generation of energy using PV + storage of energy in EVs

geothermal heat production possible

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Outline of the Interview

Interview counts in total 8 questions and will take about an hour.

Structured in 3 parts: first, this introduction, for which I would like to ask you to introduce yourself shortly.

In Part 2 (about 45 minutes) – general questions on the topics of mobility, energy and society in connection to the concept of neighborhood hubs.

In Part 3 (about 15 minutes) – ask you to select indicators from a list and rank them according to their importance for the selection of a location.

explain why you think these indicators are important for the concept of neighborhood hubs and why you chose to rank them this way.

Before that, do you have any questions before we start with the interview?

Introduction of the expert

Could you please explain your background in short to me?

Part 2: (about 45 min total, 5 min for each question)

Energy:

12. How does the energy network have to be adapted to deal with the neighbourhood hubs?
13. What is your opinion on using electrical substations (or local exchange stations, *nl. transformatorstations*) as locations for these neighbourhood hubs?
    a. Is it realistic?
14. What do you think about combining the local production of sustainable energy with the Vehicle-to-Grid (V2G) concept to balance out the energy network?

Mobility:

9. What do you think about **vehicle sharing** in the context of mobility planning?
    a. Where do you see the potentials and problems of vehicle sharing for mobility in cities?
    b. Where should shared vehicles be placed?
10. Where do you see the potentials and problems of **electric vehicles** for mobility in cites?
11. What do you think about the concept of neighbourhood hubs in the context of mobility? Please reflect critically.

Society:

3. What do you think are the potentials and problems of integrating societal functions (such as a community centre, *nl. buurtcentrum*) in the neighbourhood hubs?
4. What do you think is needed to make these hubs vital places of the neighbourhood?
    a. Which functions are the most important for fostering a community feeling?

Closing question:

15. What do you think is needed for the concept of neighbourhood hubs to prevail in the coming years?
    a. Concluding this, what is your final opinion on the concept?

Part 3: (15 min total)

Open MURAL link, orientation

Explanation of the software

Expert reads list and definitions, asks questions

Question: Which of these indicators do you find important for the selection of a location for a neighbourhood hub?

Task: **Please select 5 items from the list**. If there is something missing on the list, feel free to add it! Then please **organize** the 5 chosen indicators **in the order of their relevance** for choosing a location for a neighbourhood hub.

Expert organizes bubbles

Question: Can you please explain to me why you chose those 5 items from the list? What makes them important?

If demographic factors: Which ones do you think are especially important and worth testing?

Add. Question: Why did you choose this order / hierarchy? Why are the indicators on the top more important than those on the bottom?

Conclusion (3-5 min total)

Question: Do you have additional comments on the indicators?

Thank you!

Can I contact you in case of further questions?

Send finished research to the expert

List of all indicators

- Amenities
    - Grocery store
    - Pharmacy
    - Café / restaurant
    - Package dropoff
    - Fitness
    - Meeting/conference rooms
    - Community centers
    - Other recreative functions
    - Daycare
    - Elderly care
    - schools
- Mixed use
- Public transport stop
- Real estate prices
- Proximity to new construction
- Proximity to heat stress
- Proximity to Urban green spaces
- Demography
- Number of inhabitants
- Density

List of definitions

- **Vehicle sharing:** refers to the shared use of a vehicle, e.g. a car or bicycle, and allows users to access transportation services on an as-needed basis.
- **Electric vehicles:** are vehicles that use electric motors powered by a battery and include, among others, different types of road and rail vehicles.
- **Vehicle-to-Grid (V2G):** describes a system in which plug-in electric vehicles (such as battery electric vehicles, plug-in hybrids or hydrogen fuel cell electric vehicles) communicate with the power grid to sell demand response services by either returning electricity to the grid or by throttling their charging rate. Through this technique, EVs can store and discharge electricity generated from renewable energy sources as well as balance out the fluctuating demand for power.

Appendix 11: The case study neighborhoods Assendorp and Kamperpoort of Zwolle

In the first paragraph, the policy context in Zwolle with respect to the topic of hubs is outlined. In the second subchapter, the two case neighborhoods Assendorp and Kamperpoort are introduced.

The Policy context in Zwolle

The municipality of Zwolle discusses different aspects of their mobility planning in their current policy documents (for example the Omgevingsvisie) (Gemeente Zwolle, 2017, 2020k). Topics such as improving the accessibility by improving the cycling infrastructure, financial support of other modes of transportation, the integration of mobility and spatial planning policy are discussed (Gemeente Zwolle, 2017, p. 28). Thereby, the municipality is planning to support the trends towards car and bicycle sharing, the electrification of mobility as well as the reduction of mobility due to the accessibility of goods and services via the internet (Gemeente Zwolle, 2017, p. 28). They are focusing on reducing the need for parking areas in the city, search for a way to organize logistics on a small-scale level and try to support multiple use of space (Gemeente Zwolle, 2017, pp. 28–29, 2020k, p. 80). The central station of Zwolle is conceptualized as an efficient multimodal node in the networks of the Netherlands, the province and the surrounding municipalities (Gemeente Zwolle, 2017, p. 98). A "knooppunt" is also conceptualized in Zwolle as multimodal mode in a network, that is accessible by different modes of transportation, such as the car and public transport (Gemeente Zwolle, 2017, p. 33). Areas that have high potential are mixed locations with lower densities and a high living quality (Gemeente Zwolle, 2017, p. 33). Through the combination of reduced through-traffic, HOV axes, and direct routes for slow traffic (cycling, walking), there is potential for hubs (Gemeente Zwolle, 2020k, p. 38). Mobility hubs are described as "attractive, easily accessible facilities where car and bicycle parking is combined with the provision of shared bicycles and cars, bus stops and other facilities such as package safes and toilets or energy generation/return" (Gemeente Zwolle, 2020k, p. 80). These mobility hubs are conceptualized as multimodal transfer facilities, for which locations are searched for in the "stadsruit", the high density and mixed use ring around the inner city (Gemeente Zwolle, 2020k, p. 40). According to the Omgevingsvisie, hubs should be located in places where "city streets" cross the outer ring street (Gemeente Zwolle, 2020k, p. 44). The municipality discusses that for the accessibility of these hubs, three different travel times can be used for the three modes of transport (walking, cycling, driving a scooter): five minutes for daily use, 10 minutes for regular use and 20 minutes for occasional use (Gemeente Zwolle, 2020k, p. 45). Moreover, the municipality uses a conceptualizations of three scale-levels for hubs from the user perspective: the city-edge hub (P+R for inner city and work areas and logistics transfer point), the public transport hub (functions as a transfer point from public transport (train/main bus station) to bus or bicycle) and the neighborhood hub (origin hub within walking distance) (Gemeente Zwolle, 2020k, p. 80). From the energy side, there is the ambition to tackle the vision of energy neutrality also in the area of mobility, by increasing the sustainable energy generation in Zwolle with focus on wind and solar energy (Gemeente Zwolle, 2020k, p. 82). The municipality sees chances to combine this energy generation with other functions, using roofs not only of apartments and companies, but also of parking places (Gemeente Zwolle, 2020k, p. 82). Moreover, the necessity of buffering and storing the energy, maybe by using batteries, is discussed (Gemeente Zwolle, 2020k, p. 86). In terms of energy consumption in the mobility sector, it is argued that the increase in electric vehicles in the coming years will increase the energy demand, but that the batteries of the EVs could be used as buffers for the energy production as well (Gemeente Zwolle, 2020k, p. 86).

Case neighborhoods Kamerpoort and Assendorp in Zwolle

In the current research, the method of the case study is applied in order to test the developed methodology for finding suitable locations for neighborhood hubs. For this case study, the two neighborhoods Assendorp and Kamperpoort from the Dutch city of Zwolle are chosen. In this

subchapter, the location of the case neighborhoods within Zwolle as well as their main characteristics are explained. Afterwards, the current status of the neighborhoods and potential problems are outlined and the plans of the municipality for the neighborhoods are discussed.

Location, main characteristics

Zwolle is the capital city of the Dutch province Overijssel, which is situated in the North-East of the Netherlands and is located between the Issel sea, the Issel river and the Veluwe hills in the West, the province of Drenthe in the North, the German Länder of Lower Saxony and Northrhine Westfalia in the East and the Achterhoek in the province of Gelderland in the South (Google Maps, 2020). The old Hanseatic city was founded in the Middle Ages on cover sands (Gemeente Zwolle, 2017, p. 86; Historiek, 2020). The city covers an area of 119.36 square kilometers and has 128,833 inhabitants (in January 2020) (Gemeente Zwolle, 2020f, 2020m; PDOK Viewer, 2019). The population density is on average 1148 inhabitants per square kilometer and is the highest in the province (PDOK Viewer, 2012, 2019). The city consists of five districts[2], which are divided into 17 neighborhoods. The neighborhood Assendorp and the area Kamperpoort are located close to the city center, which is clearly distinct from the other neighborhoods by its historic water trench. Assendorp and Kamperpoort are part of the downtown and urban ring around the city center, which is characterized by a relatively high density and diversity of functions (Gemeente Zwolle, 2008, p. 45).

Assendorp is located in the southeast of the city center and consists of the areas Stationsbuurt, Oud-Assendorp, Nieuw-Assendorp, Wezenlanden, Pierik, Hanzeland and the business park Marslanden-Noord and Marslanden-Zuid (compare to figure 1) (Gemeente Zwolle, 2020a). The neighborhood dates back to the years 1860 to 1900, when the city was building social housing accommodations mainly for industrial workers and later railway workers (Assendorpibt3, no year; Wikipedia, 2020). In the centuries before, the neighborhood was used as gardens for the supply of the inhabitants (Gemeente Zwolle, 2020j). It is characterized by a big green area, the Park de Weezenlanden, in the North, two big business parks in the East and a dense mixed use area in the South and West. Through the center of the neighborhood runs the Assendorperstraat with a varied range of local shops, cafes and restaurants (Gemeente Zwolle, 2020a). The neighborhood mainly consists of low to medium-rise buildings (two to four floors) with a few higher accents (to about 60 meters), while a third of the housing stock in Assendorp is storey buildings (Gemeente Zwolle, 2008, p. 108, 2017, p. 107, 2018a). The ratio between owner-occupied and rental properties is 49 % to 51 % (Gemeente Zwolle, 2018a).

[2] In this research, the Dutch words are translated as follows: “stadsdeel” as district, “wijk” as neighborhood and “buurt” as areas.

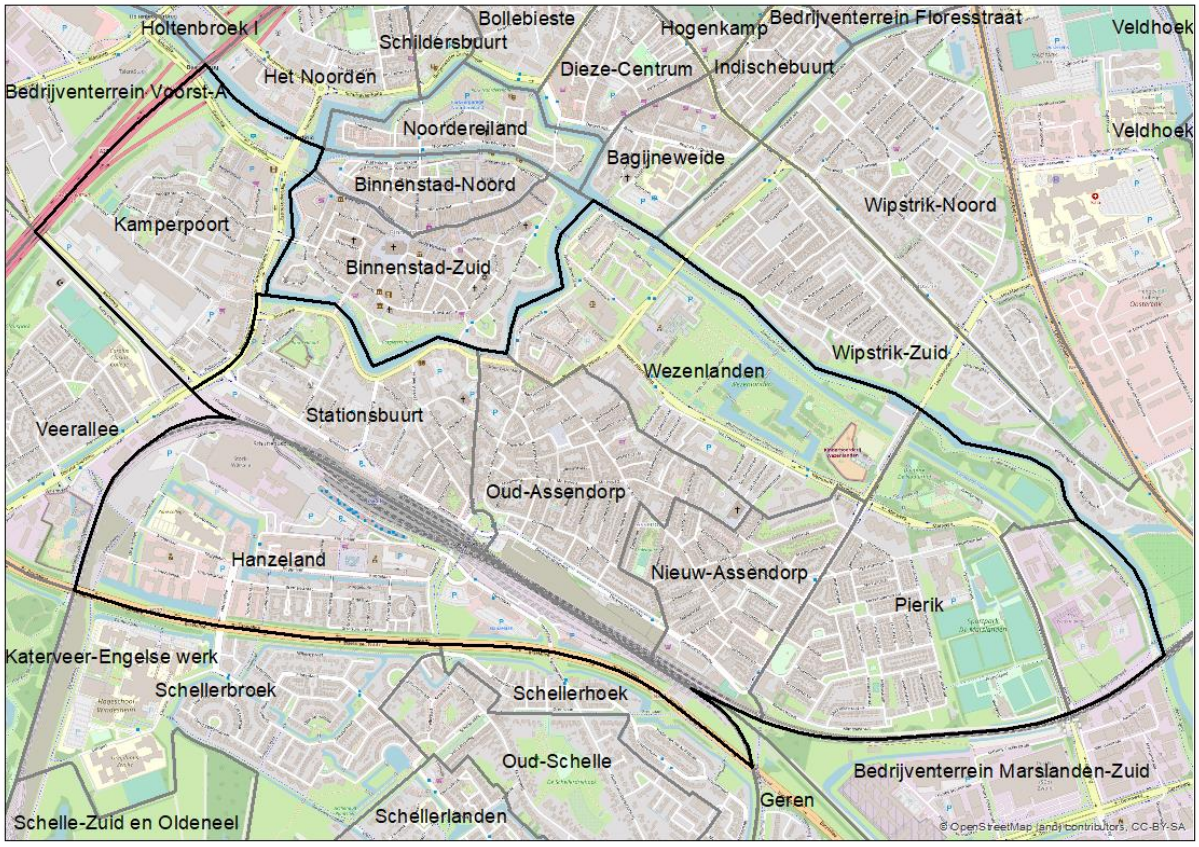


Figure 1: Case study area. The two case neighborhoods Kamperpoort and Assendorp are framed with a thicker line. Own presentation based on PDOK (2019).

Assendorp has 12,866 inhabitants, living in 6.235 households, of which 11.9 % are between the age of 0 and 11, 20.0 % between the age of 12 and 24, 46.3 % between the age of 25 and 54, 17.3 % between the age of 55 and 74 and 4,6 % between the age of 75 and 85 and older (in January 2020) (Gemeente Zwolle, 2020c, 2020g, 2020i). The biggest age group are inhabitants between the age of 25 and 39 with 27.3 % (Gemeente Zwolle, 2020c). In comparison with the whole of Zwolle, Assendorp is relatively young, with higher proportions of inhabitants between 18 and 39 and lower proportions of inhabitants between 40 to 85, but has less children than the average (Gemeente Zwolle, 2020d).

Kamperpoort is situated to the West of the city center and is a neighborhood and area at once (Gemeente Zwolle, 2018b). It dates back to around 1230, when it functioned as the entrance area to the city of Zwolle from Kampen, where it also got its name from (Ruimtevolk, 2020, p. 7). In this time, it was also used as gardens for the inhabitants of Zwolle (Gemeente Zwolle, 2020j). In 1700, it was developed as a working-class neighborhood just outside the old city (Ruimtevolk, 2020, p. 7). It is characterized by the big Ijsselhallen event hall in the South, office buildings in the West, a mixed use area to the North and a high-rise newly constructed mixed use area to the East (Gemeente Zwolle, 2020k, 37, 41; Ruimtevolk, 2020, pp. 6–9). The neighborhood mainly consists of low to medium-rise buildings (two to four floors) with an area of medium to high-rise buildings (up to 8 floors) in the Western part (Gemeente Zwolle, 2008, p. 108, 2017, p. 107). The ratio between owner-occupied and rental properties is 16 % to 84 % (Gemeente Zwolle, 2018b).

Kamperpoort has 1,809 inhabitants, living in 1.025 households, of which 7.1 % are between the age of 0 and 11, 19.6 % between the age of 12 and 24, 44.1 % between the age of 25 and 54, 17.2 % between the age of 55 and 74 and 12 % between the age of 75 and 85 and older (in January 2020) (Gemeente Zwolle, 2020b, 2020e, 2020h). The biggest age group are inhabitants between the age of 25 and 39 with 33.0 % (Gemeente Zwolle, 2020b). In comparison with the whole of Zwolle, Kamperpoort has higher proportions of inhabitants between 18 and 39 and lower proportions of inhabitants between 40 to 74.

Less children live in Kamperpoort compared to the whole of Zwolle and more people in the age group between 75 to 84 and older (Gemeente Zwolle, 2020d).

Problems at hand, current situation etc.

In order to display the current situation and the potential problems at hand, the "buurt-voor-buurt onderzoek" of the year 2018 and the "leefbaarheidsindex" of the two neighborhoods is used. Between the years 2016 and 2018, the livability, security, physical and social condition have not changed in Assendorp. Security and the social condition have improved between 2012 and 2018. This is the case, because inhabitants are more engaged in activities in and for the neighborhood, have a more positive living experience, experience less vandalism and the living environment has improved (Gemeente Zwolle, 2018a). In terms of negative developments, the reduced air quality must be named, as well as congestion, parking problems and litter (Gemeente Zwolle, 2018a). Moreover, the demolition of old houses with overdue maintenance, overdue maintenance of houses and gardens, turnover among residents, deteriorating contact between residents and increasing numbers of inhabitants resulting in higher nuisance and a lower amenity-level are cited as problems of the neighborhood (Gemeente Zwolle, 2018a). In terms of mobility, the residents perceived a constant trend in the last two years, with positive perceptions of the car amenities. In comparison with the rest of Zwolle, the car and bicycle amenities are less good, while the public transport amenities are perceived as more positive (Gemeente Zwolle, 2018a). In general, inhabitants perceive the development of their neighborhood as positive (Gemeente Zwolle, 2018a).

In Kamperpoort, the livability has stayed the same as in 2012 and 2016 but has decreased in comparison to the average in Zwolle. This is due to the perception of a reduced level of amenities, the lower quality of the dwellings and the public space and the lower quality of the social climate in comparison to Zwolle as a whole (Gemeente Zwolle, 2018b). However, the social climate has improved in comparison to 2012 in Kamperpoort itself. Positive expectations of the neighborhood are based on the restructuring, the additional amenities that came into the neighborhood as well as the new residents (Gemeente Zwolle, 2018b). Negative expectations of the neighborhood are based on increased problems with nuisance, traffic disturbance and a higher density of inhabitants. Also, the traffic safety and air quality have decreased since 2016 and there are less amenities for cars and bicycles (Gemeente Zwolle, 2018b). What the inhabitants miss the most are public green spaces for spending time outside. In terms of mobility, the neighborhood developed negatively between 2016 and 2018, which is mainly the case because of the poor quality of car and bicycle amenities (Gemeente Zwolle, 2016, p. 8). Moreover, in comparison with the rest of Zwolle, especially the bicycle amenities, but also the car amenities are in a worse state (Gemeente Zwolle, 2018b). In general, the inhabitants perceive the development of the neighborhood as positive (Gemeente Zwolle, 2018b)

Plans for Kamperpoort and Assendorp

For the structure plan from 2008, that had a planning horizon of 2020, the main policy topics in Zwolle were internal and external growth of the city (in terms of housing and business park construction), social participation / inclusion, strengthening the independent and versatile central function of the city in the region, life-cycle neighborhoods, increasing the accessibility of the city and adapting the city's infrastructure to future challenges (Gemeente Zwolle, 2008, 7-8, 42, 52). The main areas of focus were: living city, working city, amenities, green/blue city, sustainable city, accessible city, surrounding and spatial structure (Gemeente Zwolle, 2008, pp. 24–25). One of the main spatial strategies concerning the two case neighborhoods was the extension of the inner city area into parts of the Assendorp and Kamperpoort, which involved aspects such as additional amenities (hotels, shops, restaurants, cafés), additional dwellings, reducing traffic in the area and improving orientation by improving public spaces (Gemeente Zwolle, 2008, p. 52, 2020k, p. 34). These strategies are further pursued in the current

Omgevingsvisie, where the main focus is on the topics demographic changes, robust economy, mobility transition, vital community and inclusive spatial development (Gemeente Zwolle, 2020k, pp. 22–28). Moreover, topics such as multiple use of space, new forms of living, working and amenities as well as collective, sustainable and efficient energy systems are seen as having high potentials for Zwolle (Gemeente Zwolle, 2020k, p. 42).

Both neighborhoods are part of the internal densification strategy, mainly in the areas close to the city center (Gemeente Zwolle, 2020k, p. 99). There, in both neighborhoods, about 1,500 additional apartments were planned (Gemeente Zwolle, 2008, p. 53). The specific vision for Assendorp was the following: to make a vibrant city area from the railway zone, including the district Hanzeland, with an optimal public transport hub and a good mixture of living and working (Gemeente Zwolle, 2008, pp. 52–53). The area was seen as having potential of accommodating high-quality employment sites, amenities on national, regional and city-wide scale as well as accommodating urban living environments (Gemeente Zwolle, 2008, p. 53). Both neighborhoods are transformation areas, in which the current buildings and inhabitants are partly substituted by new developments and new inhabitants. This is a trend fueled by the high prices and scarce space in the inner city and is further amplified by the municipality, which is supporting the development towards a wider city center (Gemeente Zwolle, 2020k, 37, 40). The densification of the city has started in both neighborhoods, but is prominently visible in Kamperpoort, where the North and East side of the neighborhood have been rebuild already and the West and South are in the planning phase (Gemeente Zwolle, 2018b, 2020k, p. 41). In Assendorp, the north-western and southern parts were focus areas within the strategic development plan of the city in 2005, where additional apartments and ground-level houses were build (Gemeente Zwolle, 2008, pp. 28–29). Moreover, the two sites Park de Weezenlanden and the Nooterhof have been chosen for the future development of business sites for green and recreation and amenities (Gemeente Zwolle, 2008, p. 138).

In terms of mobility plans of the city of Zwolle, these were mainly characterized by parking regulation starting in the 1980s (Gemeente Zwolle, 2016, p. 3). Until today, parking regulation plays an important role in the city's planning for reducing the impact of mobility on the public space. Today however, the main areas of focus of the mobility regulation are double usage of parking spaces, price differentiation, experimenting with pilots of new solutions (e.g. shared mobility, electric bicycles, MaaS), protecting residents, enabling and facilitating citizens' initiatives (Gemeente Zwolle, 2016, 4, 5, 12, 2020k, p. 44). The city sees mobility as one of the key components with which they can prepare themselves for the future (Gemeente Zwolle, 2019, p. 5). The city chose for example to focus in the new wider city center on walking and cycling as the predominant modes of transportation, and supporting public transport, pushing the cars to the formally outer ring (the STOP principle) (Gemeente Zwolle, 2019, p. 16, 2020k, p. 44). Connected to this is the setup of several major pedestrian streets as "stadsstraaten", which are supposed to form the carriers of daily life, as well as transit cycling routes and walking routes (Gemeente Zwolle, 2019, p. 16, 2020k, p. 45). Meanwhile, the new inner ring of the city is to be supplemented with mobility hubs, thus making the city center more accessible (Gemeente Zwolle, 2020k, p. 44). The city is also focusing on chain mobility and the easy transition between different modes of transport (Gemeente Zwolle, 2019, p. 25). Moreover, the city of Zwolle plans to create mobility profiles per neighborhood and use these to decide about the mobility offer and regulations (Gemeente Zwolle, 2016, p. 11). Additionally to the above mentioned regulations, shared vehicles or more electric bicycles could become part of the concept for some of the neighborhoods, also in the combination with additional mobility hubs (Gemeente Zwolle, 2016, p. 12, 2020k, p. 45).

Appendix 12: Expert Interview Report Expert 1

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 22.07.2020

Place: Digital meeting

Time: 10.00 am

Duration: 57:38 min

Atmosphere

The interview atmosphere was informal, and the tone of conversation was friendly and polite. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was adhered to and the expert was able to answer all questions.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert to open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: So, I am Lisa Knaack, Master Student of Spatial Planning, as I just said, at Radboud University, doing my Thesis on the topic of neighborhood hubs. That is what &morgen calls them. And my topic is to find a methodology for finding suitable locations for these neighborhood hubs. And I am doing that for two cases in the city of Zwolle, so Assendorp and Kamperpoort. And in my research, I have a specific definition of what a neighborhood hub is, and I would like to just show you some slides of a presentation, so that you have an idea of what I mean by neighborhood hub. So, I will try to share my screen. (*Interviewer starts screensharing*) So, this is, you have probably seen these things already?

E: Yeah, I worked with…I worked also on Zwolle, from the energy side, from the project with the neighborhood hubs.

I: So maybe for you it is just refreshing the memory of that.

E: Mhm. Yeah, that is good.

I: So, my definition of a neighborhood hub is that it is a centralized mixed use place, in a neighborhood where one can choose between different modes of transport, so the mobility side, make use of different societal amenities, functions, and where the energy for at least a part of the neighborhood is centralized in this node. So, it is basically the combination of the three topics. And &morgen defined three different layers, the standsrandhub, the OV-hub and the buurthub. And these have different... These are different in size and have different functions. And my focus is mainly on the smallest ones. So, the standsrandhub has also logistical functions and the OV-hub of course also has a public transport function in a bigger scale. But what I am focusing on is the concept of the buurthub, neighborhood hub. Really, with a relatively short walking distance to this place, which is supposed to be a centralized spot where you can start your journey into the day, with whatever you want to do there. You have probably seen these pictures, so I'll go through them a bit faster. So that is basically the idea behind what the neighborhood hub is. And what I am trying to do is choose locations according to what is needed for these neighborhood hubs and then analyze what the spatial structure of the neighborhood is. So, to say that there is actually a good accessibility of these neighborhood hubs. Yes. This is my conceptualization of the neighborhood hubs. And I would like to give you an overview of what I want the interview to look like. So, I have two parts. First, I have around nine questions for the three topics. These are open questions, so I expect you to just answer right away, whatever you think is, or is on your mind, on the questions. And then later I have another part, where I, for which I have also send you the MURAL link, where I want to work together with you in ranking some of the indicators I need later for my research. But first for the introduction, I would like to ask you to introduce yourself, just in short, just tell me a bit, who you are and what you're doing.

E: Yeah. So, I have a technical background, I started technical engineering at the University of Twente, but then went working in the energy sector, actually right away, at the distribution system operator, Enexis.

I: Mhm.

E: And I have been working there for more than ten years, so, mostly on electricity networks. It is a distribution system operator for as well electricity and gas network in a large part of the Netherlands. Also, in Zwolle. And while working there I also did a PhD on the impact of the changing electricity demand of households on the electricity grid.

I: Mhm.

E: So, on the medium voltage level. On cables and transformers. So, I simulated different scenarios. It has been some time ago, I did my PhD defense in 2013, so you have a bit of a context for when it was. But I made different scenarios of the developments of for example electric vehicles, heat pumps, these kinds of technologies, for households, and how quickly they will develop or how they will be used in different housing areas. So, in a new built housing area or an existing housing area. And I also looked at different, I called them smart grid scenarios. So, if for example the distribution operator can give some signals that maybe the capacity of the electricity grid are low, or, there is a lot of electricity, from for example electric vehicles have a lot of demand, and you can say, okay, not, that the loading of the electric vehicles is postponed. So, different control scenarios. And then I looked at how much investment would be needed.

I: Okay, wow.

E: That is a bit my expertise in that field. After that I also did working at Enexis more on organization of innovation, there is a new impulse, a new part of Enexis focusing on innovation for energy transition. So, working with a lot of different parties. And the last two years I started to work for myself, doing different assignments, on innovation projects, mostly in the field of energy, also a bit on mobility, actually. And, so, I also worked with colleague 1 and colleague 2 in Zwolle. They already started the project and for the last part they asked me if I could provide some of my knowledge.

I: Mhm.

E: So, to see, what it means to combine the impact of these hubs. What does that mean for the electricity grid? And how could you maybe design, or what could be, would it be helpful to have some storage in a hub for example or something like that.

I: Mhm. We will definitely talk about that! So, some of my questions are also about that.

E: Ah, that is great. But it was actually quite nice for me to be able to be helpful with actually really connected to my PhD research, which is already quiet some years ago. But now it is really becoming relevant in practice. And it is nice to see that.

I: That is nice, yeah. Okay! So, I would like to start with the first question then, on the topic of mobility. So, it would be a more general question. What do you think about vehicle sharing in the context of mobility planning? So, shared mobility as a keyword.

E: Yeah, in the context of…how do you mean that, in the context of mobility planning?

I: In the context of mobility planning, so, what kind of benefits or problems does it bring, maybe, do you see?

E: Yeah, but for, for, for whom…or? Just general?

I: General.

E: Yeah, actually, I have a, … I can speak about my personal experience, with sharing, mobility sharing, because, well, I used to live in Utrecht, now I live in Den Bolder, it is between Utrecht and Amersfoort, in a village. But when I lived in Utrecht, I had my own car, and then I used Snapcar, the, I do not know if you know that, for renting my car. It was quiet a good service for me. For me, I was on a quite good location in Utrecht, where not everyone has a car, so there is a lot of people that need a car one or, once a month, or maybe once a week, something like that. And I didn't use my car, because I used it, maybe once or twice a week, to go to the office or some other location, but not on a daily basis, so there were quiet some days that I didn't use it. So, for me, I find it good also from a sustainability point of view, that my car is not standing still there and doing nothing.

I: Of course, yeah.

E: And financially, it was also attractive, and quite easy. And, well, now I do not have the car anymore, now I live in Den Bolder, and since the end of last year, we chose to live here because it is close to the train station. And we do not have a car, we think we do not need it. Now with Corona, I would say, it is, we are thinking about maybe leasing a car. But now we have a sharing mobility close. And I think it is a very good option for, if you, for a second…

I: Instead of a second car?

E: A second choice. Yeah, a second car or, in my case, I primarily use the train, and then, as a second option, a car.

I: Ah, mhm.

E: And then it is okay. But now, this first option, is…not so good. Because of Corona, I would rather not use the train, and then it gets difficult. Because you do not use the car that easily. It is not like, you always think like, do I need it, because you have to make a reservation, it relatively costs more for one time…and then…so now, I miss the opportunity to say, okay, I want to go there, and I just go. So that is the main feeling with mobility sharing.

I: Okay.

E: And that's when you have a car yourself, then, that's nice, if you can always go when you want to and then you can share with other persons, that's even more perfect.

I: Of course, yeah. And, in the context of the conceptualization of these hubs, these neighborhood hubs, the topic of electric vehicles is also very important. So, what do you think about that concept in general? What is your opinion on the future, maybe, of electric cars, but also the problems they maybe may have?

E: Yeah. Well, I had an electric car, a lease car. And now also the share, mobility share, mobility sharing, the car is also electric, so I also have some experience with that. And also of course I know the trends and within the Netherlands, I do not see large problems. So now I, for example last year when I sometimes used the electric car here, sometimes the battery is a bit low and you have to find a charger, it is better if you do not need to look for a charging station of course, and you can just go and get back without it. And then it is really not a problem on the charging station here. But I think with the current developments, with the capacity of the batteries, that will not really be a problem. And for short trips, it is no problem at all. So, yeah, we do need enough infrastructure of course, so that is hard work for the distribution system operators and the cities, to get enough charging stations, especially in cities where space is limited.

I: Mhm.

E: And of course for the longer trips, still, or for the holiday, yeah, people find that a hurdle, and it is a hurdle, to go, if you want to go further than the Netherlands.

I: Of course, yeah.

E: But that is getting better, maybe you can, in the time between the capacity and the limited, use another car for holiday and something like that.

I: Okay. And what do you think about the concept of the buurthubs or neighborhood hubs? And what do you think about this combination of the three topics?

E: Yeah. Well, I think that is really good, because for example when I started living here in Den Bolder, there's, next to the train station, there is a very big Albert Heijn, a supermarket. And we didn't

really realize that when we came living here, but when I started living here I find it really convenient to have the big supermarket, because I was used to living in the city, and being able to go to the supermarket whenever I wanted to. Or when I came (incomprehensive), or another direction, there is nearby, there is a supermarket, and they are open almost always. And then you move to the village, well these options are less, and I find it really convenient, that this option is still here, although I live in the village I can, always when I go to the train, I, there's a supermarket, I'm coming, yeah, and I can, every day, I could take something I need. And I do not have to change my habits. So that would also apply for a hub, that it would be very convenient, that you have a supermarket, when you come home, that you can do your groceries at that moment. Or for packages, these things, yeah, that would be convenient, I guess, yeah.

I: And what do you think about other societal functions, such as a kindergarten, daycare, other things? So that it really become a place where, of not only shopping, but also staying, for community issues?

E: Yeah. That is very good. I think, in my personal case, I do not use these very much, but it is always convenient to have different things together, at one place. And of course, the idea of these hubs, if you have them spread in these neighborhoods, that sounds like a good idea to have also a place for people to come together. And for, as well, the combination for elderly people, to come, to do things there and to have a kindergarten, and where also young and old people can meet. And there might be also more of a community feeling. Yeah. And also, I think it can be a good combination with sharing the car concept, because that's also, it is also a social concept.

I: Of course, yeah. So, I would like to move on to the energy field. So, you already touched upon the topic: What is…or, how does the energy network have to be adapted for the network, eh, neighborhood hubs? In how far does it have to be adapted for these hubs to function in the way I conceptualized them?

E: Yeah, well, it might depend of course, on the exact location. And the space there is, or the plans. If there are plans also for the extension of the grid, it might be easier to…but in general, it is quite a, yeah, one place, where there's quiet some demand for electric, electric demand for vehicles. So, it can be quiet a peak demand. So, it would be very useful to look how you can spread this demand, how you can add smart charging. But nowadays, you have, they call it laadpleinen, charging areas, how do you say that in English? The English word for plein? But they apply this in cities, because it is easier if you have one central location where you have electric vehicles, then you can do some smart charging. And then you can spread the demand of the different vehicles. So, if you think in hubs, it is actually a step further, than these laadpleinen. But if you design it alright, then…and also of course, yeah, no, I would say for sharing, the demand for the electric vehicles will be the same, if you share or not, because it is about how much you drive, together. But if the people will

drive as much as they do now, then with electric vehicles of course, the electricity demand will increase. And you can do something with smart charging, but probably you would also have to invest in the network. And maybe you can also do something with storage, but still…you can have quiet some demand. But if, for example, it would also be nice to combine it with PV. Generation of electricity. But still, in the…oh, actually in Zwolle, we also saw that you need quiet a lot, if you want to generate all the electricity for the electric vehicles, by PV panels, then actually the bottleneck are not the electric vehicles, but the PV panels.

I: Because of the space on the roofs, you need?

E: Yeah. But also, for the electricity grid, because it is high peak amount. Because in summer, there is a high peak supply of the PV panels. So, you need extension of the grid to be able to cope with the PV panels. You could reduce the capacity of the grid, the needed capacity, by applying storage, that would be a possibility. And then you could do that. But then you would have also to do that at the location where the PV panels are located. So you do have to look carefully and also together with the DSO, where to, how to do that, or what are the plans for the location, for PV panels, where will the hub be and is storage an option or is there enough possibility to extend the grid? And enough capacity at the DSO to do that on a certain time scale? Because they will need time to invest.

I: Okay. And about the…because, in the presentation, I showed you, I think you already discussed that with colleague 1, the idea is to use these trafostations, or, the English word I found was electric substation?

E: Transformer. Mhm.

I: Transformer, okay.

E: Yeah, but substation is a good word.

I: Okay. So, the idea is, in this conceptualization, to combine these transformer stations with the hubs. Or to put the hubs where the trafos already are.

E: Yeah.

I: But do these trafos, can they bear that? Is that possible?

E: Eh…they can, but it is easier to extend, probably. Sometimes in cities, the space is limited. And also, if you want to increase the capacity of a substation, a transformer station, you might need more space, so you'll have to look at that, locally. With, if you want to look in Zwolle, you have to discuss that with Enexis. But if you are close to the substation, you will need less extension for

the cables. So, that is a good thing. So, you still might need to extend, to invest in the transformer stations, but you might need less investments for cables.

I: Yeah, because the transformer station is just a transformer station. So, if you want to have other things there, you have to build.

E: Yeah, probably it will mean that you have to increase the capacity of the transformer station.

I: Yeah, okay. Yeah, we touched upon that topic. So there is a concept called vehicle to grid, or grid to vehicle, that is like, I think, two concepts that fit together, but is that a concept that is possible in this context of the neighborhood hubs in the future? Is that something we can expect within the next years or is it more of a long-term goal?

E: Mh, it is getting closer, definitely. Grid to vehicle is just charging of electric vehicles. So that's what's already happening, but vehicle to grid is of course the idea, that you use electricity stored in the batteries of the vehicles for other uses…The question would be, if you need to do that, if it is of added value. Because already by smart usage of the batteries, you can flatten the demand, but if you also want to extract electricity in form of the car, that means that there would be moments that you might want, yeah, even to use electricity stored at the electric vehicles. So, it would depend on, what, yeah, why do you want to do that. And is that a help for decreasing the needed capacity? Because it would think that that would be the bottleneck. Yeah, so you would have to look at how electric vehicles are used, and if it would be useful, it would be of added value to use electricity from the vehicles. There are some, there are definitely some pilots, and it is technically possible, but I think…no, I don't know this specific at the moment…I think it is less… of course they will…we learn more about batteries of electric vehicles now, and the impact of charging and de-charging the batteries, it has some effect on that. So, that's also maybe why electric vehicles, for users, are not so keen on making this possible, because that will decrease the…

I: Lifetime?

E: The quality, the lifetime of the cars. I think the impact is less than they expected. We have learned that. But not all cars will technically…well the producers of the cars do not make it possible, always. But it will be an option.

I: Okay.

E: And technically it is an option but still the question is if you need to do that.

I: Okay. So, is that something that could also be introduced later? At a later stage?

E: Yeah. Yeah, I think so. I think that's, for in the beginning, you might not need it, but in some years from now, that will be a development, that you will see more often, because it might be useful also

for people who want to add one at home. I think, if you have one home, and you have your solar panels, your electric vehicle, and your electricity uses that are more, maybe, solutions that you have your own micro grid at home. And that you can use your car battery as a battery. But there will also be other solutions, because then you don't need the battery of the car, but you can also have second life batteries, that might have been in a car, but might now be a stand-alone battery or something like that.

I: So that might be the better solution in such a case?

E: Yeah. Maybe.

I: Okay, cool. Yeah, I think these were my questions for the first part. Yeah, I would like you to comment on what you think is needed for the concept of the neighborhood hubs, in the future. So, what is needed so that they can come to life? Or that the concept really can happen in reality?

E: Mhm, good question. That is the big question, I guess. Yeah, you need to have some, I guess you need some kind of grow model. Because you cannot, like, put everything in place. Yeah, it is a really nice view, you think like, we should have things like that, yeah.

I: Of course.

E: With these hubs, and a lot of green, space for green and parks and walking in the city, and you do not need all these places for cars, that would be great. But you cannot do that overnight, so you need to look how you can use some kind of grow model to come there.

I: Phase it?

E: And I guess it also starts by, maybe by having these functions to getting people together at one place. So, besides some basic things like, maybe the…I guess it would be important to look for places where there are already supermarkets or these kinds of facilities. But then maybe also organize things for the neighborhood at this location. And, well, just for sharing mobility, you could start with such a laadplein option. And then, start small, I guess, see how it works and then see how you can let it grow. Yeah.

I: Yeah? Okay. Sounds good.

E: Yeah!

I: So, I'd like to move to the MURAL board now, I've sent you…

E: Yeah, maybe just one last...

I: Oh, sorry!

E: No, I was just thinking, that if you could show, in small, what such a hub could mean. So, for example, if you could start with one street…because of course people…it is not easy to get people to get out of their car, I guess. So that would be something to think about, how you can…if you start small, they would have…they need easy access to the cars in the hub and also be able to see that the street…yeah, that they maybe get something else for that. So that you have a really green street, or a nice place in the neighborhood, yeah, to stay. Yeah, something like that.

I: So that the people really see the exchange…

E: The benefits!

I: Yeah. And that they don't only feel like someone is taking parking places away but giving something back.

E: Yeah!

I: Okay. I've sent you the link to a MURAL board, you don't have to log in there, I think it is a visitors link. So, I think you can also have I think like visiting giraffe or something as a name. Oh, I think you're already there.

E: Yeah, I used my name.

I: Okay. So, yeah. Basically, this is just a pinboard, I think it should be relatively easy to use. Most of the things are fixed or locked, so that you cannot move them. But these bubbles here, you can move them.

E: Yeah, I do not see them. I see the picture, you showed before, it is also shrinked.

I: Yeah, I've shrinked them. You can zoom in with your mouse?

E: Oh wait, now it is better. I start it again.

I: It did not load?

E: No, right. Now I can see where you…because I did not see the list of potential indicators.

I: Oh, okay! So, most of the things are fixed, but this list of the potential indicators, these you can move around. And on the left-hand side you see, like, my personal definitions. Some from science, scientific backgrounds, some are more from a, what do I mean by that background. And the task would be, to select, from these, list of potential indicators, five of them, and rank them in the order of their relevance for choosing a location. So, what is the most important for a location of such a hub? What do these hubs really need? And if there is something missing in these bubbles, you can also add new bubbles. That is on the left-hand side, but I can also add the bubbles if you don't feel

like where you see where that is, where you have to do that. And I would give you now some time to read, maybe the definitions and read the bubbles.

E: Yeah.

Some minutes pass while the expert orientates on the MURAL board and reads the texts.

E: Okay.

I: Okay?

E: Yeah. I do not, why would real estate prices…

I: be important?

E: Yeah.

I: The idea behind that was that I thought on the one hand, they could be important, in terms of, that it is not so expensive to build a hub. So, if the prices are low, it is easier to invest there. That is the one side. The other side I thought is that real estate prices are sometimes an indicator for how much development is happening in the area. And if there is a lot of development, a hub maybe would be a good option. Because there is new people coming in there, that might have different opinions on moving around and something like this. So, I just thought I would put it on there. But I was also interested in what you as an expert or my other experts would say about it.

E: Yeah. Okay. Let us see. I think this one. Oh, I will just first pick a few. I think these are at least very important.

The expert picks indicators from the list and moves them to the ranking.

E: Oh this one could be, I would say, it does not need to be, but of course it will be easier to make a hub in a new area (*the expert points at the indicator new residential housing*). To make it part of the plan. Because yeah. So, would the question be where it is most easy to locate one, or where it would most important for the city to start one?

I: Where it would be most important for the city. So, basically, where the hub would have to most influence or benefit for inhabitants.

E: Yeah. It is not such an easy task. Because all the indicators have some importance.

I: Yeah, of course.

E: Of course.

(*Expert thinks about it*)

E: Yeah, this one not. And I also exclude this one.

(*Expert thinks about it*)

E: I think these two are related also a bit (*the expert points at the indicators mixed use and amenities*).

I: Which ones?

E: These two.

I: Oh yeah, of course, yeah. If there are more amenities, there is probably more mixture.

E: Yeah, and if it is one central place, where on the one hand there are these amenities, you can maybe also work, or shop, or, well, and in the evening you maybe want to have some dinner, or you want to go out. So that…

The expert thinks about the other indicators.

E: Yeah, so I guess…yeah, and also these two, I see some relation (*the expert points at the indicators population density and demographic factors*).

I: Of course, yeah. I see the population density more in terms of a critical mass of people that you need, in order to, for the hubs to function, and the demographic factors more in terms of which types of people live there.

E: Yeah, and I think they are both important. Yeah. I think I will…yeah. I think I go for this.

I: That is also a nice order of colors.

E: Yeah

The expert laughs.

I: But that is more of a coincidence. So, why did you choose to put public transport stops as the first one? Why is it so important in your opinion?

E: Yeah, my feeling is that it is the main function. And also, it is, if you don't have that function, it is a really good reason to go there. Because people travel always. We miss it a lot now with Corona, and we can go to other places. So, people do that on a daily basis, and it is really, well. Also, train stations are really central locations in cities for example, where people come together. So, I think that is a good starting point for a hub.

I: Okay. And the amenities is probably the same`

E: Yeah. And then there is the added value of such a location, of course, what you also see at train stations. But you can do these, that when you are there, you can do some groceries, you can sport or fitness maybe, in there. Maybe also for work, for, if you want to stay a bit, if you come from somewhere, that is also very useful. And what I said already about the mixed use. Then, that is another layer you add to it. Then it, actually, yeah, you get a sense of real center for the neighborhood. And more of a social function.

I: Mhm. And the population density is important because…?

E: Yeah. Actually, what you said also, to have this critical mass for it to be able to function. Yeah, you need it. I think it is something you really need. And that, I think it is important to look at the demographic factors. What kind of people live in this neighborhood? What kind of amenities in mixed use are relevant for this location? Yeah. I think that is also important to look at.

I: And for which demographic groups would you say it is most important to look for functions? Or is it more that you have to look for all parts of society?

E: Yeah, I think so. And it depends on the, it could also be an opportunity to make maybe better connections between different groups within an area. Because, for maybe people that are younger, working a lot, travelling a lot, they will go there and do some groceries, and, but it might be handy also if they can also have the kindergarten there, if you can leave your children, but then maybe make the connection with elderly people, that you otherwise wouldn't meet. Yeah, I see that as an opportunity to increase the social connections between people in the neighborhood. But it depends on the needs of the people, what kind of facilities you need.

I: Yes. Do you have additional comments on this, or did you miss something that you think is very important for the functioning of a hub, that could be close to a hub, or …?

E: Mh…I did not miss anything yet. No, and I just think, also these other indicators here. Yeah. So, what I said, this (*the expert points at the indicator new residential housing*) could be easy for new ones, so if you want to with one maybe, it would be good maybe to start here. It helps for heat stress, but I do think, that there might also be other solutions for heat stress, and it is added value, and not like you really need to…yeah. And that is, well, real estate prices could also maybe for, maybe it is more important for the municipalities, that really need to plan it, see how they finance it. And this is a bit the same argumentation as the heat stress. If you start this hub, then there, one of the benefits would be, that there might be more space also for green spaces. So, maybe it is even more important to put them to places where there is not so much urban green space. So, there is more benefit, if you make more space. Yeah.

I: Okay, yeah. Mhm, so that was the short little task I had for you, and that is also the end of the questions and the interview I wanted to do. So I would really like to thank you for your time. And I hope to, that I can send you an email if I have any further questions or anything.

E: Yes, of course, no problem at all. You can always write me.

I: And if you are interested, I can also let you know when I am finished with the thesis, what the result is and what the expert interviews did in the thesis.

E: Yeah, it would be nice to see the results of your work. So, what is your planning? When?

I: At the moment I am planning to be done in the middle of September, but my internship goes until the end of October. So at least until then I have time to finish it, but I hope to be finished a bit earlier, so that I can focus on working for &morgen in October. So that is my planning.

E: Yeah okay, sounds nice. It would be nice to see your thesis. And of course, no problem if you have any questions, you can always contact me.

I: Okay, yeah, thanks again for your time!

E: And good time boxing, one hour!

I: Sorry?

E: Good time boxing, one hour. It fits good.

I: Well, it is just because you gave just the right amount of time for the answers.

E: Yeah. I guess so. Well good luck with the interviews and with your thesis.

I: Thank you and I am wishing you a nice rest of the day. And maybe we see each other again for the project of &morgen, I do not know whether you are?

E: Yeah, that would be…do you know if there are any…

I: Follow ups?

E: At this moment…

I: Yeah, on which of the neighborhoods were you working? Were you focusing on…?

E: Well, I did for Assendorp, I made the calculation.

I: Yeah, because they are working for Kamperpoort as well. They are making a planning for Kamperpoort and also trying to use the concept of the mobility hubs there. So, I think there is potential for an expert.

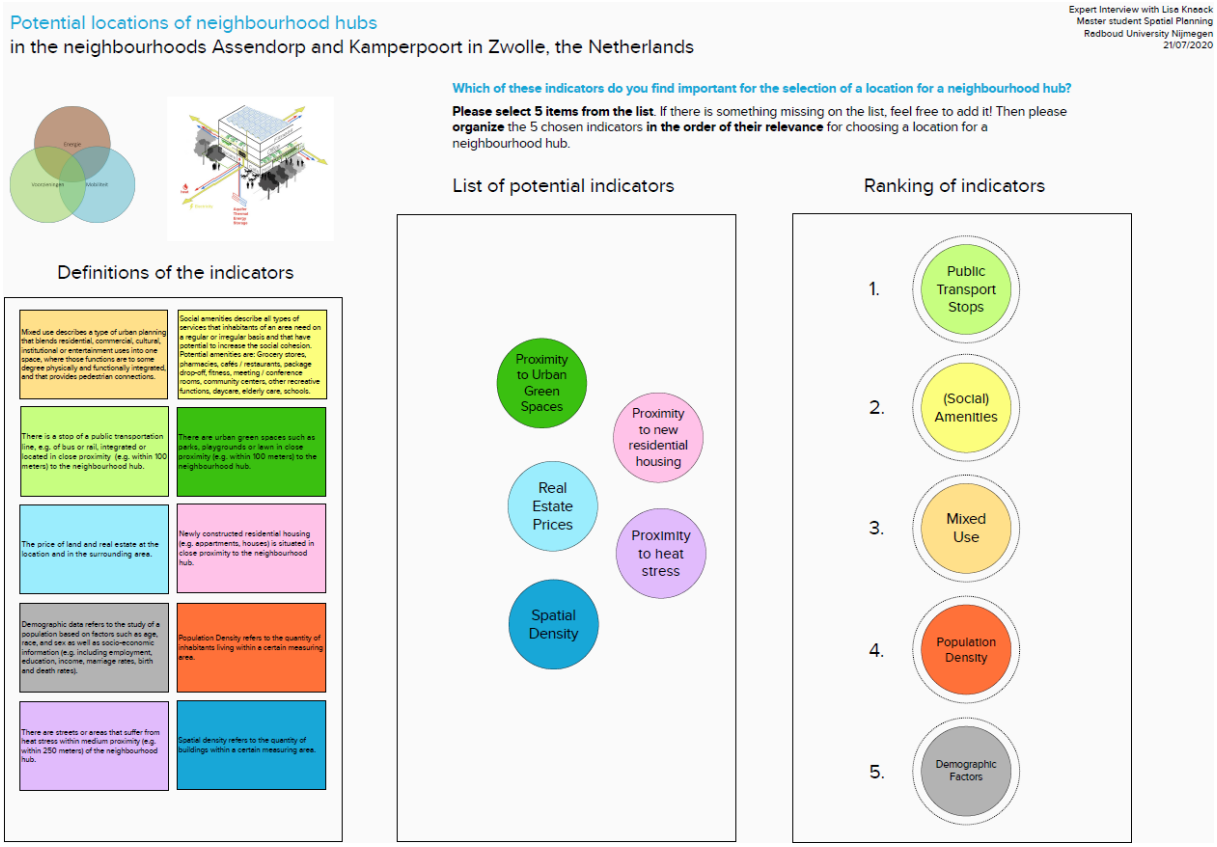
E: Yeah, it would be nice to be working on that again. So, I will also contact colleague 1 sometime, to see how it is going. Okay. Good. Well, good luck and have a nice day.

I: Well, you too!

E: Bye bye.

I: Bye.

Appendix 13: Expert Interview MURAL board Expert 1



Appendix 14: Expert Interview Report Expert 2

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 14.08.2020

Place: Digital meeting

Time: 10.00 am

Duration: 46:19 min

Atmosphere

The interview atmosphere was informal, and the tone of conversation was friendly and polite. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was adhered to and the expert was able to answer all questions.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert to open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: And then I can share my screen with you, because I have prepared a small presentation about my topic. I do not know in how far you might have seen these already, these slides. Do you see them?

E: Yeah, see a site, you made a connection with a site, I think which, there was a big kind of drawing on that, I saw.

I: Okay. So, my research topic is basically, to find a methodology for finding suitable locations for neighborhood hubs.

E: Okay.

I: And in my research, I define a neighborhood hub as a centralized space or place, in a neighborhood, which is, I am talking about buurt, the Dutch word, buurt, here, that is the translation I found, neighborhood. And we are trying to connect the topics energy, mobility and social aspects, for example amenities, in this concept. And this conceptualization is also from the mobility advisory office &morgen where I am doing my internship right now parallel to my thesis. Which is also why we came in contact I think. And &morgen basically defines three scales for hubs, the stadsrandhub, the OV hub and the buurthub. And for all of these of course there are different functions connected to it, for example the stadsrandhub is more about, has a transfer function, transferring people to the inner city, from the outer areas of the city. The OV hub is more about of course transferring from public transport to other modes of transportation and the buurthub is what I am focusing my research on. So, this is again, a bit of a conceptualization, also taken from &morgen, just to shown, what kind of aspects are related to the types of hubs. And what I am discussing in my research is the so called buurthub or neighborhood hub. And there are different aspects I connect to this topic. First of course mobility, shared mobility, in the form of bicycles, cars, or whatever else vehicles you can imagine.

The expert starts to walk around in his room.

E: Yeah, my connection was not very good, so I changed the spot, but I am still listening.

I: Okay, it is just funny to see you walking around.

E: But I am all yours.

I: That is the new home office, I guess.

E: Yeah. The new home office. A very flexible office concept that is.

I: Of course. And there are different amenities connected to it. Here for example we include aspects such as a fitness studio, office rooms, daycare, a café, but there are probably all kinds of other amenities that could be connected to it. Then, another aspect is the charging of electric vehicles in the future,

at these hubs, and the energy generation, for example through PV panels on the roof and then using also the electric vehicles as a battery for the generated energy. So, these are all aspects that I am trying to include in this conceptualization. And these are just some numbers. And you probably saw these already, I am not quite sure whether you've been into these projects or not, this is a place in Assendorp, where &morgen just made this nice view of what it could look like in the future. And, yeah, this is my conceptualization and the aim as I said is to find suitable locations. So the aim with the expert interview now is to first discuss some of these main topics I have just outlined, but also later to identify potential indicators, that can have an influence on the location I would like to choose. But this I will explain to you when we are there. So, I will stop the presentation mode now. And the interview is structured then in two parts, so the first part with the open questions and the second part with the link I have send you, the MURAL link, where I have a task for you, that you organize the indicators then. So, yeah, I hope it is only going to take the hour that was appointed in the beginning, so until eleven. If you think we are running out of time, you can always…

E: I have time until eleven. The connection is sometimes a bit bad. Maybe I am going to shift again, because…but up till now, I will try to stick to this spot now, but I…

I: Yeah, no worries if you have to change, you should change, because if you cannot hear me it will not help!

E: Well, I am going downstairs now, I am living upstairs, but I am sleeping downstairs and the router, or the connection is downstairs. So I am shifting now downstairs. So the connection is better there.

I: And I just wanted to ask whether you have any questions before we start?

E: No, just to give you an impression that I was actually the one who initiated that study, which you quoted, so I know it quite well and it was also my ambition to develop mobility spots, or mobihubs as we call them, as part of a community project I was involved in, in Assendorp. So, I am a bit dark now maybe but it is…

I: No, it is not a problem.

E: It is not a problem, but I can open a little bit the curtain, so they shed a little bit of light on me. But I was one of the originators of that idea. And it started, maybe you have seen the vision as well they made for Assendorp 2040.

I: Mhm.

E: Yeah, that is the original plan where it was about getting more space for people to play, and more green, and less cars in the streets. That is the original idea behind these mobihubs.

I: Yeah, yeah. Mh, also, I forgot to say that, but I guess you know, like I am focusing on Assendorp and Kamperpoort in the research, so these will be my case studies for applying the methodology I am developing.

E: Okay, yeah.

I: Okay. Yeah, also I have divided the questions into the three topics society, energy and mobility. And I would like to ask you think are the potentials and problems of integrating societal functions such as a community center into such a hub?

E: The problems or the opportunities, or both?

I: Both! You can decide with which ones you want to start.

E: Haha, yeah. Always start with opportunities. Because problems can be solved and…yeah, opportunities, I think that the use of these hubs of course will be much more…if there are more functions attached, so you have a lot of people going there and if it is just a normal part of a neighborhood. Just like a shop, or a kindergarten, or other places. So, I think it is an opportunity to have functions attached. And it can also bring back maybe functions in a neighborhood which normally are not there anymore. Because I guess it is the same in Germany, that sometimes there has also been due to lack of money, has been a problem, there is also social spaces for elderly for instance in, for neighborhood centers. So, this could bring back these functions again. And maybe the problems attached could be that it is harder of course, the more functions you have, the harder it is to make a kind of good mix, and maybe, but that is more the implementation of it, that you should start maybe with two or three elements, and you have like a building block, like you can add other functions. Because there can be a setback of there are too high ambitions and then when one element falls apart then the whole thing falls apart. So, stay functional and also stay realistic.

I: Mhm, okay. And, connected to this is the question, what do you think is really needed to make these hubs work in terms of society? So, what should be in place for example in order to, that people go there. What would be needed to make it a good place?

E: Yeah, I think attractiveness. I have done a study years ago about transfer, these are the big hubs on the city edges, like big parking lots, where you park your car and then you take public transport to the city center. I guess you have the same in Düsseldorf maybe or in another city. And a very important factor, success factor, was that it was attractive. It was socially safe, so you did not feel that it is open, and you do not have any security. That you have a kind of protection against the weather of course. But it has to be a nice place, and of course it can also be a kind of functional thing, that you add a package delivery, like, if you collect a package there, or if you have another reason of going there, then it is easier to use it. If you have two or three reasons to go there, instead

of just picking up your shared car, then there is more reason as well to use it. So, it is a functional part, and it also has to do with the attractiveness of it. That is very important.

I: Yeah, okay. And I have explained that also part of the conceptualization is the integration of energy into the hub. So, energy in terms of generation but also in terms of charging. And I was wondering, like, how does the energy network have to be adapted in order to make this possible? Because, charging of electric vehicles is of course, it needs a lot of energy, and what do you think about, is it realistic to do this at such hubs or is it, make too many problems for the energy system?

E: I am not an expert in energy. What I learned from the study, is that it is very important to know of course the grid of the city. You have an energy grid, and you have to look at where are the possibilities to be part of that grid? So, you do not only look at the grid from the traffic point of view, but you also look at the kind of optimal grid from the energy point of view. And I think, there are more and more smart solutions now for energy storage, and also getting energy from the sun, so I think it should be possible to have in neighborhoods, which act like a kind of battery for the neighborhood. So, the cars that are parked there, they can be used as batteries for the houses. If your people have smart apps, and they can indicate when they leave, and when they leave, their car is charged again, and if they do not go for a day, their car can be used as a battery, so I think if these opportunities are used well, it should be possible to implement these energy hubs as well as part of this concept. I really believe in, as I said I am not an expert, but what I read about it, it should be possible with smart management of energy to implement them.

I: And about one of the ideas also to use electrical substations, trafostations, as the starting point of these developments, of these hubs. Do you think that is realistic? Also talking about these two neighborhoods, Assendorp and Kamperpoort, in terms of, are these at realistic spots for adding extra functions there?

E: Mh, I do not have the map with me now, but I think, what I remember, that for Assendorp, there were hardly spots which were completely complementary. So, like you could see no spot where there was a kind of energy hub, or kind of trafostation, and a parking lot, and…because you have to look at a lot of factors. You have to look at how easy it is to get there from outside the neighborhood, so you can drive there by car, it has to be on the edge of the neighborhood, because you do not want the cars into the neighborhood. It has to be on walking distance from the houses, so it is quite a puzzle. I do not think we found a lot of spots where all these elements come together at a trafostation. But that could be way of looking at it, if there are feasible spots where the trafostation is so near, that you can actually start there as a kind of pilot. But it is quite a challenge.

I: Because then you would not have to extend the grid, I guess?

E: Yeah, maybe. But that is quiet a puzzle. And you could also look at new development. As new developments could also necessitate new trafostations. You could turn it around, you could say, okay, let's make the trafostation there where we want to have a mobihub. So, I think it is looking from two sides, how feasible it is to develop new kinds of trafostations, combined with mobihubs.

I: Mhm. Yeah, actually we talked about that already with the smart grid or smart charging. The concept of vehicle to grid is very popular in this literature about charging schemes and everything. So, I was going to ask you to say what you think about the concept of smart charging. But I guess you have already discussed that. Maybe you want to add something.

E: Yeah, I know we have also designated certain areas, where there are parking lots already, where we make a kind of smart charging of vehicles. So, we already started doing that, and the first ones are going to be implemented. But when I first heard about it, it was in Utrecht, where they had this, maybe you know it, but it was with the carsharing scheme. They have an electric, shared cars, and they made a kind of Tesla battery, and they put it near the Jaarbeurscenter in Utrecht. And I think it was quite successful, that they made a kind of combination. And when I first heard of that, it sounded so simple but also so logical, that I was quite impressed about it. Let's say, I am not an expert, but I hop really that it might also influence the way of using the whole energy network. Because now we build for the peak. Sometimes we have to build new electricity plants, because there is too much demand on peak hours. And this could be a very nice way of getting down the peak and having a kind of balanced energy consumption but also production. So, I am not…I am living in a housing project, which is also environmentally friendly. So, I have a washing machine, which also works in that way. So, I have solar cells on my roof. I have a smart washing machine and I can program it in such a way that it only washes when the energy consumption is low. It doesn't wash at peak hours. That is also a way of not demanding too much energy on the peak hours. Yeah, I believe in these kinds of things.

I: You can also use that for cars or for charging, yeah. So, what is the future of shared vehicles, vehicle sharing in Zwolle? What do you think? What are the potentials and problems?

E: Now, we are quite ambitious. We also signed the green deal for carsharing. There is a kind of national carsharing program, and we are one of the cities which participated in that. We also have goals, as to the number of cars, which we want to achieve in a number of years. And through projects like Assendorp and other community projects, we want to raise the number of shared cars. And also, as part of new housing developments. So, we have now one housing development, where carsharing is part of the concept. So, everybody who comes to live there, is offered car share. And we try to lower the number of people who have a private car. So, we do not have to build too many parking lots. So, we are quite ambitious about it. But of course, the setback could be, or the problem could be, especially now with Corona maybe, if people are willing to use it. Because, it

is not their own car, there are a lot of thoughts people have about it or maybe problems they have. The car is not there if you want to use it, or it does not smell like you want, or it does not have the features you want. Or somebody makes a mess of the car and when you use it, it is not clean. Things like that. So, I think, it is good then that people try it, and when people try it, they see the advantages of it. And maybe they can drive an electrical car, which they could not drive when they do not have the money to buy it themselves. So, you have to look at the positive thing about it. And of course, the costs. It is much cheaper than having your own car. But that are the advantages and disadvantages. Our ambition is quite high.

I: So, that is also the same with electric vehicles then, or what is the share of electric vehicles in the shared vehicles?

E: Huh, not very high now. We have Greenwheels, and they only have…they did not choose Zwolle as a spot where they have electrical vehicles. They have it in Utrecht I know, but not in Zwolle. It is only by peer to peer carsharing that you see electric vehicles. I use carsharing, and I have had an electric e-Golf sometimes. So, I know, there is maybe five to ten percent, not more. The majority of cars is just…yeah, we have now one carsharing company, but it is more for businesses, which use electric cars.

I: But do they decide that on their own or is the city, the municipality participating in deciding whether it should be electric or non-electric?

E: We try to promote it, but it is hard. This particular carsharing company, they were invited by us to provide cars in a business area. And that is a kind of pilot for us. But they actually…we provided the spots for them, and we have a kind of platform, where people can…their little…maybe you have heard about Hanzeland? It is also an area, that is called moves, and this is in the project moves. Moves is a kind of Private Public Partnership. And that is in a neighborhood near the station of Zwolle. South station. And we also made little mobispots, mobihubs there, where electric share cars and also electric share bikes. That is also, when you go to Zwolle, but I can also send you some documentation on that?

I: Yeah, that would be perfect.

E: It is another project, it is not in Assendorp and not Kamperpoort, but it is more focusing on business. Some people are living in that area too and we want more people to go to live there. It looks a bit like Stripe-S. Did you hear from Stripe-S?

I: No.

E: It is the former Philips factory. And we developed the whole area as an area where people live and people work. And very focused on electrical transport and innovation, because Philips is also part

in that. And the same organization was responsible for mobility organization in Stripe-S, they're also now involved in Hanzeland in Zwolle. So, we use a lot of their knowledge for mobility spots and carsharing.

I: Interesting! I will look through that also for my policy review part of the thesis.

E: Yeah, you should do it, that is in Eindhoven, and it is Stripe with a long, I do not know what it is in German, but you can find it, it is the former Philips area.

I: Yeah. And, I just have to check. Yeah, I think we discussed the topics I wanted to discuss for mobility as well. So, I would like to have a conclusion. The concluding question for me would be to ask you what your general opinion on neighborhood hubs in the conceptualization is I introduced you to, or you have developed in…

E: Zwolle.

I: …cooperation with &morgen and in Zwolle as well.

E: Very positive. You're not surprised about it I guess. I think the study they did proved for me that at least the concept is worthy to develop further. You see it in Zwolle, but you see it growing, also the Province of Overijssel, they were, partner with us. The province is responsible for public transport. And they're looking at new ways of bridging the gap between public transport and carsharing. And they also believe in mobility hubs. So, I am quite optimistic about it, that we can really achieve a few…we are aiming now at two pilots in the next year. We are asking for money now, to implement at least one pilot in Assendorp. Maybe in the van Karnebeekstraat, because there is already a small hub in the van Karnebeekstraat, it is one of the other mobihubs that are on the map. Or near the cloister or near the monastery you indicated, and one at the highway. That was the other example that you (incomprehensive). The A28. So, I am quite positive and I really am also positive about the challenge…the possibilities to really develop a mobihub next year.

I: Cool! I will definitely go and visit the mobihubs that are in Zwolle already and will be looking forward to learning more about it. I would like to go to the second part now. Could you please open the link I have send you yesterday?

E: Yeah, but you cannot see me anymore then. But I can hear you. I am now going to that…so I am still there, but, let me see…

The interviewer explains the software used to the expert and the expert opens the link send to him. Moreover, the visual structure of the task is explained.

I: And the question I now have is, which of the indicators I have listed here, but also additional ones, you find most important for a location of the neighborhood hubs. So, which of these things should

be located close to a hub? And I would like you to rank them in the order of one to five. And I have written down some definitions on the left side for what I understand as these indicators. But you can also, this is what the purple one is for, but you can also add several others if you disagree with the ones I have here. I would just give you some time now to think about it, read the definitions now and ask questions if you have some.

E: Yeah. Did you develop it yourself, or?

I: So, part of it is from the conceptualization, so amenities are of course within the concept of the hub, but I thought for example it might be useful to put hubs close to already existing amenities. But others are more that I derived them from scientific research about TOD, Transit Oriented Development, and policy context. So, these are basically based on the literature review I have done on the topic of Transit Oriented Development and neighborhood hubs.

E: I am thinking of…because what I do not see on the list is the parking problems. So, what we discover is having parking problems, people complain about lack of green for children to play or of course heat stress as well, but it is all caused by parking. Because there is too much demand for cars, and there's not enough space. So, either I would add that, or we could combine it with proximity to heat stress. But heat stress is not something people…well, the last couple of days of course, people had a lot of heat stress, but not through the year. It is not one of the main problems. Sometimes it is water, too much water, it can be heat stress, but parking I would say, too many cars, too many cars in the public space, so you do not have space. I would say that is an important indicator.

I: So, you mean by that that new hubs should be placed where there is pressure on the public space due to parking?

E: Yeah. If you can do that yourself, then I can think.

I: Of course!

E: And of course, the other side of it is the proximity to heat stress, or other things, because, if you have a lot of cars parked, there is a lot of stone, you have to need parking lots, and things like that. So, the first reason is proximity to parking pressure. I would put that on one. For me, yeah, the other part would be a kind of combination of the urban green spaces and the heat stress of course. A lot of people say, they complain in Assendorp, there is a lack of playing facilities for children and green areas, parks for instance. So, I would…yeah also maybe that, the green one, and then also add facilities for children. And that has to do with demographic factors as well. Because if you have an area where there are a lot of people with children, with family, then that can be an important reason too. Also, space for children to play.

I: Would you use that as the same one or is it a different indicator?

E: Yeah, of course green spaces can be used by children. So, I would, yeah, maybe you could combine then or something. Then, I think the population density is important too. Yeah, because you have to have a number of people living in walking distance from a spot to have a good use of it. And mixed use, I would say that is the next one.

I: Okay.

E: Yeah, and the last one then proximity to new residential housing. If there is a possibility, like for instance the example you showed about the…near the monastery, if we build new houses there, that could be a nice way of implementing a mobispot. Because these people might then be open to new solutions.

I: Yeah, of course. And also, because you can start from a blank, not blank, but you can start easier than implementing something new in an already existing area.

E: But I also use this as well or I choose this because we choose, in the future we have to build 10.000 new houses in the next ten years. And we want to build all these houses within the existing city. So that would mean that all the new residential housing will be in the city. So, all these houses will be there, the people going to live there, they are close to the station, they are living in neighborhoods which are already quite crowded. So, we try then to persuade them to use as less cars as possible. Or maybe we put it into regulations almost. Low parking facilities there or the number of parked vehicles is low. Okay, this is my score.

I: Yeah, these will be used, I will ask a lot of other people and then the end result will be also five of these indicators, and these indicators I will try to research in a GIS analysis. So, for example, put all of these five things into a GIS map and then map out which of the spots in the area are good spots for a neighborhood hub. And I hope that this will, might be a new methodology for finding a spot for a neighborhood hub.

E: Of course, public transport spots are very important too, but you have to make it to five, so, it is not that that is not important, but for me it ranks a little bit lower.

I: So, we could say, transport stops belong here, as number six.

E: Yeah, because it can be an added value, that you…of course, the type of public transport…we are now working on a taxi type public transport, where you have no bus stops anymore, but you order a kind of taxi bus. So, you could have stops like that combined with a mobihub, where you can use such a kind of a taxi, which is a kind of public taxi. These are new. Maybe you could also add that we should look at new forms of public transport, like, not big busses. At times that is also a type of public transport which is between the carsharing and the bus. Small vehicles which can

also take passenger but also goods and combine it with logistics for instance. That is also something we are looking at.

I: Interesting!

E: And I miss also in this part as well the logistics part. But it could be spots as well where goods are being delivered from outside bike the neighborhood to the neighborhood, and then the last mile is being delivered by for instance or that there are lockers where you can pick up your goods at the mobipoint. So, I would add, as an indicator, a kind of logistic analysis. That you could say, in Assendorp, we made a kind of profile, &morgen did that too, about how the logistics were organized with the shops which are in the neighborhoods. And if that is a feasibility then to have a kind of logistic hub, then that could also be an added value to the mobihub.

I: Yes, of course. Yeah, the logistic part actually, I was more, I totally agree that it is important, and I was also thinking about including it in the conceptualization, but I have actually not thought about including it as an indicator, so that is a good point that you named that, so I will add that here.

E: Yeah, it has something to do of course with the spatial density or mixed use. Like, Assendorp is a neighborhood, where you also have shops and supermarkets and things like that. Sometimes you have a neighborhood of course where you do not have shops, or factories or companies. But Assendorp has quite a lot. They also have schools and other amenities. Offices, and they also have logistic needs. So, in this sense, it has to do with mixed use as well, but logistics I think it can be an important feature as well.

I: Okay. So, if do not have any other indicators…? I think we painted a very good picture with the ranking. So, yeah, I would like to thank you for your time.

E: Yeah, you are welcome.

I: Yeah, if you do not have any other comments, I can offer you to send you the finished research, when I am finished, that might not be before October.

E: I would really like that, because I think it is positive that you chose this as a topic and I am quite impressed about the way you deal with it, and this method as well, so compliments for that. And I still have to, I could bring you into contact with expert 6, who is my colleague on walking, accessibility of the city. Because neglectable expert is, I think today is his last day in the office. I forgot to bring you into contact with him, I know he was quite busy too. But he is the parking officer. So, he is responsible for parking. But expert 6 is still there and she is quite willing, to…and I will speak to her in a few minutes, so I can send her your information and then I give you her email address, then you can contact her yourself. She is involved for instance in neighborhood

development and goods from the shops to the houses for elderly and for people who have Alzheimer's and something like that. So, I think that is important in this respect.

I: Yeah, I have seen her, there is a video of her, where she introduces her job, at the website of Zwolle. But I did not find contact details. That is why I thought…

E: Yeah, I saw your question and sorry that I did not respond to it yet.

I: No worries.

E: I will bring you into contact with her. That is for neglectable expert, we will have to do after a week or three…Or there is also neglectable expert 2, he is responsible for the loading of the electricity, charging of the public space. So, I could also bring you into contact with him.

I: Oh, that would also be very interesting.

E: He just started, just two months ago. It is a new topic for him, so he is not in that sense an expert, but he has to develop also a new method of deciding if we are going to charge the vehicles in the streets, or on charging areas, like on squares or near mobidots. So, it could be a possibility, that he, to include that in your study. And in that sense, you can help him making up his mind, and talking with him about this.

I: Yeah that would be good. I have also interviewed an expert on electricity networks. On the topic of charging electric vehicles. So, I have gotten a bit of expert knowledge on that, but it would be very interesting to talk to someone about charging elextric vehicles seen from the mobility but also from the energy network side.

E: Yeah, we have another one, expert 5, he is more the expert on energy, smart energy, and things like that. As I said, neglectable expert 2 is just started, and expert 5 is experienced on alternative fuels as well. So, I could give you both names and you can get in contact twith them.

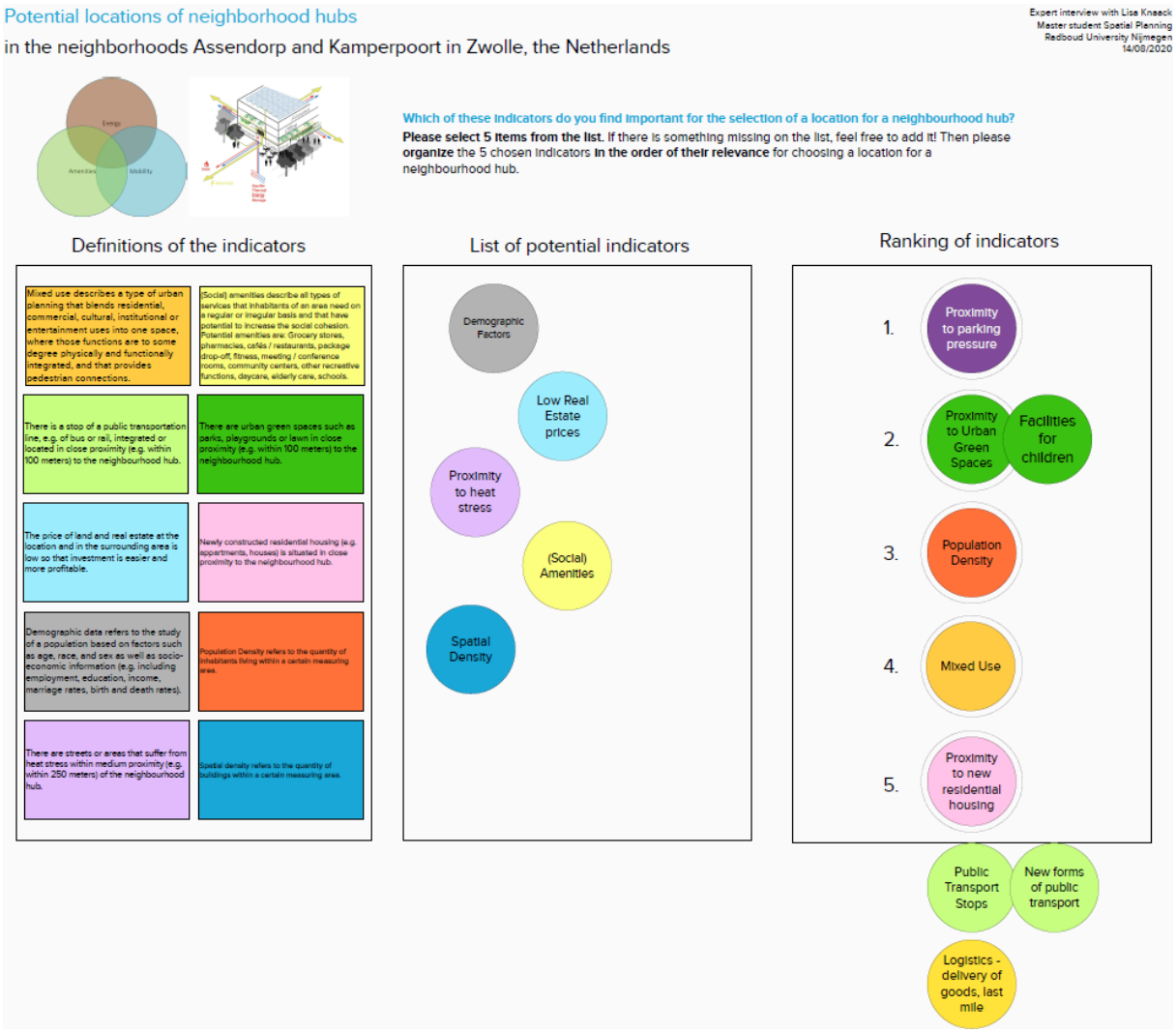
I: Yes, that would be very good.

E: Okay, you are welcome.

I: Okay, so yeah, again thank you for your time, we made it in about an hour, so that is very good.

E: Okay, very much success.

Appendix 15: Expert Interview MURAL board Expert 2



Appendix 16: Expert Interview Report Expert 3

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 19.08.2020

Place: Digital meeting

Time: 12.00 am

Duration: 56:20 min

Atmosphere

The interview atmosphere was informal, and the tone of conversation was friendly and polite. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was adhered to and the expert was able to answer all questions.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: And I have a little presentation, but I guess, I will ask you as well to explain a bit of your background later, although I have some information from Willem, but yeah, I would just explain some parts of the conceptualization, I use in the Masterthesis, which is basically the conceptualization of the neighborhood hubs of &morgen. But just to have an introduction for our interview, I would like to discuss this. So, what I am focusing on is finding a methodology for finding locations for these neighborhood hubs. So, what is a neighborhood hub? You of course know that, or the conceptualization is also the conceptualization from Zwolle, or is basically more from Zwolle than from &morgen.

E: Yeah, we share the same…they did a study for us, focusing on Zwolle. I recognize the picture.

I: The image, yeah. So, the idea is to combine topics of energy, mobility and now I called it amenities, but actually it means societal aspects into the hub. And on the right-hand side is just a conceptualization. And what I understand as the three layers of hubs that can be useful for Zwolle are the city edge hub, the stadsrandhub, the public transport hub of course and the buurthub. And of course, each of those has their own amenities, potentials, whatever connected to it. And these are just some conceptualizations I think &morgen did for what kind of functions could be connected to the hub. And I think these are all important, but what I am focusing on is the buurthub, the neighborhood hub as I call them in English. That is the best word you can find, although I think it is hard to translate. And there is a lot of topics connected to this and I really like this scheme because it shows that there is shared mobility in all kinds of forms, so cars, bicycles, scooters maybe. So whatever mobility you need. So whatever mobility you need there, you can put it there. There are amenities in the hub, such as a fitness studio, office, daycare, and of course that also depends on the situation. The shared vehicles can be charged at this hub. So, this is an important characteristic, and the energy should come from PV panels or other sustainable energy sources. Potentially they can also be there so that the energy is generated at the hub. And what also is connected to the topic is the geothermal heat production, that could support the whole neighborhood with heat. And I think you have probably seen these pictures, so this is the place in Assendorp before, and this is the nice scheme &morgen made for how it could look like after. And I am focusing on, as I said, finding a methodology for finding suitable locations and afterwards I am testing the methodology in the two neighborhoods Assendorp and Kamperpoort, which is why I included this nice picture here.

E: May I ask you a question? Why Assendorp and Kamperpoort?

I: Basically, because &morgen was, is working on the two neighborhoods and we discussed what I could do about the topic of neighborhood hubs. And they thought that maybe it could be a good ad on for Zwolle as well. If you find out, how you do that in a scientific way, which indicators are very important, how indicators can be measured, and then what the end result is. And the idea of the

end result is then a map with a ranking of all the potential locations and these locations all have a grade from one to five, and you see, which one is the best. Which ones are situated at very good locations in terms of the indicators I had a look at during the thesis.

E: Ah, interesting.

I: And the idea with the expert interview is to discuss first some of the topics I just showed you, electric vehicles, shared mobility for example, and then afterwards ranking some of the indicators. Therefore, we will need the link I have send you yesterday, but we will look at that later. But first, I would like to ask you now to give me a short introduction of yourself. I understood it as far that you are working for Zwolle and you are also working on the project, &morgen is working on.

E: Yeah, correct. A little bit by myself, I am 44 years old, I actually live in Zwolle. But in the north, in Stadshagen. That is a neighborhood that is still developing and only has new buildings, so it is not like Assendorp. So, I think the aspects of neighborhood hubs will not be working here as much because there is a lot of space in here to park your car, and everybody has one, two, or maybe more cars. So, I am working…this is my third year. Just starting my third year at Zwolle. I have been working at a company just like &morgen for 17 years and I have seen lots of…how do you call gemeentes?

I: Municipalities.

E: Oh, municipalities. I was working two years over there and then three years over there. And then I thought, but I want to build something. And I had to, my priority was to…nearby…so not to travel one, one and a half hours a day in a car to get to my job. And now I work at Zwolle and that is 20, 25 minutes' drive by bike. So, that is only for the better. So, no pollution, fitness and health is better, I am very happy. And the aspects of the hubs, where Willem and I…Willem has started on, is something I would love to realize here in Zwolle. Maybe in Assendorp, or maybe Standsrandhub, as you called it, it was one of my aims to realize before I retire.

I: That is nice aims!

E: Very large ambition, because I still have 20 years to go. But it must be able to realize something like that within the next 20 years, I hope. But we have to talk about money, and who is funding it, and maybe the biggest problem. Everybody wants it but who is going to pay for it? If you make it larger, and you put more…

I: Functions into it, then it is more expensive.

E: Yeah, it is getting more expensive and it gets more difficult to get everybody on board. So, to say. If you have one or two stakeholders, that is no problem, but if you have four, five, six, seven or more, it is getting more complex. So, I am not thinking that will be realized in one or two years, but for

long-term I think it is something that every city in the Netherlands is thinking about as something to realize. So, I am very curious what your results will be!

I: Me too! I think there is a lot of research, or not research there is lot of policy on it, like, especially from Provinces there is a lot of focus on the topic and municipalities are also focusing on it. But I feel there is a lack of scientific research on it. There is like, Transit Oriented Development, which is basically the big topic where it is situated in, but it doesn't really have a relation to these hubs, it is not the same, because TOD is normally US, very US specific with large stations and everything. And that is why I thought it would be nice to do something scientifically, just to support municipalities as well.

E: Yeah, I think you are right. And I think that inhabitants of a city do not see the larger picture in it. Everybody thinks that owning a car and parking the car nearby, they feel it like freedom, a feeling of freedom. And if they have to park the car in a hub, on a two minute walk or a three minute walk, the think that the government is taking their freedom away, but during the Corona crisis, we are still in of course, people are realizing that when they are more at home, and the streets are empty and it is more silent and there is more space for walking and cycling, that is also a big, how do you call it, advantage. So, maybe there is a transition going we did not plan, but it is getting a spin off. So, maybe this situation will give us some more space to get on with it. But that is, we will see.

I: Let us hope for it!

E: Yeah, we will see next year. But in the center of the city, you are noticing already that people are thinking more about other ways of…the polluting cars were gone for a while and the generators on the cooling trucks were gone and later on they got back and everyone was like "God, it was so quiet in the city!". So silent. So, even the transporters are now thinking "Hey, we are getting complains about the cars being back" and everybody found out how it is also possible. And maybe it is getting some spin off. But let us hope the Corona crisis will be over soon and we take the benefits of it in our pocket and realize some hubs in the next few years.

I: Okay. Yeah, my first question, so I have divided the questions as well into societal, energy and mobility related topics, and the first question would be what you think are the potentials and benefits of adding societal functions into the hub? Into the small neighborhood hub?

E: Yeah, I think in German or Dutch you call it reuring. There is more, people are getting more lonely, everybody's on themselves and especially in the neighborhoods like Assendorp, there is a great community feeling, but they are now, the shops are all going to the center of the city, and the groceries and little bakeries are leaving the neighborhoods. So, maybe when you can combine those things and people can come together and socialize again, I think that is one of the main, maybe the most important ways to get people connected again. Well, we are talking like this, but

we are connected, we are more connected than ever before, but we are not meeting really, like meeting and talking, and I think that is in those neighborhoods, there is a great community feeling, but there is no place to express it. And in the new areas we have community buildings, where people can meet. But that is all developed in the, during the renovation of the neighborhoods. And in the old neighborhoods, there is no real space. So, when you combine those things, they can shop, they can meet, they can recreate, it will be, I think a great combination for people to come to. So I think that is one of the main advantages. And when you go there because you've parked your car there, it is more easy to get a cup of coffee, or you can combine things. You park your car there and you start walking, you can walk with other people, like, let us meet there, and then we will walk to a nice park or whatever. So, I hope that is one of the main focuses for the neighborhoods where there is not much space and recreational business in the neighborhoods, that is one of the spin offs, a hub, which you can put there. And also, but that is not socializing, but those old houses do not have storage for bikes, for example. They all have to park their bikes on the streets or maybe they have a very little garden at the back with no alley, access to the garden. So, they do not buy a bike because it is rather expensive. They have to park it on the streets, and they are afraid it could get stolen. When you have a community building where you can park your bike, then people can, are more eager to buy, to go cycling, and by bike. So, that is one or two things which I think that is probably an advantage when we have hubs where people can go to.

I: And do you see problems in this? On the social side? Could the hub have any problems or cause any problems?

E: Yeah, everything can cause problems. So, maybe there is noise, when…for example, early on, you had youth…jeugdhonk, how do you call it in English? Places where youth can get together and there was always people shouting, smoking outside, drinking, and people in the neighborhood were complaining at the government, because of the loud noises later on, but when those youth locations all closed, they went to another place…

I: To the parks for example?

E: Yeah, where the children used to play, on the playgrounds, that is where the older youth was going, because they had a shelter, or they could just hang out there. And those became the next problems, or the parks, the lakes. In Stadshagen we have a nice recreation area, there is a lot of complaining from the people who live around it. So, yeah, there could be these problems. And the accessibility has to be good, for cars as well as for bikes. So, you can't center a hub in the center of a community. It all has to be on the sides. So yeah, probably, when you start with something where you do not know what it is going to be, there will always be starter problems. And you are trying to minimize that but there are always things you have not thought of. Maybe, the scooters are getting more and more electric, but if there is four or five scooters leaving at a hub, the people around it will

complain about the noise from the scooters, when they are still on fuel. But I think here was the focus on the advantages and not on disadvantages from something like that. But you have to think about it, but not focus on it.

I: Yeah of course. Because otherwise you can just not realize it.

E: There is always a reason not to do something. And let us find reasons why we should do it. And that is where…I hope you are focusing on as well. Laughs.

I: Yeah! So, what is on your opinion a, is there something specific that would be important to make a neighborhood hub a vital place? So, what is needed to invite people to go there?

E: What is needed…well, as I said before, the accessibility. People have to get there and leave there easy. So you do not have to…and that also has something to do with opening hours, if you park your bike there or whatever, and you are coming home late at night and you want to take your bike out, it should be closed, because you are arriving at the station with the latest train arriving in Zwolle at midnight and you can't get your bike because it is closed…

I: You are standing at the station…

E: Yeah, you will not park your bike again there. So, that is one of the things where you have to look after, the opening hours, I think in general I think they call it "broken window theory", when there is a broken window, the whole neighborhood is going down. So, it has to look nice, it has to give something rather a feel that you are welcome there. And not has to be some backdoor with a dark entrance…so it has to be well accessible, well maintained. And I think, well that is I think the most important, thing, opening hours, the accessibility and the look and feel of the hub. It should not be just a few parking places for a bike on a dark alley in the back of a neighborhood. Because people are not feeling safe there.

I: Yeah. Also, a bit of a feeling of surveillance. That there is not only the backside of the houses, but also balconies for example, so it is not…

E: Yeah, social…

I: Social control in a way.

E: Yeah. And maybe real control. There is a doorman or something, how do you call it in English? A portier. Or someone who is at least till 12 there and providing you, opening the door and saying hello to you. In Zwolle we have, at gasthuisplein, we have a bike parking indoors. And I think it closes at eight o'clock. I think it is because at the night, it is not "save", people do not like to be alone at 12 o'clock, and people have been drinking. There always have to be two and then the costs all go up. It is all a big discussion in Zwolle, what should be the opening hours, should there

be one or two people. We also use a lot of people with a little distance to the arbeitsmarkt, how do you call it?

I: Yeah, I understand what you mean.

E: But you cannot put them there alone at night. They always have to be accompanied by one or two people who are fully equipped to accompany them, to cope with people who are causing trouble. Socially, that is also a big problem, or "big problem", but something you have to take into consideration.

I: Yeah…And about the topic of energy, there is, as far as I understood it, the idea that the electric vehicles can be charged at the hub. But in how far is it realistic to adapt the electrical system to charging vehicles there?

E: Well I think that is one of the main focusses of the next decades. More and more people are using electric vehicles and what we see in the existing parking there is not enough energy to charge all these cars so there can only be a few, maybe a handful, a dozen, parking places to charge the cars. So, when you design a hub, you have to think about…

I: What the demand is?

E: The demand and the capacity of the electricity network. But then again you can also use those cars. We are now talking about Grid to Vehicle, it would also be nice if you could also use the cars, the Vehicle to Grid, to use the energy from the cars, when they arrive at five or six in the evening, and everybody starts cooking, and I do not know, the lights go on in the winter, use the energy from the cars to the electricity net. And then when everybody is asleep, then charge the cars. So, you can charge both ways. But you have to design the hub for it. And you have to design the hub maybe for 100 electric vehicles to charge there and not one or two. I think it is possible, but we do not do it. We have a very big problem in the whole world, because we all want zero emission in 2050, I guess, and we cannot do that just by depending on wind and what else. H2? I do not know. There will always be, we will always need electricity. For some, maybe it is periods of twenty years. But maybe there is some genius who thinks about how we can get H2 in an easy way. But I do not think that is going to happen in the next 10 years.

I: Yeah, probably not. And with designing the mobility hub or neighborhood hub according to the needs you mean in terms of capacity? Or do you mean other aspects as well?

E: Yeah, I think capacity is one of the main focusses, I think.

I: So, yeah, it is also a bit of adaptive, so there is enough space that you can add additional cars or charging spots in the next years, if you need them.

E: At this moment we are only realizing charging points when people ask for it. Because it is free for the government, because the company who places the electric charging points, earns their money from selling electricity. So if we just strategically place those charging points and we do not know if anybody is going to use them, it is just the company who tells us, we are not selling any power there, probably, so, you pay for it. But realizing a hub that is one of the things we are focusing on, so we have to invest in it. And we also have to invest in larger cables maybe and more power adapted to it. And in the beginning just make ten charging points but taking into consideration that in the next years there will be maybe 20, 30 or more people who use that point. And you can also use it to tell people if you have an electric car, there is enough space, so park your car over there and we are not going to place on the street a charging point. No, take the electric car, you go to the hub, it is just a two-minute walk, and there is enough space over there.

I: Yeah. Also, I think it is consuming less money and less capacity if you put it at the hubs. The charging stations, and not on the streets?

E: Well, maybe? Why do you think that?

I: Sorry, not on the streets, what I mean is…I read a study about if everybody gets their electric vehicle and charges it at their own home, then this building of the infrastructure to support this energy use would be more expensive than putting hubs and people can go there and charge their car there, because then you do not have to invest into the whole infrastructure.

E: Yeah, correct. Otherwise you have to upgrade the whole infrastructure, from every street and every house, and when you place it in a hub, you just have to place an extra cable maybe, I simplify it, but you take an extra cable from the electricity point to the hub. I think it is less expensive. And maybe you can combine it with large batteries, which will be generators for the solar peak in the summer or on a bright day, place a large battery that you can charge on a solar energy, and in the evening you can take the power in the battery and use it for the houses and charging the vehicles. And then during the day, because I think especially in Hessenpoort, we have so many solar panels, or PV panels, as you call them, there is, we have overcapacity. And what we do with overcapacity. We cannot, if you have lots of energy, but nobody's using it, what do you do with it? You are just throwing it away.

I: Yeah, it would be more useful to use it at some other point of the city.

E: Yeah, at this moment, I do not think we can, the overcapacity from the PV panels, I think nobody is using it. You are just not using it. Or you have to make H2 out of it, that is where we are looking at now. How we can use the overcapacity of the solar panels to generate, how do you call it, waterstof?

I: Yeah…

E: H2.

I: Yeah, I do not know the English word right now. But it is the same word in German.

E: No problem.

I: And the concept of shared mobility, what do you think about this, in terms of, what are the potentials and problems for Zwolle using shared mobility?

E: Yeah, that is also difficult. As I told you in the beginning, people like to think that a car gives them freedom and they are not looking at the actual costs of a car, they are just looking at the costs when they go to the fuel, to the gas station. And they fill the filter and they say, oh, just 60 euros, or just 80 euros. And they are forgetting about insurance and all the extras. Yeah but those are monthly costs, and they do not see it on their mobile, they do not see it on their Handy, as you call it, but they are not looking at it. They are only looking at the out of pocket costs. Well those are not really this much because everything is payed in advance or in a monthly basis. So when you are looking at the actually costs of owning a car, people should think…especially the second car, which is not very…We also have two cars and we almost never use the second car at this point. We bought it when I was working in Utrecht, and my girlfriend was working in Apeldoorn, and we needed two cars, we had one lease car. And we owned one car. And then when my lease car was gone we bought a second car and now I go to work on the bike every day and the second car, we use it once or twice a week for, because we can, not because we have to, but because we can. And I think that it is something a lot of people do. They do not need a second car, they just have it because, yeah, you can sell it, but you are getting a few euros for it, but…

I: You might use it at some point again.

E: Yeah. I can. Because. And when you have shared mobility, you have to pay…

I: A monthly fee?

E: Yeah, a fee every time you use it. And people think, ah, it is very expensive. But when you use it once or twice a month, for a small amount of money, I do not think it is that expensive. But people are also afraid I think, that when they want to use it, there is no car available. So, you always have to have enough cars available at any moment. And that is the big question. How can we manage that? So one Greenwheels car, one snap car is not enough, you have to have a wide amount of cars and sorts, because some people want just a small city car, and the other wants a big family car, because they have to go with five kids to a holiday party or some people just want a Van, because they have to move something. And maybe you also have to have a wide variety of cars available. But I think, especially when you look at neighborhoods like Assendorp or the center of Zwolle, yeah, it is not possible in the nearby future to own two cars, or maybe even one car. If you want

to have a car in front of your house, you just have to look for another place to live than Assendorp or the center of Zwolle. You just go living in Stadshagen and be my next neighbor. So, I think what you are seeing right now is some transformation in the concept of thinking of people. But it will take some years still to get adapted to it, for everybody. Also, for me. Because I am not selling my second car, for no reason, I just do not.

I: Yeah, basing on this, what is your general perception towards mobility or neighborhood hubs, or mobihubs, I think you call them in Zwolle. Is that something, like you said, you want to realize several until you stop working. Is because you think the idea is future proof or what is it?

E: Yeah, I think it is future proof. Every year, everybody is saying, this is, we have reached the highest level of cars and the highest miles traveled by car and there is no more space and there is no more room for extra roads, and every next year we see we are still building roads, the cars are still, every next year, there are more cars on the road, and it has to stop at some point. Because else we will just like in America, we need roads with 10 lanes each direction and our country is not big enough for that. So, it has to stop at some point, and people have to think about, the planners, the environment, it is not possible to go on like this. So, I think there is a future, and maybe we are seeing it, but other people are not seeing it right now. But there is change going I think and in the next years people will see it and will adapt to it, I hope.

I: I hope so too.

E: And the same goes with riding a bike or, what you see now, students in holland, Swapbike I think it is, we are not owning, the younger people right now, they are not owning, they are just leasing it. Bikes, cars, garden equipment, they are using it from each other, and maybe that generation will be like, I have to own everything myself. I just have to make sure to know where to find my car, bike or whatever. And when it is broken, I will just change it for another one. In bikes you see a movement like that, and in cars maybe also.

I: Interesting. That is an interesting trend, actually. Not owning anymore but using. Basically, a very, much more efficient, I think, than what we are doing now. In terms of usage of the things. I think a car stands around normally 95 percent of their time, or something, which is of course not very efficient.

E: No, and you consider that for every car in Holland, there have to be two parking spots at this moment. Because it is either standing in front of your house, and an hour later it is standing in front of the place you are working at. So, I think, when we have 17 million cars, we have 35 million parking places. And if you consider how much spaces that needs, we have to think about other concepts of working places and living places. We have to combine those as well. And then there is more

efficient use of the limited space we have in Holland, especially in cities. In Zwolle it is still okay, but when you look at Amsterdam or Rotterdam or Utrecht, it is going to be a problem then.

I: Okay. I would like to go to the second part of the interview now. Please do not open the link yet…

E: Okay, okay!

I: First, I would like, I am sharing my screen again, to start with you and gathering some ideas about what is your opinion on indicators and then afterwards we can discuss about the indicators I got from literature and other experts. But I would like to first ask you, from all what we have discussed now. If you we talk about what needs to go into finding a suitable location for such a neighborhood hub, what do you think are important indicators to measure? The question is also standing here as well, and I will just write down the aspects that you name.

E: Okay.

I: So, you can just think about it some minutes.

E: From the point of view of the people who live there, nearby? So, within a few minutes' walk? Because otherwise, people will not use it. From the point of view of the car owners, it has to be accessible quick from the main roads. I think it has to be on the outside of the neighborhood and not inside, because what you want with the neighborhood hub is to get the cars out of the neighborhood, so if you realize the hub in the center of the neighborhood, everyone is still driving there, drives through the neighborhood. So, you have to, it has to be on the side of the, on the outside of the neighborhood. And of course, it has to be nearby of the electricity network, or it has to be easily realized, to get the electricity to the hub. What more…I think that is…that is what I can think of right now. Maybe something will come up later, but…

I: Yeah, if you are done thinking, you can now open the link and then move to the second part of this thing here.

E: Yes, the MURAL link…?

I: Yeah, the MURAL link. You do not have to put your name there, I think you can use whatever name you want, and there is I think an explanation or something.

E: Enter as a visitor…

I: Mhm.

E: Okay, and I can see that you are adding, or editing.

I: Yes. And what I have actually done here is collected a list of things that literature says that could be important, so all of these things are either derived from literature or the other two experts I talked to before. And I wrote down some definitions on the left-hand side, to make it easier to understand what I mean by that. The task now would be collecting, reading maybe the definitions, if you think you are not sure what one of these things is. And then afterwards ranking these potential indicators here and tell me which ones are the five most important indicators for the location of a hub. So, which should be taken into account when I want to have a look at suitable locations.

E: And the ranking, is that random or is one also the most important?

I: Sorry, yeah, one is the most important, five is the least important but still you think it should be taken into account, because you cannot take all of them into account right now.

E: Okay. Let us…so, focusing on the location?

I: Mhm.

The expert ranks the indicators in the order of their importance.

I: Of course, you can add something if you think that something is still missing.

E: Okay, but now I did not use my own input, so that is not very handy.

I: So, I think the proximity to the electrical network, I will anyway have a look at. So this is already in there, even though you are not putting it on the ranking.

E: No, and the question is, if you look at location, that is focusing on the location alone, but of course there is always a reason why you should…because a hub in Stadshagen, it can be accessible from the main roads, it can be outside the neighborhood, and accessible by all modes and close to the electricity network, but it probably will not be used because there is no problem concerning spatial density, demographic factors, proximity to parking. So, I think, the things I have ranked right now are important to realize a neighborhood hub that will be used. That is what I have tried to do right now. Because the things I have mentioned before, they are also very important when you realize…let me explain it otherwise, you are focusing on Assendorp and Kamperpoort for a reason. And the things I just mentioned, I just ranked, are randvoorwaardelijk, how do you call it in English?

I: Mh…

E: You have to have some spin off…You know what I mean?

I: Yeah, yeah.

E: A hub in Stadshagen will not work but can still score great on the things I used, I named. So that is why I ranked it the way I did right now.

I: I was just thinking whether I can come up with the English word, but I did not find it anymore, but I totally understand what you mean.

E: You understand what I mean, that is the most important thing.

I: So, I would like to ask you for the five ones you ranked, or you have taken, so, you just says that these are the ones that are really needed so that it is working out. But why did you choose this ranking, why is spatial density on the first, and the other ones in this order.

E: Alright, let us look at the first one, spatial density. You have to have a certain amount of households in the neighborhoods so that people will start using the hub. If there are just one or two houses in a circle of two or three hundred meters, yeah, there will only be parked two or three cars, and that is not enough to realize a…how do you call that..?

I: Make it economically…

E: Yeah, actually economically…

I: Feasible?

E: Feasible, that is maybe a nice word! So, that is the first one, there has to be a certain amount of households in the neighborhood that will be at least able to use it and that will think about using it. So, that is the first. The second, demographic factors. You have to look at the households. If there is a lot of elderly people who do not own a car or do not use a car, then you can make a hub with parking places, but it will not be used, so you have to look at demographic factors. What kind of households to you have there.

I: Also, in terms of what you put there, I guess.

E: Yeah. And I am still focusing on a hub including parking places. So that is the, I think, also for you, something that you have to take into consideration. Because a hub can also be without parking spots. You can still put some things, combine it into a building, for example shops, shared mobility, and public transport, and then it is also a hub. But it is a different hub than with parking spots. I am focusing on a hub with at least some kind of parking places. Yeah, proximity to parking pressure, it is I think also important because if there is lots of free parking places in the neighborhood, people will choose to park their car near their house, in front of their house. We see it here in Stadshagen, people first use the parking places in the open air and just then look at the parking garages. I do not know why people do that, because they do not like to go into a built

parking place I think, but sometimes people drive around looking for a free place on the main road instead of using the garage. I do not know why.

I: Wow, interesting.

E: Yeah. So, the parking pressure has to be high in the streets to get people to use the hub. Population density. Well, that is a bit like the first two, but you put them as well. But just something else. The quantitative inhabitants, yeah, I think that is also important, because you need to have some population, it has to be again feasible for shops or parking places to be used. Or else, you will start a hub and two or three years later it will be bankrupt and will not be used again. And the last one, proximity to new residential housing. Well, I think, that is a way to finance the hub. If you also realize some houses in the layer three till five, six, seven, eight, I do not know how high we can go in Zwolle, but that is also a way to…I think we are doing it now in Wezenlanden Noord, it is a location that is being developed in the nearby future. There is also I think, 500 new houses, but there is also room for a hub, and there is still a lack of financing to maintain the hub, I am afraid. So, you have to have some, I think, lots of houses to finance a hub. This is a way to finance it. So, that is why I used those indicators. But all the other indicators that you already combined, and I just told, are also important I think.

I: Yes, of course. So, just to inform you, the idea behind this is now to, that is why it is also five, the idea is that I take the expert interviews and count how many times each of the indicators has been used, on ranking one for example. And then I have an end result, where I have five indicators that all experts found most important, and these I will then analyze in a GIS analysis. There is different methods I can use for that for example also for accessibility, there is the network analysis, where you can see how far you can actually go from one spot within five minutes for example. Which is then used to see what the situation is in the two neighborhoods and afterwards I can hopefully say, this spot, this spot and this spot are the most useful in terms of these spatial or population indicators, I have analyzed. And that is the idea behind the Master thesis.

E: Interesting, okay, interesting.

I: And that is also the ending of the interview, that were the questions I had for you.

E: Well, just within the hour, I guess.

I: Yes, I think we made it within the hour, so that is also perfect because I do not want to take up too much of your time. And yeah, thank you for you time, it was very nice to talk to you.

E: Yeah, when do you think, what is your expectation, to be finished with your thesis?

I: At the moment I am planning to be finished at the end of September, beginning of October, but I am not very sure whether I will make that. Because I am also working part-time for &morgen at the moment.

E: Ambitious. Okay!

I: In my internship, and that is probably a bit too much at the same time, but I will discuss that with colleague 1 in the next weeks. And I wanted to offer you that I can of course send you the research whenever I am finished, you can receive an email.

E: I would love to. That is how we always cooperate in Zwolle with any examination, we are glad to help, but we always like to see, what has come of our input and your study. So I would love to see that.

I: Yeah, and if you have any other questions, in the next weeks, if you think oh, she did not think about that, you can always email me of course. and yeah.

E: Okay, thank you, so that goes for me as well. If you have any other questions or would like to have something explained then I am looking forward to it.

I: Okay, perfect.

E: Okay, good luck with it, and I am looking forward to your report.

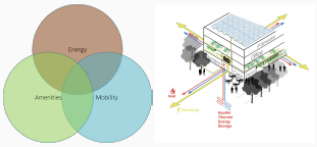
I: Bye.

Appendix 17: Expert Interview MURAL board Expert 3

Potential locations of neighborhood hubs

in the neighborhoods Assendorp and Kamperpoort in Zwolle, the Netherlands

Expert interview with Lisa Knaack
Master student Spatial Planning
Radboud University Nijmegen
19/08/2020

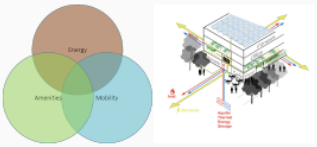


Which indicators do you find important for the selection of a location for a neighborhood hub?

Potential locations of neighborhood hubs

in the neighborhoods Assendorp and Kamperpoort in Zwolle, the Netherlands

Expert interview with Lisa Knaack
Master student Spatial Planning
Radboud University Nijmegen
19/08/2020



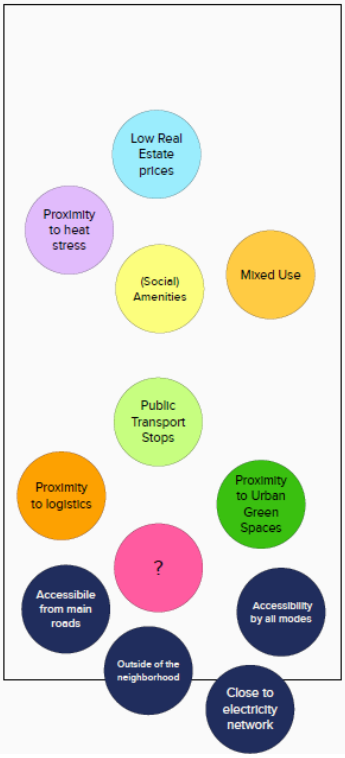
Which of these indicators do you find important for the selection of a location for a neighbourhood hub?

Please select 5 items from the list. If there is something missing on the list, feel free to add it! Then please **organize** the 5 chosen indicators **in the order of their relevance** for choosing a location for a neighbourhood hub.

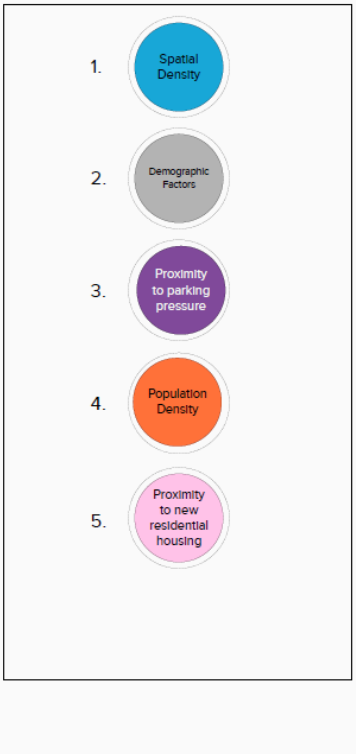
Definitions of the indicators

Mixed use describes a type of urban planning that blends residential, commercial, cultural, institutional or entertainment uses into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian connections.	(Social) amenities describe all types of services that inhabitants of an area need on a regular or irregular basis and that have potential to increase the social cohesion. Potential amenities are: Grocery stores, pharmacies, cafés / restaurants, package drop-off, fitness, meeting / conference rooms, community centers, other recreative functions, daycare, elderly care, schools.
There is a stop of a public transportation line, e.g. of bus, rail or of new forms of public transport (e.g. taxi bus), integrated or located in close proximity (e.g. within 100 meters) to the neighbourhood hub.	There are urban green spaces such as parks, playgrounds, facilities for children or lawn in close proximity (e.g. within 100 meters) to the neighbourhood hub.
The price of land and real estate at the location and in the surrounding area is low so that investment is easier and more profitable.	Newly constructed residential housing (e.g. appartments, houses) is situated in close proximity to the neighbourhood hub.
Demographic data refers to the study of a population based on factors such as age, race, and sex as well as socio-economic information (e.g. including employment, education, income, marriage rates, birth and death rates).	Population Density refers to the quantity of inhabitants living within a certain measuring area.
There are streets or areas that suffer from heat stress within medium proximity (e.g. within 250 meters) of the neighbourhood hub.	Spatial density refers to the quantity of buildings within a certain measuring area.
There are streets or areas in public space that suffer from high parking pressure within medium proximity (e.g. within 250 meters) of the neighborhood hub.	There are logistic facilities (e.g. delivery of goods, last mile delivery, lockers for delivery and collection of parcels) located in close proximity to the neighborhood hub.

List of potential indicators



Ranking of indicators



Appendix 18: Expert Interview Report Expert 4

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 20.08.2020

Place: Digital meeting

Time: 12.00 am

Duration: 01:05:37 min

Atmosphere

The interview atmosphere was informal and the tone of conversation was friendly and open. The interview was conducted and recorded using the video meeting platform Zoom. The interviewer took part in the meeting from home, while the expert took part from his office, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was approximately adhered to and the expert was able to answer all questions. The language of the interview changed between English and Dutch, because the expert often did not know the words in English.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: And maybe you have seen some of these pictures already, as I think you have been working on the project in Zwolle, the projects of &morgen in Zwolle as well?

E: Yes.

I: So, some of these pictures you might recognizes. So this is the conceptualization of neighborhood hubs, that I am using in my Master thesis. It is as I said, based on energy, mobility and societal aspects. I now call it amenities, because I think that is a big part of it. But there is also a lot of other aspects connected to it of course.

E: Mhm. Yeah…what is amenities?

I: Mh, voorzieningen.

E: Oh, okay.

I: Yeah. On the right-hand side, you see the conceptualization that &morgen uses for what they think is a hub. and I will discuss some aspects of this as well. And &morgen divide three layers, or areas of hubs, that can be distinguished. The first one is the city edge hub, which has a transfer function. Where you for example come with a car and then change from the car to the bicycle and then go on to the city. Then the public transport hub, where the same happens maybe, but with changing from the train to the bicycle, or you go the rest on foot. And the third one, they are also trying to introduce, are the buurthubs, the neighborhood hubs, and this is the focus of my thesis as well. So these are some general pictures of what the different layers of hubs can mean, and what kind of functions can be connected to them. So the, as I said, the stadsrandhub, with a transfer function also for logistics, for example. And the buurthub, the neighborhood hub, has also a lot of functions connected to it, in this conceptualization that I am using for this thesis. And the topics that are connected to it are shared mobility of course, with shared cars, shared bicycles and all other things you can share for example. Then amenities in the hub, can be connected in the hub. So, for example offices, fitness, a daycare, a café, but that of course depends on the place where you put the hub. Then charging of the electric vehicles, the shared electric vehicles is one of the main points that &morgen put into the conceptualization. And these shared vehicles are charged by PV-panels, zonnepanelen, on the roof and that is the idea, to use the hub as well as a battery for the neighborhood. And also, but this is less of the focus right now for me, they connect the topic of geothermal heat production, aardwarmte is het volgens mij. They are trying to connect this as well to the topic. And there is one picture they made for Assendorp…

E: I know the place.

I: Yeah, I thought that. For Assendorp, so before and after, what a hub could mean to the neighborhood as well. And in my research, I am focusing on Assendorp and Kamperpoort as the two case studies.

So, I am developing a methodology for finding these suitable locations, and then afterwards I am applying this methodology in Assendorp and Kamerpoort and then hope to find out which spots in the neighborhood are the best ones for a neighborhood hub. and I am trying to do this in a scientific way. I think I am one of the first people who are doing this in a scientific study, I think. So, I am a bit trying to find out, what are the right aspects of this. And that is why I am also doing the expert interviews. These are supposed to help me with finding indicators or finding aspects that are relevant to a location of a hub. yeah, so that was my introduction. And I would like to ask you now to give me a short overview of who you are and what you are doing, just in short.

E: Okay, my name is Arjan Broer. I live outside, just outside Zwolle, near Zwolle in the beautiful landscape between Zwolle and Hasselt. Yeah, outside the city, so green surrounding. And I built my house myself, for a great part.

I: Yeah.

E: Together with a company of course. but a very sustainable house from, a barn house. Do you know?

I: Oh wow.

E: From black wood. It has very sustainable energy systems on board. That is just something of myself, I live there with my wife and my two big kids already. And I work in the city of Zwolle or in the surroundings of Zwolle. And what I do is I work with…

I: Cities, municipalities?

E: Ik werk aan maatschappelijke problemen…with the people or with groups of people. Hm, mijn Engels is heel slecht at the moment.

I: Doe het maar op Nederlands dan!

E: Ne, maar het gaat wel. So, what I do is I go into the city and look at where are the problems, what kind of problems do the people have in their neighborhoods, in their streets. In this time, the people often have problems with less green, with climate change. Much rain, much water, too much water…I mobilize those people and we are going to work together. Together with the community of Zwolle, or another city or village. And that is what I also do in Assendorp, but then with mobility. On the theme of mobility.

I: So, on changing the behavior of people in terms of mobility?

E: Yeah. There are very much, veranderingen, changing all the time, with all those e-bikes, and the gevolgen ervan. Die enorme verkopen van e-bikes. And what we try to do in Assendorp together, to get the cars more to the side of the neighborhoods and in those little streets not anymore. So to

create more space together, for living in those streets, playing by the kids. Meer ruimte voor groen, meer ruimte voor klimaatadaptieve maatregelen.

I: Yeah. Okay.

E: And we open just, opened our first mobipunt, we do not call it hub. we call it mobipunt. I do not know if you have seen the video of it, or pictures?

I: The opening, yeah, I have seen pictures of it.

E: Yeah. It was very nice. We had a very special action. We organized it with the neighborhood. The people could get a Christmas tree instead of the car. That was very successful, people liked that. A Christmas treet as a present. But they had to park their car on the mobipunt for a couple of weeks. And ten people, or ten households did that. And yeah, it was nice. So, the first mobipunt is there already. But with…om de mobipunt aan te kleiden, we have already space to park your bicycle, you can go by bicycle to the mobipunt, to get into your car and go further on. We are busy with package…pakketkluizen. Yesterday we had a meeting to get more, laadpalen…the?

I: Charging spots.

E: Charging on the mobipunt. And also the sharing, carsharing cars. So, we try to…

I: Integrate this.

E: Yeah, the first mobipunt of Assendorp.

I: Cool, yeah, I am also planning to visit Zwolle and to visit the mobipunt. It was not possible because of Corona. I actually wanted to do a different topic, but that would have been more with interacting with people, and asking people on the street, but that was not possible because of Corona, so, I will definitely come and visit the new mobipunt.

E: Oh, nice. Then we want to guide you…

I: Oh cool, that would be nice. So, in terms mobility, we already touched upon that, the topic of shared mobility, car sharing, bike sharing. Where do you see potentials and problems of this, for Zwolle? What would you say?

E: For sharing?

I: Yeah.

E: Sharing cars, sharing bicycles. Yeah, most of the people are not ready for it. Or it looks like they are not ready for it, that is it, I think.

I: Why are they not ready?

E: Because they used to use their own car and their own bike. And most people want to buy something instead, or rent something, or lean?

I: Lease, I think.

E: Of lenen, lenen?

I: Yeah, I know the word.

E: Yeah, but it is…there are people who do it, who already do it. And yeah, that is good to see. There are already cars, snap cars, and mywheel cars, die al gedeelt worden.

I: Yeah. But what do you think about the coming years, for example the next ten years. Do you think this is going to change? Or do you think it is probably going to stay the same way as it is?

E: No, it is going to change, yeah, really. There are trends visible. Younger people who are, who like a nice bike much more than a car. The whole culture of also personalize a bike, or custom bike, yeah, I think that is a sign. Yeah. There are young people, who…die eigenlijk niet meer een auto nodig hebben, die zijn er genoeg.

I: And in terms of electric vehicles, which is also a part of, like, one of the it-topics, right now?

E: Yeah, it is booming, yesterday, we talked also with the guy who arranges also all the charging options in Zwolle. Yeah, most of the people do not like it at all, they do not want that in the street, because they are very fossil minded. But only the fact than an electric motor is much more efficient…hoe zeg je dat, efficient?

I: Efficient, yeah.

E: Than a fossil fuel motor. The cars who drive around right now, with petrol engines, and diesel engines. They are the energy of …. for 70 percent it is warmte, it is not…it is not…

I: It is not for getting forwards, it is lost basically.

E: Yeah, we are warming the environment.

I: Which is bad, because we are doing that anyway, right?

E: Not only with the gas, the uitlaatgasen, but also with the warmth of the cars. And the e-bikes, they are a hit, and it is booming. It is not going to change. It is going to change I mean. It is…niet te steuten, ik weet niet hoe het in het Engels heet.

I: Yeah. And discussing that, electric vehicles, shared mobility, also when you say, people do not want to have the charging stations in their streets. So, these are also potentials of the neighborhood hub, I guess, or the mobipunt, if you put them there.

E: Yeah, we want to put them there, so people are automatically, also with an electric car, go to the hub or the mobipunt.

I: Do you also see negative aspects of the mobipunt then? Is there something that is not beneficial to the neighborhood?

E: Depends on how you look at it. I think most people do not like it to walk 250, 300 meters for going to the car. Because of the rain sometimes, or you cannot look at your car, you cannot…

I: See whether there is any problems with it, yeah.

E: So…But naja, ik heb goeje mood, zeg maar. Ik denk dat het wel de goede kant op gaat, maar dat het ander niet, it is not going as fast as we want to.

I: Yeah, because people are changing slowly. It is not from one day to another, they cannot change. In terms of societal aspects of the hub, I think that is a very important topic, so that the hub is not only a parking spot, but actually adds something to the neighborhood. Like you said the one with the, the idea with the Christmas trees, that is one part. But what kind of functions do you think are beneficial that could be also gathered, at such a hub?

E: Beneficial, what is beneficial?

I: Societal functions.

E: Yeah, well, I am very, ruim denkend. The ideas by this first mobipunt, are well, parking, bicycles. The first mobipunt. We hebben afgesproken, that we have a surrounding of 250 meters, walking 250 meters, not more. But it is the first mobipunt, so it is for a bigger area than we planned. So that is why we…that is why you can also park your bike at this mobipunt, so you can also go by bike to your car. Well, also those, the pakketkluizen, the package lockers, I do not know?

I: Yeah, that is the word.

E: That is also a very, that is also a gift to the neighborhood, because those busses do not have to go into the…

I: Street, yeah.

E: Anymore. And that is also, that is…daar klagen mensen ook over, al die busjes die de pakketjes bezorgen. That is very good also that you can, if you park your car and you go to, you walk to your home, you can take the package with you.

I: From the same spot, where you park your car, yeah.

E: And well, maybe brievenbus. Often it is a combination. But also green. We are busy with the green, a green spot between the parking place and the, or the parking place for the, the normal parking place and the mobipunt. Nou, green has a good effect on people, because you are more healthy if you experience more green in your area. That is something we want to realize over there. We have talked about climate adaptation. That is really an issue, because…daar ligt al gasbeton, ken je dat?

I: Mhm, yeah.

E: Het water zagt al goed op zich af. Het ligt wel laag, maar het absorbeerd ook.

I: Where is that?

E: On the parking place, of the mobipunt. Well charging options. And also charging options for the electric sharing cars. Yeah. Hoe heet het…the sharing bikes, bicycles. Also, the cargobikes, the electric cargobikes. We also did a pilot with that in the Assendorperstraat. That is not at the mobipunt, but we wanted to do that with the ondernemers…

I: Shop owners there.

E: The people of the shops. Well, that was very nice also. Some people have, they have bought their own electric cargo bike now.

I: Oh wow, cool. And other voorzieningen? Do you see potential for such things as, say, a café for example in the future at the mobipunt, or do you think it is more like in the far future?

E: Yeah sure. No, it is…but everywhere it depends on what the neighborhood wants from the neighborhood. I am thinking right now...vanuit het eerst mobipunt. That is…yeah, specifieke situatie. You do not put a kindergarten over there right now. That is not a question, it is not…but I can imagine that if you have a space with a school nearby, or just another space that you also have a building, with, like your picture, with all those voorzieningen, yeah. Yeah, I can yeah. But we have to look, every time, we are going, we have planned six mobipunten voor Assendorp. Every time we have to look with the neighborhood, with the people, the companies there, what is necessary for that neighborhood.

I: Of course, yeah. So, the order of things is more like, putting a mobipunt there, with parking, then adding several functions that could be connected to it, such as sharing and then green. And then afterwards voorzieningen?

E: Yeah. Maybe we can arrange a community garden. Or maybe on the roof of a new mobipunt. That is what people tell me, if they think with me about the mobipunten in the future. That kind of things. It has to be green. Even it is having the look of a big parking building, you have to green it, on the sides and on the roof. Well, some people they talk about the battery for the neighborhood. Naja. Om het netwerk te ontlasten, met al die nieuwe producenten, producers of electricity, and also users of electricity. And yeah, as an answer on the energy transition.

I: Yeah, that is I think one of the points that they are discussing, to rather put the charging stations at the several points, and then improve the network there, instead of that everyone improves their own…like, if you charge your bicycle, electric bicycle at home, then it is…a lot of pressure on the network. And that is one of the points as well, right? That you reduce the pressure. From discussing the topic of neighborhood hubs, all things that could be connected to it, what do you think is really needed to make these hubs, yeah, functioning in the next years? What has to happen?

E: What has to happen…well, I think that the community of Zwolle…has to…moet gewoon meer ventileren, van wat, hoe de toekomst eruit ziet. What the future looks like. Because they want…that the eople do it by themselves. For the greatest part. But it is good for the people that there is the spot on the horizon, where we are going to together, that it is more clear for the people, for the community has a, yeah the gemeente Zwolle has a, in my opinion has a role in there, daarin zeg maar. They have to…

I: Support the people?

E: It is very important that we change those streets, that we put the stones out if the street, add more green. We do that all together but know that we are moving together to a point in the future. So, people can conclude by themselves, then I have to put my car away or to the border of the wijk, of the buurt.

I: Yeah, okay. If you do not have any other comments on what we have discussed until now, we can go on to the MURAL task. Please do not open it yet, because I will share my screen again. and you can, I think you should see it now. The task is divided in two parts. First, I would like to ask you to brainstorm indicators, that is what I call them, so aspects that are important for selecting a location, for a neighborhood hub. and afterwards we will go to a list of indicators, that I have from the literature and what other experts said, and then I would like you to rank these indicators in the order of their importance, but that, we can discuss then. So, the first question I have for you, is to brainstorm for a few minutes, what you think are important aspects for a location?

E: Okay, and do I have to open the link?

I: Oh sorry, I will now, I can write down the aspects. And then later, we will then go to this part, you will see this one then. You can also open the link and work on there, but if you prefer, I can also do that, I do not know, what you prefer. Whatever you wish.

E: Okay.

I: So, you can just come, name some indicators that come to your mind, or aspects that come to your mind.

E: Yeah. Owner of the grond.

I: Land, maybe.

E: Yeah, space. That is an important one. Bereikbaarheid.

I: Accessibility.

E: Yeah.

E: Huidige infrastructuur. Wat is het in Engels, yeah infrastructure.

I: Yeah, the infrastructure that is in place right now.

E: For example, for the charging options. Or for placing a battery.

I: And with this you mean for example, there is, the electricity network is close to the place or there is an electricity line in the…?

E: Yeah, if it is already there or not. Because if it is not there, well, you can wait…you have to have such big amounts of money to place a new infrastructure. If it is safe, safe area, feels safe. Voorzieningen in de buurt. Yeah, it is also een beetje accessibility, maar de routes erheen en terug, de routes die afleggen.

I: So you mean it in terms of other, of all modes of transport? So that you can walk there easily, for example?

E: Yeah, but also if it is a nice route or not. If you walk under the trees, if it is very hot, it is nice. But if you walk through the stones, if it is very hot, it is not nice to go to the hub. yeah. It all matters. Is it light enough in the evening?

I: It is also a bit connected to safety, I guess.

E: Yeah, everything is connected.

I: Of course, yeah. If that is it, we can also, I would like, I would then take these to the next part. You can now open the link, but I can also leave the screenshare on, if prefer?

E: Mhm.

I: So, yeah. Do you want to open it, or do you want me to do that?

E: No, you can do it.

I: Okay. So as I said, these indicators, this list of indicators, you see here, these colored bubbles, these are what I have got from literature, on the one hand, but also what other experts said. Some of them are from other experts. And I have some, listed some definitions here, some of them are a bit longer and some are more just explaining what I mean by that. And the idea is now that you have a look at them, read maybe some of the definitions, if you are not sure what I mean by that. I mean, amenities, you already named, for example. And then, tell me which of these, but also of the ones you said, you included here, which of those are the five most important topics to have a look at, for deciding which location it should be for a hub. So, I can zoom in a bit if you want.

E: Yeah, that is nice.

I: Mhm.

E: Proximity what is that?

I: Distance. So, the distance to, how close a place is to another one. It has to do with accessibility a bit as well. But the proximity from here to a place which is 100 meters away, that is little prox, that is short proximity, and something that is 500 meters far away, is not that close. So, it is basically closeness to something.

E: I think…I think the space itself is most important. The mobipunt itself. What it feels like. Not only safety. But also green or not…is it a nice place to come? That is very important.

I: Yeah of course.

E: I do not know if it is already in one of those circles?

I: No, I think…I mean I can add it. The point is, like, the idea is to find a good place for where this hub, that has all, say good characteristics, to make it work in the surrounding as well. So, there is of course some aspects that are better for putting a hub, than others, or other places, some places are better. So, for example as you said, on the outskirts of the neighborhood, on the outer areas of the neighborhood and not in the middle. So, I mean I can put the attractiveness of the hub itself…so you think that would be on the first place?

E: Mh. Like, another one. Consciousness.

I: In terms of what?

E: In terms of the…noodzaak.

I: Oh, yeah.

E: That people see that it is necessary. That we have to do that, that we have to park the cars there, because of the fact that the water is not going away. Or, the animals are, hoe zeg je dat?

I: You mean ecology, and that there is not enough space for birds and other animals?

E: Also, yeah. But maybe more space for themselves. That people need space to live in. and with all the benefits of it, like more green and feeling healthier. More space for the kids to play. If you think about the effects of the, all those cars. It is ridiculous that we get…that we have come into this situation.

I: Where you, most of the cars are parked 95 percent of all their time.

E: Yeah! And in front of your door. You are looking at it. Do not you want to look at something green?

I: Yeah, of course.

E: Or do not you want more…those houses are very small. Very much people live in Assendorp. There are two times more people on a square kilometer than in the other parts of the city. So, yeah. I am wondering if people know that.

I: Yeah, that is a point. So, in terms of urban green space, or urban green, in the surrounding, do you think that is important to place a hub where there is already, where there is already green space, or where there is little green space, so that you can make, like, by taking the cars away from there, you can put green in there, instead.

E: Yeah!

I: The last one then?

E: The last one, yeah.

I: So, we could put for example this one here, but with the addition of, it should be distant, to, or the place where there is less green space?

E: Mhm.

I: Mhm.

E: Yeah, it is difficult, this.

I: Yeah.

E: Yeah.

I: And do you think one of the other aspects you named, are they, like, in the ranking, would you give one of these other aspects the second place or rather one of these remaining ones here? So, you named for example accessibility or amenities?

E: Yeah…People are going there, when they see that it is urgent. So, we have to tell them…what I try to say is that it has to come between the ears of the people.

I: Mhm. They have to understand the…again what you said, the consciousness, or the necessity actually, so why this is needed, you mean?

E: Yeah.

I: But what, so I can put this for example here, or on the first spot, but what do you think of these aspects would make it, after the people understood it, hopefully, at some point, what aspects could make it easier for them to use?

E: Yeah, exactly, but that is number one for me.

I: That is number one for you.

E: That is number one for me. And we cannot see it los can de rest. But then I think…yeah, it has to be easy for people to reach the mobipunt. So, the accessibility is very important. The routes that go there are very important. Then the possibility to charge over there. And to go there by bicycle also or maybe by step easily. And the routes have to be good. The pavement has to be good. Yeah.

I: So, these are all, so most of it, this is accessibility, and this is then attractiveness I guess, right?

E: Yeah.

I: The routes that go there, the pavement is attractiveness, this is attractiveness, yeah.

E: The pavement is also in the streets of course. On the route.

I: Yeah.

E: Yeah.

I: And of the other ones you named? So, for example, the amenities, would you rank them? So, would the amenities come after the attractiveness or would they come before the attractiveness?

E: It goes together.

I: Okay, so yeah, it belongs together actually. So, this is this one. Is it then the fourth one, the green space, or do you see any other aspects that you think are more relevant than green space?

E: Nah, also that proximity to heat stress, zeg maar, the climate adaptation.

I: So that also belongs to this one, right? Because if there is places where there is less green, you mostly have heat stress.

E: Mhm.

I: Mhm. And is there another one you think, of your own ones you named, or one of these, the ones I have listed here, that you think is the, maybe not the most important, but should still be analyzed for a location? So that it functions?

E: Yeah. Where do I have the charging options?

I: The charging options are here now, in the attractiveness, as part of the amenities, actually.

E: Yeah, but they have to be, the electricity has to be alright to…so, it has the, yeah, I do not know if that is most important for…

I: Yeah, it is a bit of a voorwaarde, for the, for charging there, right?

E: Yeah. Exactly. Owner of the, wat staat daar? Owner of the?

I: Owner of the plot, owner of the land, maybe? That is one you named.

E: Yeah, because the space of the first mobipoint, the land of the first mobipoint is from the Isala kliniken. It is not from the gemeente Zwolle.

I: So, what happened then, what did they do?

E: Yeah, sometimes, that is a problem. You have to ask everything. Can we make the charging options over there? Can we put some green over there? Everything. So, it is not handy.

I: So it would be the most handy to take a spot where the municipality is the owner?

E: Yeah.

I: Okay, yeah. And that is, is that on place five, or is that more important than the others?

E: Yeah. I do not know. It is difficult to…because we can work with it, it is no problem, but every time you have to, you need to have extra time and energy to…contact the people of the Isala.

I: It makes it easier of course.

E: It makes it easier, yeah. But so, it is not number one, it is number five.

I: Okay. Yeah. That is okay.

E: That is it, I think?

I: Yeah, that is it. It is also the idea to use these indicators as the next step. So I am doing in total I think ten interviews. And then I am taking the average for every indicator or every number. And then the five indicators that have been ranked the most high, so those that, so if everybody for example says accessibility, which I think everybody will, because that is important, then I will do for example an analysis of the accessibility of several spots in the neighborhood. And then afterwards try to find out, where the heat stress is for example, if that is ranked by everybody. And by this I will try to find these locations I am aiming at in my research. Just to give you an idea of what I am trying to do with these indicators then. But yeah, that is it. We ranked them, we discussed them. So, that is also the end of the questions I have for you. Also, we are a bit out of time, so I do not want to take up more of your time. I will stop this now. Yeah, I would like to thank you for your time, that you took the time and discussed this with me. This is very important also for the backing of my research. And of course I will send you the end result, like what I, when I am done with my thesis, in the end I can send you the document, so that you have a look at what is the end result actually of what you have taken part in. and yeah, thanks again. So, if you have any other questions?

E: Met wie ga je nog meer spreken?

I: Sorry?

E: Wie ga je nog meer spreken?

I: Oh, ik heb verschillende personen van Willem gekregen, dus vooral mensen van de gemeente Zwolle, en een, twee personen van de provincie Overijssel. Maar ik heb al gesproken met expert 2.

E: expert 2.

E: Dan heb ik gesproken met expert 3, gisteren. En morgen spreek ik nog met expert 6, en expert 5, geloof ik. En dan heb ik nog twee andere mensen, iemand van volgens mij van de Provincie nog en nog iemand van een extern bureau, maar die ook een beetje betrokken was bij, ja, bij een van de projecten van &morgen. Dus probeer ik eigenlijk een beetje de thema's mobiliteit, energie en sociale aspecten…mensen te interviewen die voor elk van die thema's een beetje een gevoel hebben en iets kunnen vertellen. Dus, dit zijn eigenlijk de mensen. En in het eind heb ik hopelijk

deze lijst van indicatoren, en daarnaar kan ik dan kijken welke ik verder ga analyseren, welke van deze aspecten.

E: Yeah. Dan zijn het vooral mensen van de overheid. En mensen die zijn ingehuurd, ik ben ingehuurd door de overheid. Maar is het niet belangrijk om ook bewoners bijvoorbeeld of winkeliers te vragen?

I: Ja, op zich wel. Het probleem is alleen, dat ik niet echt wist, waar ik die contacten kan krijgen.

E: Ja, bij mij, he!

I: Ja, ja. Maar ja, heb je nu enige mensen in gedachten waar je nu zegt, ook nadat je nu dit gesprek hebt gehad, zou je enige mensen kunnen voorstellen, die ik nog kan interviewen?

E: Ja, hoor.

I: Okay, want dan kan ik natuurlijk ook daar nog een beetje met mensen praten.

E: Ja. Ik zal nog even mijn gedachten daarover laten gaan.

I: Ja, natuurlijk.

E: Hoe veel mensen heb je plek nog?

I: Twee, drie, misschien?

E: Oh, dat is niet zo heel veel.

I: Ne, dat is niet zo heel veel, want ik moet nog, ja, nadat ik die expert gesprekken heb gedaan, moet ik nog die analyse doen. En anders wordt het natuurlijk een beetje veel. Te veel gesprekken in relatie tot de analyse, daarom.

E: Ja, ik denk dat je expert 13 sowieso nog even moet spreken.

I: Okay.

E: Hij is eigenlijk een beetje mijn collega. Maar hij is ook inwoner van de wijk.

I: Okay.

E: En hij is ook…de man achter de leefstraat.

I: Ah, mooi.

E: We hebben enige leefstraten gehad, tijdelijk vergroening van straten. En hij woont in de Seringenstraat, en de Seringenstraat, die, dat is zo een straat in Assendorp, die heel snel overloop,

wanneer het hard regent. En dat is laatst ook weer gebeurd, paar dagen geleden bij die grote buien. En hij heeft ook, ze hebben toen ook, tijdens die eerste leefstraat, dat is anderhalve jaar geleden, hoor. Daar hebben ze ook ervaring opgedaan met op afstand parkeren en zo. Ja, en hij is degene ook, met wie ik samen die mobipunten aan het regelen ben, alleen ik ben meer vanuit mobiliteit, en hij doet meer vanuit groen.

I: Oh, ja, mooi, okay.

E: Dus, je zou hem kunnen vragen. En dan heb ik ook nog, ik werk ook heel veel samen met een wijkbeheerder, van de gemeente Zwolle, expert 10?

I: Ne, die heb ik nog niet op mijn lijst. Maar het zou wel goed zijn.

E: Maar goed, dat is dan ook iemand van de gemeente, maar die kan het ook wel meer vanuit een bewonersperspektief bekijken. En verder inwoners…ja, bij inwoners is het natuurlijk lastig om mensen…welke achterbaan vertegenwoordigen ze, dat is altijd een beetje…maar ik ken wel mensen die dus op afstand parkeren nu en die dan ook wel duidelijk hebben wat bij hun, wat bij hun wel en niet werkt. Dus, ik kan je ook in contact brengen met mensen die op afstand parkeren en nu groen voor de deur hebben, bijvoorbeeld.

I: Mhm. Ja. Ja, ik zou dan eigenlijk graag, ja, drie personen misschien, dus die expert 13, heb je gezegt, en dan de, ja ik weet niet, de wijkbeheerder, zal ik die dan ook interviewen, of niet?

E: Expert 10…ja het is wel weer gemeente, dus…heb je dan juist nog weer even een bewoner of zo.

I: Misschien liever twee bewoners dan?

E: Ja, misschien iemand van 50 Tinten Groen, dat is een groot burgerinitiatief in de wijk. Die ondersteun ik. En Adriaan ondersteunt ze ook. Allebij vanuit onze eigen expertise, zeg maar. Dus, je zou ook iemand van het bestuur van 50 Tinten Groen kunnen vragen. Ja. Die kan ik je in een mail zetten, nog.

I: Ja, graag.

E: Ja.

I: Dan stuur ik direct een uitnodiging en een korte vraag, of korte introductie van wie ik eigenlijk ben en waarom en zo iets naar deze personen.

E: Ja, helemaal goed, dankjewel.

I: Ja, dankjewel voor de tijd. En ik ga ook bellen of zo, als ik dan naar Zwolle kom om de mobipunt de bekijken.

E: Ja, okay.

I: Tot dan, fijne dag nog.

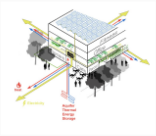
E: Hetzelfde!

Appendix 19: Expert Interview MURAL board Expert 4

Potential locations of neighborhood hubs

in the neighborhoods Assendorp and Kamperpoort in Zwolle, the Netherlands

Expert interview with Lisa Kneack
Master student Spatial Planning
Redboud University Nijmegen
20/08/2020

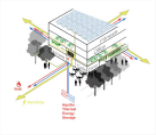


Which indicators do you find important for the selection of a location for a neighborhood hub?

Potential locations of neighborhood hubs

in the neighborhoods Assendorp and Kamperpoort in Zwolle, the Netherlands

Expert interview with Lisa Kneack
Master student Spatial Planning
Redboud University Nijmegen
20/08/2020



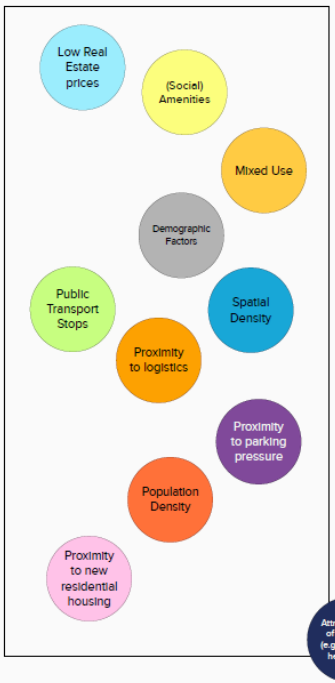
Which of these indicators do you find important for the selection of a location for a neighbourhood hub?

Please select 5 items from the list. If there is something missing on the list, feel free to add it! Then please **organize** the 5 chosen indicators **in the order of their relevance** for choosing a location for a neighbourhood hub.

Definitions of the indicators

Mixed use describes a type of urban planning that blends residential, commercial, cultural, institutional or entertainment uses into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian connections.	(Social) amenities describe all types of services that inhabitants of an area need on a regular or irregular basis and that have potential to increase the social cohesion. Potential amenities are: Grocery stores, pharmacies, cafés / restaurants, package drop-off, fitness, meeting / conference rooms, community centers, other recreative functions, daycare, elderly care, schools.
There is a stop of a public transportation line, e.g. of bus, rail or of new forms of public transport (e.g. taxi bus), integrated or located in close proximity (e.g. within 100 meters) to the neighbourhood hub.	There are urban green spaces such as parks, playgrounds, facilities for children or lawn in close proximity (e.g. within 100 meters) to the neighbourhood hub.
The price of land and real estate at the location and in the surrounding area is low so that investment is easier and more profitable.	Newly constructed residential housing (e.g. appartments, houses) is situated in close proximity to the neighbourhood hub.
Demographic data refers to the study of a population based on factors such as age, race, and sex as well as socio-economic information (e.g. including employment, education, income, marriage rates, birth and death rates).	Population Density refers to the quantity of inhabitants living within a certain measuring area.
There are streets or areas that suffer from heat stress within medium proximity (e.g. within 250 meters) of the neighbourhood hub.	Spatial density refers to the quantity of buildings within a certain measuring area.
There are streets or areas in public space that suffer from high parking pressure within medium proximity (e.g. within 250 meters) of the neighborhood hub.	There are logistic facilities (e.g. delivery of goods, last mile delivery, lockers for delivery and collection of parcels) located in close proximity to the neighborhood hub.

List of potential indicators



Ranking of indicators

Appendix 20: Expert Interview Report Expert 5

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 21.08.2020

Place: Digital meeting

Time: 10.00 am

Duration: 01:08:07 min

Atmosphere

The interview atmosphere was informal, and the tone of conversation was friendly and polite. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was minimally exceeded, but with the consent of the expert. The expert was able to answer all questions.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: Of course, you are not going to be in the Thesis with your name and everything, it's anonymous. So, that should not be a problem then.

E: That is alright.

I: So…

The interviewer starts sharing her screen.

E: Oh, this is a bit small for me, but, yeah, I can see it a little bit…

I: Otherwise I can zoom in a bit more.

E: Yeah, I can see it. I recognize the pictures.

I: Yeah, of course, that is also why I would like to ask you about your, what your position in the…

E: Yeah, I changed my telephone, so I have now another position, so I have it in landscape now. So, it's okay now.

I: So, I am working &morgen at the moment or doing my research in cooperation with &morgen, at the moment. I am a master student of Radboud University in Nijmegen, of the master of spatial planning with focus on urban and regional mobility. And my research topic is to find a methodology for finding suitable locations for neighborhood hubs. And neighborhood hubs is the English term I found for it, &morgen call them buurthubs, but they are also called mobipunten, I think, in Zwolle. So that actually depends on the place, but I will now give you a short introduction of what I and &morgen perceive as a neighborhood hub. And there are basically three levels of hubs…

E: Yeah, but you are focus is on these small locations, yes?

I: Yeah, of course. This is only to show that…I give an example. So, there is for example also people focusing on the big ones, the city edge hubs, where it is also, they have a transfer function from the outer city to the inner city, also with the public transport for example, but the buurthubs, the neighborhood hubs, they are not that much researched until now, in science, so that is why I said I would like to focus on these ones. And these were the pictures from &morgen, just to conceptualize what kind of functions could be connected to the bigger ones, to the city edge hub, the public transport hub and also the neighborhood hub. You might have as well seen this picture already, I think.

E: Yeah, I recognize it.

I: Okay, just to give a refreshment to the idea, the idea is, also the conceptualization is to combine mobility, energy and societal needs in these hubs. Mobility in terms of shared vehicles but also in terms of electric vehicles that could be charged using sustainably generated energy that could come from PV panels on the roof for example, but also not only make it a mobility hub but also make it a place for the community, so, where there is meeting place, offices for example. Of course, that depends a bit on the place. And the generation of energy as well as the geothermal heat production are parts of the concept. Although I am not focusing too much on the geothermal heat production, I am more focusing on the how to include the electric vehicles and the energy that is needed for them in the concept.

E: Yeah. I myself find the thermal energy storage, well, you can question about it, if that is possible, looking at the scale. So, my mind is not very finished about that idea if you can realize that. So, it is okay.

I: Yeah, and maybe you have seen this as well, this is a place in Assendorp, and &morgen just made this picture, so before and after, what the hub could look like or what it could bring to a neighborhood. And I am showing this just to explain, I am focusing with my research on Assendorp and Kamperpoort. So, after I developed the methodology, I will then test it on Kamperpoort and Assendorp. So, these are just the cases I am using. And the methodology I am using is to…first I did a literature review, now I am doing expert interviews. The function of the expert interviews is to clarify some ideas but also to find indicators that define a location, in the later part of the interview, and then with the ranking that I will get out of the interviews, I will then do a GIS analysis for the different indicators. So, just to give you an idea of what I am trying to do. So that is the introduction from my side, and I would like to ask you to give a short introduction of your work also in relation to the topic of neighborhood hubs.

E: Well, I will do. First, we have until 11, eh?

I: Yes.

E: Because it is a subject where we can speak a long time, a very, very nice subject. My English is not so good as yours, I think wow, you speak very good English.

I: Thank you!

E: Well, my function at the city of Zwolle is first, environmental advisor. So, with a direct relationship for building houses, building, and growing the city. So, the two areas you mentioned, Kamperpoort and, especially Kamperpoort is an area where a lot of possibilities are, where the location of the Ijsselhallen, where big events happen. That will be in transformation, maybe 600 until 1000 houses are coming there. All thoughts, but it is not very concrete at this moment. So that was my first part, my first role here, but my second role is more adapted to energy. I focus on the bigger solar

parks, the wind parks, and to trying to get new parks in Zwolle, where local parties are connected and where the way these solar parks are built is, well, with lots of trees, and it is looking good. So, that is one of my parts. I took a lot of, to make this possible, I have a lot of contact with the, with Enexis, and what we see is that the local and regional infrastructure from the tenants and Enexis is not suited for all those, for the growth of sustainable energy. But also the trend, the way we are making a transition, so, getting electric cars, getting electric bikes, the idea and the way we are working to have other forms of warmth, not using gas, so that makes heat pumps, and other kinds of techniques. And these techniques ask a lot of electricity. And in the history, we have not built Zwolle this way. So, what is happening, we have to think about how to facilitate this movement to get…the city is already here and all the new locations, that they can heat their houses in the winter time with electric systems and the system is not adapted to that. So, what we know is that, if you translate it to the view in the street, what will change in the first ten years? There will be a lot more small, ugly, normally ugly buildings from Enexis, where the electricity is coming from.

I: So, trafo…?

E: Trafo, trafo buildings. So there will be a lot more trafo buildings. We want a city that is adapted to climate change, so we have our ideas how to build these buildings. But Enexis says, and I understand that, well, every city, every council has their own ideas, we cannot do that, so, this is what we have, and you can change the color. Wow!

I: Haha, nice!

E: Nice. So, that is one of the problems. So, the change, what we will see in the next ten years, that is already there, so, that is the biggest problem I think, so there will be a lot more trafo houses I think. Trafostations. And we do not want to have everywhere a loading system for the electrical cars. So, that is the fine thing about this idea, to think about where can we realize these smaller hubs. And then, the thought of, how do we communicate this, and how will our citizens… They are used to park their car before their house…

I: In front of their house, yeah.

E: In front of their house and now they have to walk maybe 200 to 300 meters to a place where this electrical infrastructure is already made for them and not to do it everywhere in the open street. Okay, so, that is part of my work.

I: Yeah, that is also, yeah, a part of it is what I wanted to talk about. So, if we are discussing these trafostations. One idea is to use the trafostations that are already there as…one idea is to just put the mobility hubs there, like, make a bigger thing out of it, maybe improve the trafostation, and then maybe add shared mobility and maybe other functions. And there is a lot of things related to

it. So, my questions would be how realistic is this in terms of where these are, like, are they at good places for this? And then also in terms of if there is space for that in the surrounding of these?

E: Do you know if &morgen has this data layer of the infrastructure of the trafo houses?

I: Yes, they have that.

E: Okay, I have it too. Well, it is interesting to start, and you can look with Google Maps. It is interesting to look, where are they, with a focus on Kamperpoort and Assendorp and which of them are maybe suitable to change the surrounding? So, make it bigger, and try to integrate. That is a point we have to discuss with Enexis. I know that Enexis and Liander are not keen on integrating their functions, because they want every minute of the day, they want to, if there is a problem, they want to go to their assets, and I understand that, but I think you can arrange it, in that way, that they can go when they want, but try to integrate this in a bigger building. But they are not so…we have to massage a little bit.

I: It is a bit of a stakeholder management then I guess.

E: Yeah. So, I think that they understand that there will be a change in the next coming ten years. So, they have to change their attitude to that. But it should take some time. But I think that is a very interesting idea, to research Kamperpoort and Assendorp on their local assets, the locations to check, which locations are suitable. Because sometimes it is a very small building too, but two meters, it is already integrated next to a house. And then you do not have space, but there are other locations where there is.

I: About if I find a spot where this is possible, what is the dimension of increasing the power network? So, if you want to, instead of putting trafostations everywhere, you want to integrate it, or make this one better, what is the dimension, does it have to be double the size, triple the size? I am just trying to get a feeling of how much space this will cost.

E: Yeah. That is one of the questions we want to discuss with Enexis. We are having some experience in Berkum, that is in the north part, and several scenarios. And one of these scenarios is quite heavy, because it will change a factor five. What we have now will not be doubled, but five times more than now. And we are not clear. It depends of course, on the way this area is built, this neighborhood. Because if Berkum is an area that is built in 1960-1970, all houses with their own garden, not to dense, not too intensely built. If you want to go with heath? Warmtenet?

I: Heat? Heat network.

E: Heat network, easy. This area is not suited for a heat network. But if you go to Haltebroek or Aarlanden, that is more in the Northwest, where a lot of flat buildings are standing, then a heat network is probably the best way. So, all electric concepts, we do not expect them there. So, maybe

it is enough what is already standing and in Berkum we need five times more. So, if we focus again on Kamperpoort and Assendorp. I know there are some developments and thoughts about the area direct to the highway, A28. That is all going up, so that is compact. They do not have a garden, that is suitable for a heat network. But the thoughts about the Ijsselhallen area I think we can expect then there will be houses with gardens and not too much in the sky. So, probably, Kamperpoort will be an area where we can expect two until five times more trafostations. And that can be a chance also. If we know that there will be a lot more trafos, then you can change your question. The first question, and, okay, what will be a suitable spot for a new place, and can we make that place bigger and integrate the thought, about hairdresser, parking, loading docks for cars and bikes.

I: So, it would depend on the place basically whether it would be more useful to expand the existing trafo or add a new one. If you have new residential buildings, it is easier to put one there.

E: Yeah. So, if you compare the two focus areas I would say that Kamperpoort has the best, for you the best opportunities to look where will be a good, what will be a good place for the new trafostations. Because Kamperpoort is an area where there is a lot of development, will be going on in the coming years. Assendorp is more on the edge, on the outside of the neighborhood, that is also a chance, by the way. The foto, the picture you showed, that is on, very close to the provinciehuis, near the big park, with new buildings, and working space. On the other side, that is close to the railway area, there is also a location where we think that hundreds of new houses are coming. And the neighborhood itself, the old Assendorp, is very dense. So, I do not expect there. Maybe by breaking older houses and making new houses on the same spot. So that is the difference.

I: But that is more on a longer time horizon then I guess?

E: Yes.

I: A five-year time horizon is probably, then the next five.

E: Yeah. So, Kamperpoort has a lot of locations where new developments will be, will be coming. And Assendorp, the neighborhood itself, does not have a lot of space. And just at the edges, so near the railway areas, and Wezenlanden. But I think, I am not sure whether that is Assendorp. Maybe that is another neighborhood.

I: I think that belongs officially to Assendorp, but sometimes it is not counted because it is a bedrijventerrein.

E: A little bit, yeah.

I: And there is not so many people living there, which is why it is not counted as residential area.

E: And I am involved, also involved in the development of Wezenlanden Noord, there are some 160, 180 flat buildings there. And that will be 500. But that location, if you compare it with Assendorp itself, is too far away. So, that will not be a suitable place for people in Assendorp to park, it is too far away.

I: Also, for walking.

E: Yeah. So…But the thought about the edge, the railway area. I am not sure about the distance, what is comfortable for them, 200, 300 meters?

I: 200, 300 meters, yeah.

E: So, you can check, suppose that that will be the area, where there is space, to make an integrated trafo and you combine it with the other functions, make a circle and try to get into sight, what part of Assendorp will be focused on that area. Because there we know there will be a development. Because the other parts in Assendorp…mh…less.

I: Yes, what I will also try to do, I do not know in how far you know about GIS techniques.

E: No.

I: You can make a network analysis, that is what it is called, a network analysis in terms of it will measure the actual distance it takes you from one point to another, it has a radius, but it is not a circle, so it has the actual distances, so if there is a dead end, you cannot go further, although the circle would go further. So that is a more realistic version, so if I have some spots, I will do this analysis.

E: Yeah, perfect. Maybe, I do not know if you have an interview with a colleague who knows more about the spots in Assendorp where development is possible. I should know that. But I do not have…only the railway area, there is a big development, maybe about four to five years. And the other parts. But that is more…Wezenlanden Noord location. But that is too far away from the consisting neighborhood.

I: Do you have a colleague in mind? Because I do not think that I have someone who is specialized on this.

E: I think, I do not know if you have an interview with expert 2?

I: Yes, I already had that. But I can of course contact him again.

E: Okay, because he lives there in Assendorp. And he has very strong roots in Assendorp. So, from his role as a strategic advisor of mobility, he must know if there are other locations in Assendorp. But I doubt it. Very small.

I: I will just ask him to indicate them on a map, maybe. Because that also makes it clearer for me and my analysis. Because I feel like there are so many aspects you can take into account, but this is of course an important point.

E: Yeah.

I: Yeah, another question about the concept of Vehicle to Grid. So, in terms of smart charging. I do not know in how far you have expertise in this.

E: Yeah, a little bit. I should be one of the advisors, but we do not have experience in Zwolle until now. It is very…so, I follow it, I read about it, I talk about it with colleagues in other communities, and that is olne of the reasons we want to work together with &morgen. But it is still vague. Also, we talked about it with Enexis. But I have the feeling that the persons who I speak, that they do not have the experience. So, it is all just speak speak speak and we do not know exactly how it works.

I: It is an idea, it has not been done yet in that sense, yeah.

E: And if you want to make it more practical, that is one of the discussions we have with Enexis. We want, we have to know more about the local system in the area, in the neighborhoods. And part of this information is privacy, so Enexis cannot give that in detail. But it will not take long that we know more about it. Because it, otherwise, it is for our community…

I: You cannot plan otherwise.

E: Yeah. So that is part of the discussion, and we do not have the details, but it will not take long that we will know more about it. So, that is one of the parts of the discussion. What is the positive, of course it is positive to try to use the accus of the e-cars. And to unload or do something with the grid. But how it exactly works and how it is in these two focus areas, yeah…I cannot say.

I: So, what would you say about the time horizon of this? So, I understand it now as maybe, trafostations are coming, then electric vehicles are coming, but is there something that is chronologically following from that? Or is it like we have to really invest in it for making it work?

E: The last. I had a…when was it? Last week, I had a conversation with a new colleague, it was the introduction talk, and we did a walk in Zwolle, and one of his parts of his job is to make to create more loading stations for cars. And we had this discussion. And we asked, what is leading? And it is quite old-fashioned, to…

I: React?

E: React only. So, we have to work more and more together. Mobility and energy. And think about what is the impact on the city. So, we considered that we have to come together with a lot of advisors,

and think about when do we know, when do we have the information from Enexis, combine it with the knowledge about which developments where do we expect and then think about how to avoid that in every street everywhere there will be loading stations for cars? How do we create this process and how to take our citizens in that idea that you have to walk to your car more than you are used to? So, that is a process that we have to go through this second part of the year. So, it will take at least half a year, to make up our minds. So, it is not…there is no policy yet. We have to think about it.

I: Is this then also part of the, because I think Zwolle had the Omgevingsvisie already finished very early.

E: Yeah, the second one is, we have a second one, an update, and if you want to check, you can google Omgevingsvisie Zwolle you will get the actual version two. So, we have it ter inzage, so everybody can say something about it. And it is more, this development is more in the text. They describe it. But there is no policy. But it is more of, this is what we expect, and how it…

I: How it will develop?

E: Yeah, that is too much detail.

I: But it is also a vision, so it is not the idea to plan everything out already.

E: Yeah.

I: So, just on a side note, I was looking through the vision of Zwolle a lot, because I was doing an internship at Gemeente Nijmegen at that point and they were busy with their own Omgevingsvisie, and they were just like, oh, look at this, and what did they do, and you can take something out of it, not in terms of text, but in terms of the method. Because everybody was struggling with how to do this thing.

E: Yeah. It is quite complex. If there is a party who has already made their minds up, well, try to think about it, if it is something for Nijmegen. An old colleague of ours, he is called X, X works now in Nijmegen. So maybe you will meet him.

I: What is his last name?

E: XY.

I: I think I have not met him.

E: Very nice guy, small, little hair, he is living here in Deventer, where I am living. So, it is nice.

I: Yeah.

E: But, that part, it is a very important process we have to do. So, we have not made our minds up until now. And that is very important to try to translate it. How will it end in all the neighborhoods? What will visually change if you make these combinations? And it will have consequences for the citizens in that area. I do not think many citizens realize that, they always think that, oh, I can see my car from the window, sitting in my chair.

I: Is that really all you want? (*both laugh*) Maybe one last question to these aspects, because then I would like to move on to the second part. In terms of electric vehicle charging, so, of course, not everybody has an electric vehicle right now and not everybody will have one later I guess, but it will increase, the number of electric vehicles. Is it realistic to charge them with PV panel energy? So, if you have PV panels on the roof, and a battery in the house, or you use the trafostation, expand it. Is it possible to do that or is it more like that there are so many technical issues with it that it is not really realistic?

E: Well that is a very important question you ask. And I have heard it is possible. And I myself believe that there is a lot possible with technical innovations. So, I think it is possible. But there has to be a lot done, to find out how it works. Because if you have a neighborhood, where people in the morning go to their job, and take the car and go away, and move to another city, and other people are coming from their home to Assendorp because they have their job there. So, there is always a certain amount of cars, with an accu, with a battery, and maybe with 80 or 90 percent. It is a smart idea to use those batteries. But how it works, and…one of the people from Enexis said, if at this moment two people in one street buy a E-Jaguar, so e-type, they have a very big…they ask a lot of energy for loading, and at the same time they want to load their cars (*makes sound of system failure*). Refrigerators, there is too much…

I: Demand on the grid.

E: Yeah, demand at that moment. Oh, that is a nightmare. Because I expect that in the near future, there are a lot more. So, we have to make a system, a smart grid system, so if number two is wanting to plug in, it is possible but at that moment he will not get energy.

I: So that it is charging later, when the other one is done charging.

E: And if it is one o'clock in the afternoon and it is a very sunny day, that the battery of the car is also used to…

I: Store the energy?

E: To avoid, yeah, to avoid the problems at the sunny day of the network. So, I think it is very nice, and I have heard that it is possible, but it is not…

I: It is not clear yet.

E: It is not standard work.

I: Okay, yeah.

E: But I think it is possible.

I: But that is why I think it is such an interesting spot, or interesting topic because there is so many things integrated in it, and for me it is like, some people are saying it is very realistic, and some people are saying, ah, it is not possible at all, and I think it is just very interesting to see the development in the next years.

E: Yeah, and the first location, where they came with this idea, in Holland, in the Netherlands, is Utrecht. So that is near the big event area, and the nearest area is Lombok. Lombok energy. But I have not followed them the last two years. So I do not know exact how far they are. But the same idea was there also: use the electric cars and their batteries at sunny days and, well.

I: Yeah, I will have a look at that, maybe for the background.

E: It is nice to check.

I: Okay, thank you so far. Can you now open the…oh sorry, not open the link yet, sorry.

E: No, no, no.

I: I will share my screen again; I hope it is possible to see that. Because the task I would like to do with you now is in two parts. First, I would like to collect some indicators without seeing the list that I will show you later. So later, I will show you a list that is derived from literature but also from what other experts said, and now I would like to ask you just to brainstorm, some ideas of which things should be taken into account for a good location? So, what aspects should be fulfilled at the spot where such a neighborhood hub could be placed. Yeah, I would just like you to brainstorm some ideas.

E: Well, first, from energy view I would say, look for a location where you normally would create a new trafostation. So that is the first. The second I think what is important is that the location is for the people who live in that area, a location where it is normal to pass by. So close to their house, part of a route for walking or biking. To go to a shopping center or near to a park. So, the location must be part of this route system. Let's see… of course, if you build it, … I change it. It should not replace a part in the neighborhood where trees or…or you have to do a lot of with green walls. Otherwise it will be part of the problem that areas will get more stonier and…so, from heat stress, and the problem with the…the rainfalls increasing…so that will be a part too. So, if it is a place where, when there is a big shower, all the rain comes to collect, well, do not use that spot. Or make a combination, change it into a chance. You can, if it is a lower point, where a lot of problems are

with rainwater, when there is a big rain, well, wolkbruik, I do not know how the word is. Tropical shower, let us put it that way. Well, the costs will rise. Then you can use it as a place, where you can use it like a kind of basin, where the water can hold on for a small period, so there can be a chance, the can be a chance.

I: Also in terms of other climate adaptation aspects probably.

E: But try to avoid to make your development in the green areas of the neighborhood. I do not think that is a good signal. Because I have my questions about the financing of this idea, hm, we have ten minutes, but you can always, for picking the location, maybe it is good to analyse the neighborhood, where there are buildings that are quite old. You could say, well, this building, we cannot lift it up and we have to break it down. And instead of building a house back, you can maybe try to build here a mobile hub. So, get out one or two houses, but what is coming instead is supporting the whole neighborhood.

I: Yeah? If these are the ones, totally fine. We can takes these with us to the next part. You can now open the link if you want, we can also do it with the screenshare, but I think it is easier…

E: Yeah, I will open it. Oh, I got a signal that is not so good, I try it again. It says this space cannot be found.

I: Why, that is interesting, it did not happen until now.

E: I cannot open it.

I: I will send you a link again.

E: Yeah.

I: Mh, that did not happen until now.

E: I am the first.

The interviewer sends a new link to the expert. There were problems with the browser the expert used; after switching to another browser, the problem was solved.

E: There is something happening. Okay, that was a good idea.

I: It is like a pinboard.

E: I am visiting koala. Enter as a visitor?

I: Yes.

E: Before you start…nah, you guide me, I think?

I: Yes. The white thing, you can just move around, and you can also zoom in with your mouse, and the circles you can move around just like drag them, like drag and drop them. The other things are fixed, so you cannot move them by accident. And there is the upper part, you already saw that in the screenshare. And then there is the lower part, where I have the list of potential indicators, that I have from literature or other experts and on the left hand side there are definitions of these, so, what I mean by this, if this is not clear for you. And the task is now to read them of course, and then get a feeling of what they are, and then rank them in the order of their relevance for the location. So, which of these really have to be analyzed so that it is a good location in the end? And you can of course use your own indicators as well, I have moved them down here. But you can of course also change your mind and just use the indicators of the list.

E: Yeah. Well, I read population density. Actually, it is about the same as what I said about is it part of the route? Because if we choose an area where nobody lives or all the houses are far away, there is no supermarket in the area…so I think…ranking the indicators, well, real estate prices…I think mixed use is a very important one. I think to make it attractive. I think it is a concern, I am not sure, if it is already there, the way how you finance this. It is not standard way of developing a location because of the mixture of the functions. So, will it be a commercial party? Who is the first? I am not sure; I do not think so. Well, the business case…

I: I have it a bit in this one, I think (*The interviewer is pointing at the indicator Ownership of the location*).

E: Yeah.

I: In terms of, because some of the other experts said, it might be more useful if the plot is owned by the municipality for example.

E: Yeah, I can imagine. So, I think that is one of the most important things, to make it realizable. You make financing. Shall we do that? Can we combine?

I: Yeah, of course we can combine.

E: I read some demographic factors, but we already have two focus areas. So I think that is not…we have already these two areas, so they are suitable I think. The new residential housing, that is one too. Because then you can…

I: Include it easier?

E: Yeah, integrate it into the new ideas.

I: What we discussed for the Ijsselhallen area.

E: Yeah, yeah. And then the proximity, proximity, how do you pronounce it?

I: Proximity.

E: Yeah, the proximity to logistics. That suggests also that it will be a location for walking, for cycling, if you go to the network with the car, to the regional network. It is an important one. And… I think the relation with the Enexis network is also one.

I: So, you mean the…?

E: Smart grid. A little bit smart grid suggests also that there is a link with the Enexis network. So that is why I see here the combination. So where should, what location in the neighborhood is the best location if you want to expand your local network? And that is also important by thinking, looking for a location for this hub.

I: Yeah, of course, because Enexis is probably the company that has to expand it.

E: Yeah.

I: Yeah.

E: I have a little bit more time, I see. I got a message, that my next call is a little bit later, so we have ten minutes.

I: Okay! Yeah, I mean we have discussed these, so if you are happy with the ranking you made now, the things I wanted to do we are done then, but we can of course discuss a bit about the financial, the financing, if you have further thoughts about this.

E: Yeah. It is a political question. And we are thinking about it, with our council, but our council is not so…their mindset is not at the position, to have a common sense about, well, we as the city, we are prepared to make this investment into these locations, for buying the locations, and trying, and doing it as the city. Because normally, it is a commercial activity.

I: Normally, you sell the land and someone else would build something.

E: Yeah. So, this is not old-school work. We have already several parking buildings, but what we want here is more than only a parking buildings.

I: Yeah of course.

E: And if we do buy…the realization of an integrated buildings, where you can go to your hairdresser, where you can drink a cup of coffee, where, well, other things, where you can park your car and we have a combination with Enexis. Wooow…that is new, completely new! What kind of organization do you need to develop this kind of buildings? Because it will not be one place, we

think we need these areas on several places. And that is huge. So, it can be, that we have to work in the direction of making a…how do you say…?

I: Public private partnership, is it that?

E: Yeah, yeah. Kind of. A coalition, so I think we first have to have a kind of commitment from the council and the financial to explore this, to do research. Then we have the discussion with Enexis about, and they are not commercial, so, I think they will say, well, we have our law, and the law forbids us to do this, so there has to be… Well, we have to look for partners.

I: And also, to find suitable arrangements in the end for everybody. So that Enexis is happy, but also the municipality is happy, the people are happy. So, it is probably a lot of discussion, a lot of work in just trying to figure out what everybody wants.

E: Yeah, and it is why the complex of translating the costs of this project, because you have to compare every time. If you know that there will be a lot more the need for extra trafos in the street, it is 100 percent clear. And the spatial effect, it is a worse situation, because you need maybe spaces with trees, to [hide them]. But if we can make it a chance, to make a combination of a mobility hub, that is also financially interesting. But you have to think it out with a lot of parties. That is new. How do you organize this? So, the way of, yeah, we have to make new coalitions. Also, with commercial parties I think.

I: Okay.

E: Yes!

I: Very interesting! The whole interview just gave me a lot of information.

E: Yeah.

I: Yeah I think I would stop here then, we could talk two hours more, but you have your other appointment, and I also do not want to take you from your short break between this and the other appointment. So, thank you for your time, that was a very interesting, very good to talk to you.

E: Yeah, it was nice!

I: I will probably not be finished before the begin of October, but I will be happy to send you the result in the end, the thesis.

E: Very interesting yeah.

I: Because I of course want to give something back to you as you took the time to talk to me.

E: And which colleagues of mine do you also have in interview? You have already expert 2, expert 8, will you?

I: Yes, I will talk to him, but he is on holiday right now I think, and I will talk to him in the next week, I think.

E: Yeah, his last week.

I: And expert 6. And I talked to expert 3….

E: Expert 3, yeah.

I: Yesterday, and I think…who else…

E: My new colleague, who I had a walk with last week, also said he had a mail from expert 2, for this interview. But he said, I am just here, I do not know what to tell.

I: Neglectable expert 2?

E: Yeah. Well, I think, it could be interesting, because you have ideas, and maybe you get inspired by her, and…

I: Yeah, that is what expert 2 said as well. Yeah, I mean he should not be scared, to talk to me. He probably knows more about it than me.

E: Yeah, I am not sure. He can be inspired by you. So, I think it is good to do.

I: Yeah, and I also just checked, I also talk to expert 4, from, who is now mobility makelaar, in Assendorp. And I will talk to expert 7 from provincie Overijssel, just to get the other perspective a bit.

E: May I suggest a new person?

I: Mhm.

E: I think it is good to…because otherwise…the people you mentioned now are working in the city of Zwolle, or is a very active citizen of Assendorp, or little distant, is from the province Overijssel. But we also talked a lot about the role of Enexis. So, I think it is good. I can prepare him, but if you think it is good, you could speak with expert 9. He is our accounthouder, account manager from Enexis. We have almost daily contact with Enexis, ith him. And he is the first person where we have to talk about, where we have the discussions about, come on Enexis, tell us, what can we do in Assendorp, or what can we do in Berkum? So, if you…? Shall I ask him? Do you have the time to ask him also…or?

I: Generally, I am probably running out of, like, it has, I have been suggested several people already, like you for example. And there was, like, I really like to talk to a lot of people, but I also have to take into account that I have to analyze this. But I think it would be good to talk to Enexis actually. To see the energy side, it would be the best probably to talk to the people organizing the energy side as well.

E: Yeah. Okay. I am not sure if I have time today, because this afternoon I have my kids to take…now, from school, and so this afternoon I am free. I shall check, I will call him on Monday, and I will let you know, okay?

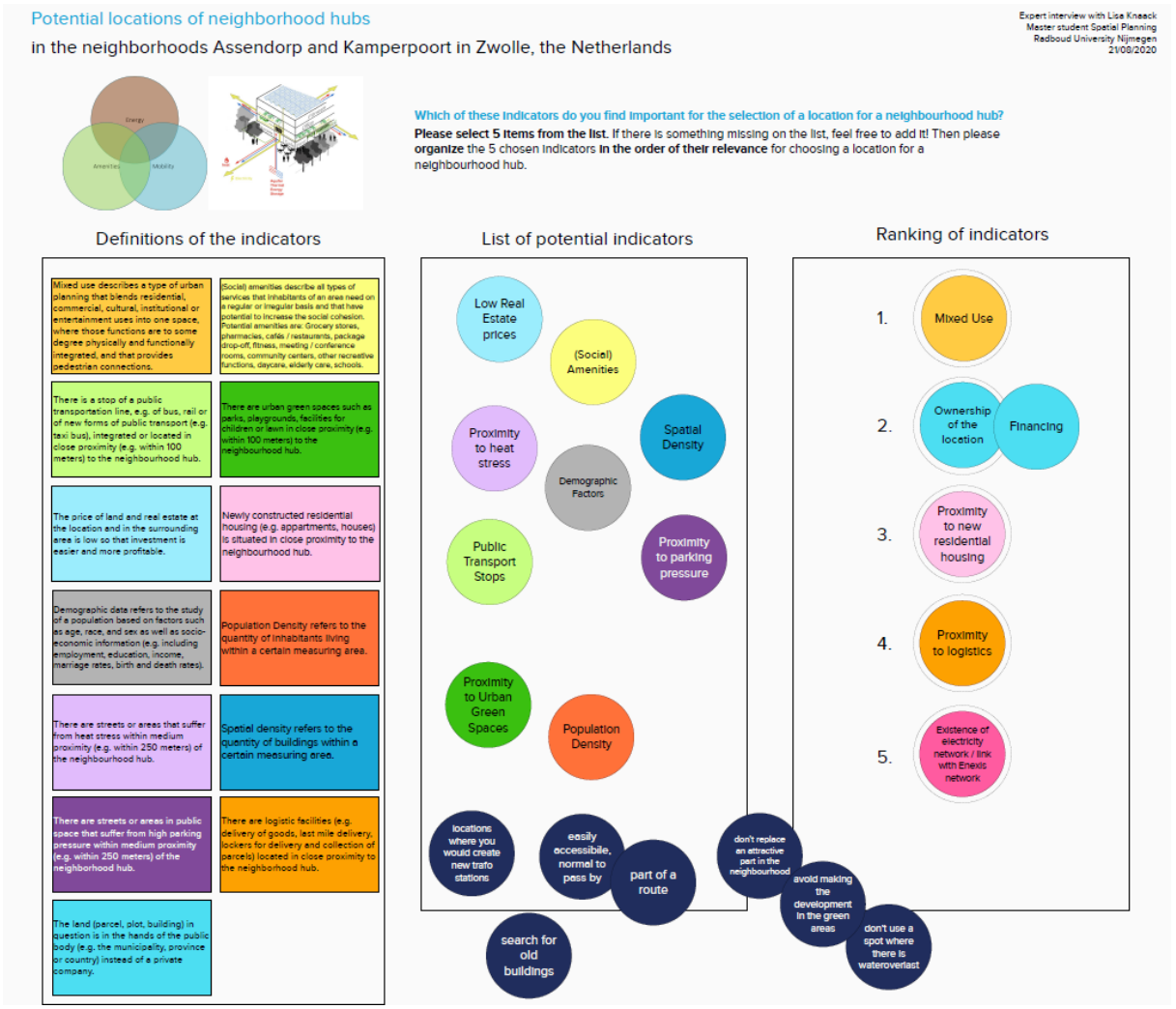
I: Yeah, perfect.

E: Because I think it is, he is very important in the total system. So, if you are going to work, and think about these neighborhood hubs, Enexis is…we need them. So, I will make a note for myself for Monday, and I will call him and let you know.

I: Yeah, perfect. Okay. Thanks again for your time.

E: You too. Success!

Appendix 21: Expert Interview MURAL board Expert 5



Appendix 22: Expert Interview Report Expert 6

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 21.08.2020

Place: Digital meeting

Time: 12.00 am

Duration: 47:16 min

Atmosphere

The interview atmosphere was informal and the tone of conversation was friendly and open. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was adhered to and the expert was able to answer all questions.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: Of course it will be anonymized for the research, so that you are not as a person in the research, but that should be expected from an expert as well, so that is what I will do. So, as I said, I am an intern at the moment, for &morgen or at &morgen, at distance of course, but that is working fine as well. They have this conceptualization of what a neighborhood hub is. And they are trying to integrate the topics of mobility of course, as it is a mobility hub, the mobility is the main point of course, but connecting it with energy, and social aspects, which is in part amenities. So these three topics, and on the right hand side you see a graphical conceptualization of what could be in there. And also, what could be the benefits of a hub, like, giving more space to the surrounding, if you put mobility, also in terms of shared mobility, in the hub. And I do not know, maybe you have seen these slides already, like &morgen is working for the municipality of Zwolle on the topic, so…

E: Maybe some, but this one was new for me.

I: Okay, yeah. So, the conceptualization of &morgen is that there are three types, three layers or scales of hubs. And the first is, or could be, or would be, city edge hubs, so those where you have a transfer function from, for logistics for examples, but also maybe for cars, so that you can park your car there and then can go with a bicycle to the inner city, to reduce the pressure on the inner city in a whole. Then you have the public transport hubs, which are indicated in red here, where people arrive with public transport and then can go with other modes of transport, for example also just walking into the city. And then what I am focusing on are the buurthubs, the neighborhood hubs, as I call them in English, which are the lowest level of this scale, and only focusing on an area in the surrounding, so a very small area focusing on. And these are just conceptualizations or ideas of what could be connected to a stadsrandhub, a public transport hub. There are all kinds of functions connected to it. And this is the neighborhood hub. So, just to have an idea of how this is connected to other aspects. So, the neighborhood hub has a lot of different aspects connected to it. One of the main points of course is mobility and here the focus is a lot on shared mobility, so sharing cars, sharing bicycles, maybe sharing scooters. And the idea is to put them into such a hub, and then you can go there, you can get something that you need and then leave it at then next hub. Also, that the scooters are not standing around everywhere, which we have in Germany at the moment. Connected to this is also the charging of electric vehicles. If these shared cars are electric in the future, you should be able to charge them there of course, because that makes it easier to use them. And this could also be done with sustainably generated energy, so PV panels on the roof, that can charge the electric vehicles. Then of course, to not only make it a parking spot, but to make it a societally relevant place, there could be office spaces there, a café, parcel delivery, all things depending on the situation, depending on the people, what the people need there of course. And also, in the conceptualization of &morgen, there is geothermal heat production connected to it. This is not so much the focus of my thesis, but it is in the picture, so I just thought I would

include it. So, what I do, I try to find a methodology for finding suitable locations for these neighborhood hubs. So, how can we select a suitable location? And I am using literature review, expert interviews and then a GIS analysis as a methodology. And the expert interviews are used to select indicators, that will then be analyzed in the GIS analysis. And I then test my methodology on two case neighborhoods in Zwolle, Assendorp and Kamperpoort. And that is also why I included this nice picture &morgen made, so before and after, so this is what the situation could look like. Of course, it is a vision, it is not what will happen in the next two years. But just to give you an impression. So, this is what I do. And if you have any questions, you can of course ask them, and otherwise I would ask you to give me an introduction to yourself, a short one.

E: Okay, that is okay. Expert 6. Working now for about 20 years as…I started at Gemeente Zwolle in 2006, originally, I am mainly a traffic designer, so designing for bicycles, mainly, it is my focus. But in the last years, my job has changed in a way, that in 2014 / 2015 I am the city ergonomist. I think that is the proper translation. So, for the UN resolution for people with disabilities. It is am ambassador role in the organization, to help people to integrate that into their job. It has become a big part of my job as well. And that sort of transformed in my other job with the traffic engineering part, as that I am more into pedestrian policy. Which is upcoming in the Netherlands. I do not know how it is in Germany, but in the Netherlands, pedestrians never had a very big position, when talking about traffic, and nowadays it has. So, we are trying to figure out, well, what you should do. So, we are at the starting point. And that has changed the way I work, so that the designing part is not a really big part of my job anymore, mostly the UN resolution and the pedestrians as a main part. So that is really in short, my job.

I: Okay! Yeah, I found it very interesting to read that you are stadsergonoom, no mobility ergonoom. Because that was like, I never saw a job description like that, oh, that is an interesting job, what is that?

E: And the interesting this is, people, I can understand it, they usually think that it is mostly about the build environment, which is a big part of what I do. But actually, it is about the whole VN resolution, or UN resolution if you correct me in English, but it is also about the social aspects and the information, so that everything could be accessible for everyone. That is the main goal.

I: Very important I think, because that is an aspect that is often forgotten, especially where people who are not disabled for example, they are not thinking about it, normally when you are planning.

E: And the thing I try to communicate the most, that if you design on all aspects for someone with a disability, it is better for everyone. Because you as a not disabled person, who can walk on a narrow sidewalk. But it is always comfortable if it is bigger, and wider and not as steep. So, it is sort of your minimal design goal and if you communicate in a way that is understandable for

people with a lower IQ that his understandable for anyone. So, ultimately, designing for people with a disability is designing for everyone. It is designing for all.

I: Yeah, very good. So, then I would like to start with the questions for societal aspects. So, coming from the neighborhood hubs as a conceptualization, what do you think are the potentials and what do you think are the problems of integrating such functions into a hub?

E: I hope that I am interpreting this question right, but I do not know if you saw the recent report of the college of Rijksadviseurs?

I: Mhm, no.

E: I think it might be interesting for you. They recently published a report, and it is called naar gezonde stad te voet. And in it they propose a way to make cities more pedestrian friendly. And they used the city of Rotterdam as a research pilot. So, they took neighborhoods, and they analyzed how you could transform those neighborhoods into more pedestrian friendly neighborhoods. One of the aspects that they, in every, no matter what neighborhood they took, the mobility hub is essential for transforming. So that is a big plus I see for mobility hubs, because what they say if you want to make a neighborhood more pedestrian friendly or more bicycle and pedestrian friendly, you have to remove the cars. So, it is essential to put them in a different spot. You need the mobility hubs to make that possible. So, I am really pro hubs. The difficulty I think is planning them in the right spot. So, they should be walkable, bicycle, not only walkable, but the route to, should be comfortable and attractive. And I think a very big question I have is how do you get people who live there to be…

I: To use it?

E: Not only to use it but also to accept it. Because you want to remove. To make this work, you have to remove the parking spaces that are now in their streets. And how do you get people to agree to that? It is a really, really big transformation of your public space. I think it can bring a lot at climate, socially, all the aspects, the things we want in life, but it is a really huge change. So that is a main concern I have, is how to get people to want this. That is where it starts.

I: And what do you think should be…like, what is the most important thing to do then? Like start this process that people accept it?

E: I think starting with people who want the change, so maybe, starting really small and that also has a, I mean you are looking at spots where mobility hubs could be, but maybe the spot is the best spot, but not the spot where the most people live that want to change, so there could be a sort of discrepancy of those. Maybe you have to start where the space is less (good) but where the people want to change. I think the people should be the ones, the main…

I: Focus?

E: Yeah, not the spot, but the people, I think you should start there.

I: Okay, yeah. I mean, as I am trying to do the GIS analysis, that is very difficult to include, but you are absolutely right, it would be, basically, it would be good to walk around there and ask, make a statistic about who wants it, and then make it in proximity to these people.

E: Yes!

I: Interesting.

E: I mean, I think, neighborhoods as Kamperpoort, and Assendorp, there I see the possibility, because they are very narrow, so there is a lot of potential. I think I can understand, I think those are the neighborhoods you want to start with, and then add a spot and then sort of hope, that other people see the positive change and then you get what we call the Zwaan-kleef-aan effect.

I: Okay. In terms of society again, or what we started with, is there something specific you think is needed to make it not only a mobility place but also a community place? So, to integrate this part?

E: I think the report I just mentioned, they state that, the emphasis is on the word nabijheid, so close by, that you promote pedestrians. What they are saying is that there is a difference between a car, bicycle and being a pedestrian, it is that cars and bicycles, they are still about going from place A to B, whereas as a pedestrian you are already there, the walking is part of the what you are doing. Because it is never going to be a mobility that is faster. So, it has to be very attractive. And the attractiveness of a neighborhood not all, but partly by that things are nearby, or feel nearby. There is a difference between being nearby and feeling nearby.

I: Of course, there is a difference between, I do not know, you walk down a production hall or whether you walk down a nice area, yeah.

E: Yeah. So, if you want to bring things that are close by, or nearby, then maybe these hubs are places where, if you look at the neighborhood, and there are things lacking which you should have to make it an attractive pedestrian neighborhood, maybe you should start there with adding the things you need at the hub. Because you are already building it. I do not know whether that is working anyway.

I: On the topic of mobility. What is your opinion on the vehicle sharing, vehicle sharing, car sharing, bicycle sharing for Zwolle? What is the perspective for Zwolle, what do you think? Or for the two cases?

E: I think it is a hard one to…we sort of…Zwolle is a village becoming a city, so we are sort of in between. I would say the people who still have the village feeling, they do not want to share cars, they are not the…they want their own car in their own street, on the driveway. But I think there is a change, with new people, and with the insights into climate, that they do want to change. But the part of the city that is willing to go along with the change, well, that is the part, I do not know. So, again, the same with the location of the hub, it is something you want to research. How many people are willing to make that change and focus on the people that are willing to do or want to share cars and not so much on the people who do not want to change. I think, start small and then make it bigger.

I: Okay. And connected to this is of course the question for electric vehicles. I mean, there is a trend towards buying an electric vehicle and then charging it at your home, but, would you say, it is rather this, or that there is also potential for sharing electric vehicles?

E: I think if people want to share cars, the electric cars are not a problem. And for us as a city, it is even easier, because the infrastructure you need for the car…because some of them have a dock at their home, but most of them put them in the streets, so we have these big units, we have to put there. And it is difficult to put these into the streets. So, I think for us as a city, it is easier if you have a hub where you can, sort of, combine all these elements.

I: Yeah. Because, otherwise, you just have all the small streets full with charging infrastructure. And then you start removing the trees because you do not have enough space for charging stations!

E: No one wants them. We had this discussion yesterday. We have someone who wants these charging units, I do not know what is the right term, but where do you put it, because if you put it in front of his home, it feels as if it is his own charging station, but it is for everyone, but if you put it somewhere else, someone will ultimately say, I do not want those charging stations in front of my house, because then other cars will be staying in front of my house, and then…yeah, that is the kind of discussions.

I: So it would also be needed to find locations that are also not causing so many problems in terms of this…so, what would you say, in the middle of the neighborhood or rather at the edges?

E: I think it is depending on what the hub is. Maybe you should have smaller hubs within…I think if cars is involved it is getting bigger, so that might be difficult, having to find a spot in the neighborhood, especially in neighborhoods as Assendorp. But maybe you should make a difference between really small mobihubs that only have electric bikes or scooters, and the bigger ones, which are further away. And then later on…but ultimately you want the car to be further away, because you want the people to go by bike or scooter or walking, preferably. So, putting the

car at the near distance does not stimulate walking and bicycling as much as putting it far away. On the other hand, putting it further away might decrease the enthusiasm of people, to…

I: to use it.

E: to use it. So, it is sort of a…or to make the change, but I think smaller hubs without cars are easier to integrate at nearby spots than the car oriented mobility hubs.

I: But then you still have the issue that people will probably not get rid of their car, which is then still staying in the…

E: Yeah…you should do both. So, people who want to participate, say, who know you are going to remove the cars from their street, or, we are going to remove a couple of parking…it maybe should…Rotterdam has these flonders. I do not know if you know them. They can put it on a parking spot, and it is either a bicycle rack or green, anyway. So you can place some…

I: Replace some parking place directly.

E: But it is only temporary, and if it is…maybe you should not make the change permanent in one step, but just gradually change the streets. And then helping people to get accustomed to the situation.

I: And the very small ones, you just said, the bicycle ones, and the ones with a car, do both, but is there, in terms of phasing, would you do the smaller ones first, and then the ones with the car, or at the same time, or did you see any…?

E: For the changes that you want as a city, the cars ones are obviously more important than the smaller ones, but the smaller ones are easier to…I am not sure, that would be something I…yeah, I do not know.

I: Okay, yeah, that is also okay. I have realized that already with talking with experts. It is such a new topic as well and it has not been implemented in many places, so it is just, everybody is just testing, and trying, and like, if you do not know it, it is not a problem. So do you see any other additional problems in finding a location? We discussed that it is, that people do not want it there maybe, that, also with phasing there is problems, but do you see other problems with finding a location?

E: Hm…well, to find physically the space, is just, it is going to be…the visible spots, and the way it connects to the network, I think that those are important issues to address. And the way it connects to all the network, so the car network, the bicycle network, public transport and pedestrian.

I: Okay. So, that would have been my general questions. Do you have any other comments on this before we go to the next part?

E: No, not on this one.

I: Okay. I mean you also already said a lot of things that are connected to the second part, so…yeah, I will put on screensharing again, because I will ask you later to also open the link, not yet, but later, if you want to, I can also do that, do the things for you, but it might be easier to do it yourself then. Do you see the website now?

E: I see expert interview Friday the second.

I: Yeah, that is, I already had one today, so, that is why second. Here again I put the two aspects that are connected to, or the two things that make my conceptualization, and this task is in two parts, so that is why I am asking you not to open the link yet. So, first, I want to ask you to think about which indicators you find important for selecting a location of a neighborhood hub. So, which things should be analyzed, so that in the end I choose a good location for a hub. And yeah, I would like you to just brainstorm, just come up with the first few things you think about.

E: Well I think those are the things we already mentioned, I think the Dutch word draagvlak. Because I do not know the English word from draagvlak.

I: There is not really an English word for it I think.

E: Okay, and the network, all the networks, the way it sits in the network of all the mobility systems. And for pedestrians, it should be very attractive for pedestrians and bicycles, but pedestrians mainly, so the attractiveness as well of the routes. I think the social safety. Maybe it should be cameras, but mostly especially when you have smaller hubs, they will be easier to integrate to social safety, they will probably be in the neighborhood itself. And maybe not a very nice one to name, but costs?

I: In terms of what, what do you mean by that?

E: The investment needed to make the mobility hub. Then to transform streets as well, because I think those two go hand in hand. So it is not as much for what kind of location, but you should, you need to add something (further than) the mobility hub as well, you have to extract something from the neighborhood in terms of car parking.

I: So, you mean by, because there is costs, you should also give something back to the neighborhood or?

E: More of a…well, there is a reason, why you want to build these mobility hubs and you want to change something in the way we use mobility. To do that, I think, we have to change the streets as well. So, you cannot just add parking spots, you have to change the streets that are participating. So, you have to transform them into more pedestrian areas, and obviously, there are costs involved with building mobility hubs and changing streets as well.

I: Yeah okay. And these costs might also vary from location to location, because some places are already better suited than others.

E: Yeah. Exactly.

I: So, it would be in this case, more useful, for reducing costs, if you choose a place that is already good for a hub?

E: Or if you look at the Kamperpoort, there is going to be some changes, you have the Ijsselhallen there, they are already transforming the area, so maybe in transforming the area you can use that change to add the mobility hubs.

I: So, new residential housing?

E: Or big changes in the city. They are always easier to take with them than with existing projects.

I: Okay, then you can now open the link.

E: I will try.

I: I hope it is working, this morning it did not work. Because the expert used, I think a browser that did not work with the program. But just test it and maybe…so I am using Edge, Microsoft Edge. And he used…oh you are already there, so it should be working.

E: Enter as a visitor?

I: Yeah, you can go as a visitor, because then you are also…You do not have to create an account or anything, that is also what I wanted for you. It might show you some explanations of the program, but it is actually not very difficult, it is just a pinboard actually where you can move around things. And most of the things that are there are already locked or fixed, so you cannot move them. But these circles here, you can move them, as well as the ones we collected now. And this list of potential indicators here in the middle, the bubbles here, these are collected from literature but also from what other experts said, so, things you could take into account. On the left-hand side, I have definitions of what literature, or…oh, you can zoom in with your mouse, then it makes it easier to read them. Oh!

One of the text boxes was moved by the expert although the text boxes were supposed to be locked.

E: Oh! You are doing this as well, right? We are both changing the screen, both? We are working on the same screen.

I: Yeah, that is the idea behind the program that you can work together. It is just like a sticker board where you can move things around and the idea, or the task for you now is to select five of the

listed things here, from the original list I brought here, but also from your list. You can also just choose yours of course. but maybe these are in inspiration from what other people said, or from what literature said, you can also add new ones and then rank them in the importance for the location. So, for example, is it the most important that it is socially safe? Or is it the most important that there is draagvlak for the project? I would give you some time now to read, also the definitions if you want, and organize it a bit.

E: Okay.

The expert is working on the MURAL board.

E: I am thinking about the demographic factors…I think they can help to have…to look if you have draagvlak. But it is…

I: We can also move them as the way of measuring draagvlak, maybe.

E: Yeah.

I: Then I would still have to, or maybe you can already indicate that later, but, get an idea of is it younger people who want it or is it people with this amount of monthly income, or is it people with children, you know.

E: Yeah, I mean, if you have areas like in Stadshagen, where there is a lot of two working parents with children and two cars, then the chances of having a change is probably…that is not their focus in this time of life.

The expert is working on the MURAL board, some handling problems with the program were solved in discussion.

E: So, I think population density for me has…the denser an area is, I think the more of a chance is of draagvlak, again, but it is also easier with your social safety. And I saw another one…

I: Social safety was just moved away; I do not know why. I did put it back.

E: So, oh, I can see why it is doing that, it sticks. So, I saw the one, proximity to heat stress, I was doubting that one, but I think if you have parking pressure, then probably there is a lot of, the chances of having heat stress are bigger, and then also again, you have more of a chance of having draagvlak, because with the mobility hub, you can change the street to more green streets, so it is sort of, all connected.

I: All connected. So, we can also put it here. Yeah, I mean, it is still, I will try to measure a part of it. So, heat stress for example can be measured using satellite images. But of course, that depends, I mean this is, the proximity to parking pressure is of course connected to heat stress. Because

normally you have a lot of, no green, where the cars would stand on. I think, can you say something about the amenities and the logistics? So, the second and third place here, just explain why you chose them, maybe?

E: Yeah, social amenities, I had to read the definition, but it says, all types of services in the area in need on a regular and irregular basis. So that is the thing I started with, if you want to, so nabijheid, the word nabijheid, so, if you can use these hubs to add things that the neighborhood now is lacking, I think that is a big plus and it can create hubs that are going to be used, because that is obviously what you want. So, that is my motivation for social amenities. And the other ones, well, the proximity to logistics, that is sort of the thing I said about the connections to the mobility network, it goes as well for the logistics part. So, if you have a hub at a good location, then all the deliveries made in this area can maybe transfer at that station or they have these loading docs for…so that is the reason why I chose that one.

I: Oh yeah. So that if there is already such a parcel delivery spot somewhere, then it would be useful to make the hub close to it, for example.

E: Yeah, or the area around it, if you can integrate it in the system.

I: Mhm. Okay, yeah, I mean of course a lot of other things are connected as well, as we already discussed, so it is not saying that the other ones are not relevant, it is just trying to find out, which ones are the most important to analyze. I think it is a good result then.

E: And maybe one last thing. Those social amenities, they have connection to the social safety as well, so if you have more facilities that are used by people, then you create a social friendly environment, or maybe we should say women friendly, because mostly that is…

I: That is the point mostly, yeah.

E: Mostly, yeah.

I: Yeah of course, also, I mean this is also a lot of times discussed, with a guard sitting there, guarding the shared vehicles, and then, even if you come back at night, you are feeling safe because there is someone taking care.

E: And that is one of the things, because we were a pilot city for the parcel locations, so the cabins? Parcel cabins? Is that the name? And it is one of the things I says, when they were looking for places for those parcel cabins, you have to think about the social aspects, the social safety aspects. If you come home at night, this was before Corona, late at night, and as a woman you still want to feel safe getting your parcel from a cabin…So, if you can integrate it in a hub, it is a plus for more things than just the mobility hub.

I: Is there, you said it is a pilot, is there already some policy document about it, or some results?

E: I do not know; I am not sure about who is conducting the pilot. Well, I know it is not us, we are just providing the spots, so it is Post.nl, I think, which is doing the pilot.

I: Okay, maybe I can find some information about it on their website, because of course it is always good to include some examples in the research.

E: One of the things that I said not because it has nothing to do with mobility hubs, but one of the things that they did write is that the cabins are quite tall…

I: And if you are small?

E: Or if you are in a wheelchair, and the parcel is in the top cabin, then you cannot collect it.

I: Oh yeah, right. And then maybe you have to wait until someone is passing by to get it. Yeah, that is something, that is what I mean with you are not thinking about it, or planners are not thinking about it, so that is why I think your position, or your job is very important. But then you just need a longer one, that is just low enough.

E: And I mean if you are making just the cabin, then it is hard to have an area which is so long, but if you have a mobility hub, then it is a lot easier to integrate the parcel cabins into the structure you are already creating.

I: Yeah, of course. I can stop screensharing now. Okay, that were actually my questions, that was the last task. You can of course comment other things if you still have ideas.

E: No, not at the time.

I: But that was very interesting, very good to talk to you. Yeah, thank you for your time, I will, I also said that to the other experts, I can send you the thesis in the end, if you like, it will not be before I think beginning of October, because I still have to do a lot of work, but I just thought it might be interesting as well to see what is the result of it.

E: Absolutely.

I: Also, as I am interviewing some people from Zwolle, I should give something back to you from taking the time, I give the result to you at the end.

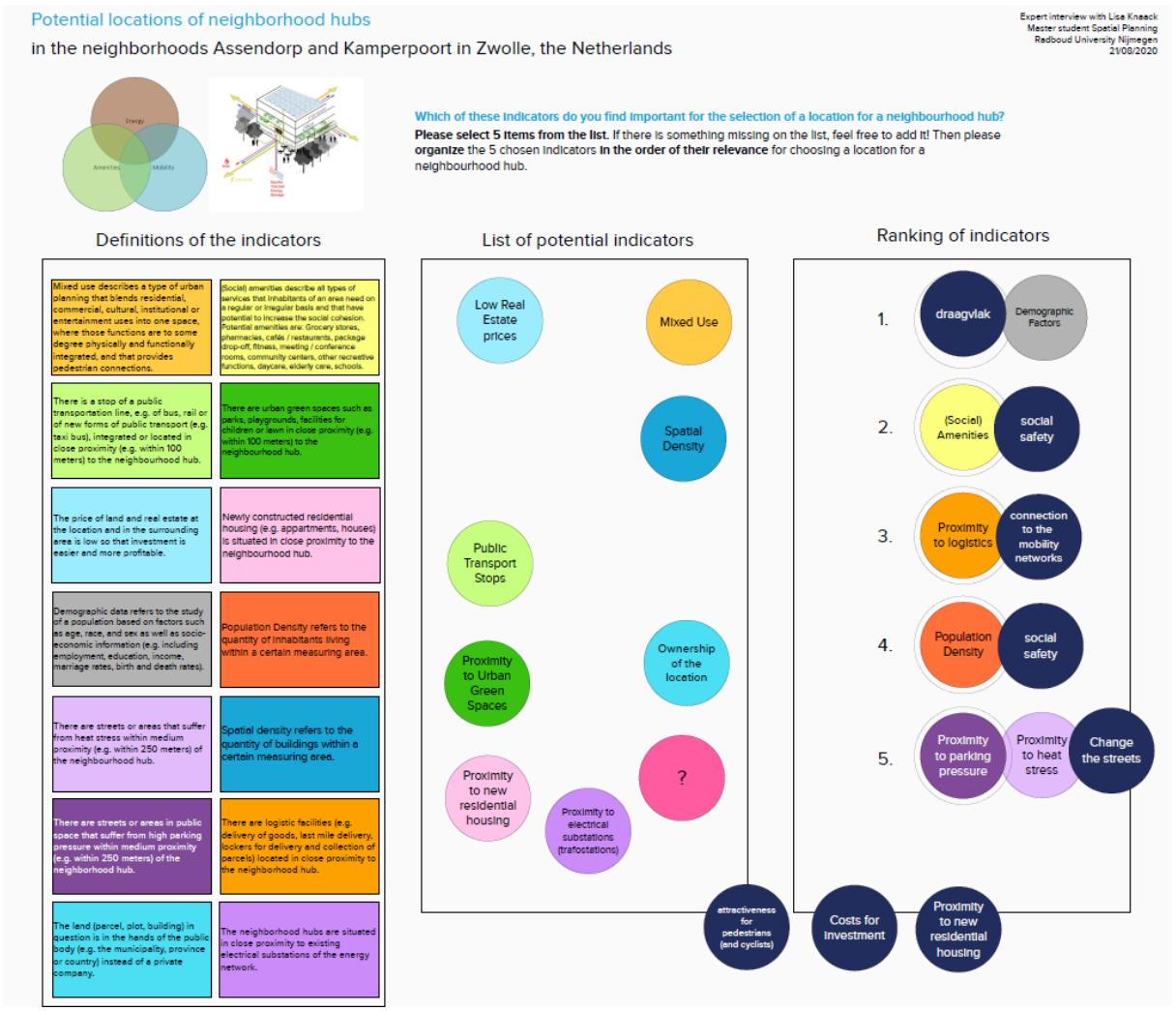
E: Yeah, I am very curious. I like that.

I: Okay, so, thanks again, I wish you a nice rest of the day, nice weekend.

E: And you a lot of success with your thesis. Okay, bye!

I: Bye.

Appendix 23: Expert Interview MURAL board Expert 6



Appendix 24: Expert Interview Report Expert 7

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 24.08.2020

Place: Digital meeting

Time: 9.00 am

Duration: 01:01:44 min

Atmosphere

The interview atmosphere was informal and the tone of conversation was friendly and open. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was adhered to and the expert was able to answer all questions.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: So, I will start the recording now. And I have prepared a short presentation with some pictures and slides just to make it easier for you to follow, what I am doing, which I will share now. I hope it is possible to see. Yeah, just before I start with that, some general aspects about me. I am Lisa, Lisa Knaack, German, Master student at the Radboud University of Spatial Planning with focus on Urban and Regional Mobility, I am at the moment doing my Master thesis on the topic of neighborhood hubs. And I am working as an intern at the mobility advisory office &morgen in Utrecht, so that is where the topic comes from, and also the contact to you. Yes, and my research topic is to find a methodology for finding suitable locations for neighborhood hubs. And in the conceptualization of these neighborhood hubs, there is the topics energy, mobility and societal aspects connected to it. This is also the conceptualization of &morgen. And on the right-hand side here you see just a graphical explanation of what &morgen thinks a mobility or neighborhood hub could mean to the neighborhood. So, there is different aspects connected to it. And my focus is Zwolle, the city of Zwolle. And there is, according to &morgen, there is three scale levels of hubs. Of course, there is a lot of different typologies, like, some people are classifying hubs differently, but the classification of &morgen is now that for a city there is a stadsrandhub, so a city edge hub, where you mainly have the transfer function. I mean, you of course probably know a lot of these things already, but I just put them here to give you an idea of what the background of my thesis. Then you have a public transport hub, where people arrive with trains and then transfer to other modes of transport, for example also walking into the city. And the focus of my research are the neighborhood hubs, they call them buurthubs, which are the smallest level of this kind of mobility hubs. And these are just some visual conceptualization, so a stadsrandhub can also have logistical functions, a public transport hub has these transfer function from the bigger mobility to the smaller mobility. And the buurthub is a bit different conceptualization in its' own way. And there is three points connected to it. So, the main point of course, is the main focus, why this is thought about is mobility, shared mobility in this case here. So that you can take a shared car and bring it back to another mobihub or buurthub. In this conceptualization these cars are also electrical, they can also serve as a battery for the neighborhood. They can also be charged by using for example PV panels on the roof, which are visualized here. So, these are the mobility and energy aspects. But there is of course also, it is important to combine it with societal aspects, so, combine it with different functions that can be combined, so for example a fitness studio, a daycare, a café, so that you do not only have the reason to go there for mobility, but also for other aspects. And &morgen, and I think Zwolle also combine the idea of geothermal heat production to it, this is not so much part of my conceptualization for the thesis, but it is just to give you the full picture, this is also connected to it of course. And the focus of my research, as I said, is Zwolle, and as I said, I am trying to find a methodology for finding locations, which I am doing with, first literature review, then expert interviews, and then GIS analysis. And with the expert interviews, I try to derive potential indicators to measure in the GIS analysis. And afterwards, I will test this method in two case areas

in Zwolle, Assendorp and Kamperpoort. And this is just a visualization of &morgen from before in Assendorp and after, how a mobility hub could look like, how it could transform a neighborhood. And this is more a visualization than really part of my concept, but it is just to give you an impression. And as I said, the research aim, or the aim of the expert interviews is now to discuss some general topics with you, for which I have some questions, and then afterwards discuss indicators. But first of all, I would like you to introduce yourself, just in a few sentences, just that I get an idea who you are. Of course, I did some research on you, but it is easier to discuss that in person.

E: Well, I am working with the province of Overijssel more than 20 years now. And originally I was working in the public transport sector, and I became working at the province of Overijssel when the public transport was organized in another way with tendering and everything, so I was on that side of the table instead of the public transport company. So, in the last 5 to almost 8 years I am in the strategy club from the mobility and spatial planning department in the province of Overijssel. And I am very interested in the transition of mobility nowadays, to shared mobility, to new mobility, to electric mobility, and all kinds of new mixed mobility. And the concept you just discussed with the mobility hubs and the three aspects of spatial development, mobility and energy transition, was also my thinking already a few years, and when we came to the Zwolle study, I brought this also into the discussion and I think &morgen, colleague 1, embraced it very much and so it is now, it is bigger, we are giving it a new start, a new thinking how we can organize to develop such places. And I am very pleased to be part of this transition thinking because I believe very much in this. Yeah, the problem is, how to create those places and who takes the lead in it? How do we finance it? The concept is I think fine, but now it is [about] how to make them real, that is the next step now. And that is a very complicated thing, I think, because there are a lot of stakeholders, involved in the process. And governments, but also all kinds of private companies have a role, and also for financing, they can also have develop money for making a new business concept. But that is very interesting for now for me. How do we organize that in a good way? The role of the governments and public parties, and energy clubs, how do we find a mix in it, so that everybody does their part and no one is waiting for the other, and thinking, well the others are financing it. It has to be a new balance I think for organizing those mobipoints.

I: I think it is also getting more difficult with every function you want to include, I guess, right?

E: Yeah, every place I think has its own mix from aspects on it, it is not one size fits all, you have to, with every mobipoint, with every…how do you call them?

I: Now I called them neighborhood hubs, but that is more the translation of buurthubs, but you can say mobipunt, mobihub, whatever you think.

E: Ah, neighborhood hubs. Mobihub is (incomprehensive), I think. But that is not a mobihub, it is also a spatial and energy hub. And also, the topic I think, what you are talking about, what indicators from the places, to create them, is also very interesting now. Because originally you would think, which places are available, for instance, parking lots or something like that, or empty buildings or office buildings. That are the first things you think about. But maybe, that will be easy for starting, but it will not always be the best solution, and that will be a search, to find a sort of optimum in the available places, in the available locations, or maybe locations who are the best for the functions the hub will have, for mobility, for energy, or for spatial planning for the city or the future. I think you will have to consider those things with the development of those mobihubs. And my task in our team is, for what kind of role does the province play in it? How to work together with the city and how can we help them? And also, for the upscaling for other areas for other cities, to stimulate other cities to also work on this kind of topics. That is sort of my role.

I: Very interesting role, I think. So, I would start with the societal part, then maybe. And the first question from my side then would be to ask you, what do you think are the potentials and problems of including aspects such as a café, a daycare and other societal functions, into a hub?

E: For me, I see the, on the picture was also the parcel, the parcel function, that would be a very interesting function, I think. Because nowadays, all kind of vans are crossing through the city and delivering packages at every door, but when it is more growing, it will be a very busy in the cites. And we actually do not want to have those vans crisscrossing through the city centers. I think a kind of centralization from that kind of package, parcel function will also be helpful. Nowadays, it is already in supermarkets or other pickup points, it is already starting to grow, and I think the mobipoints will also suitable places for that kind of…because people are more traveling via these points in the future, where they pick up the car, or they pick up the shared bike, and so on, and in the same journey, they can pick up the parcels, or bring the parcels to that point. I think that is a very interesting, new sort of function, and very helpful to organize those kinds of logistics things better, so, to me, that is a key function for those points. On the other things, I have not really a very vision at the moment of these kind of aspects. I think, when creating a point, you can consider all those kinds of social functions, is it necessary, in this place, or is it, are there any parties or organizations who want to put a function there? It could be all, I think. But I think it is very depending on the energy from the market, from the parties, who want to be there, and it is a sort of a puzzle to make room, to make space for those parties to be there. But when there is more traffic…but I think there will be sort of a mobility aspect also about those functions, but in the core, it is also a mobility point. You have to think, as always in the city, you have to always consider the mobility movements of your business. From what kind of mobility aspect has it on it? Because if it attracts a lot of new traffic, and you do not have space for it at those mobihubs, then maybe it is not very wise. My vision is always, with supermarkets and all those things, they

do not belong in the city center but also have to be on the edge of the city. There is more space for vans, for cars, and groceries and stuff. And you do not have to put those functions into the city centers, I think. Because of the traffic that goes along with it. So, you have to always consider, and also with the creation of the mobipoints, what functions and who kind of mobility brings it with it? And is it suitable for these mobipoints, yes or no?

I: So, you see the problems, these are the problems you see there, I guess.

E: Yeah, because I now see it with my colleagues, that work on the city center to become more economically livable, so, lots of empty shops, and they attract all kinds of new functions into the city center, but not considering what kind of mobility aspects are combined with that. And I think that is a very important aspect to think about when you have spatial planning and new functions in the city center but also at the mobihubs.

I: And do you think that there is something that should be in place, in such a hub? Because we discussed that the main function is mobility of such a hub, but if we would try to connect also social functions to it, what do you think is needed to make these vital places, so also that maybe different people from the neighborhood come there? Do you think there is something you can do about it or is it more of a development that happens or does not happen?

E: Of course, always a sort of hub is more attractive when there are more functions than just mobility, I think. When it is a bit livable, it is a nice area to be, and it is close to the stations of the public transport, and railways, they are always very concerned about the stations to make them at good places, to be. It is the same for this kind of mobipoints, neighborhood hubs. But because the scale is very little, the question is, can you have a shop, or a coffee shop at every hub, I do not think so. And it is not always necessary, maybe it is enough to make it more open places with trees and things or nice places to be. And the functions, the spatial thing, when it is appropriate there, when it is logical there, when you can make a deal with some parties to put something there, then you have to sort of try to provide it, because it will help to make it a better place, a nicer place. But it is not really, I do not think it is really necessary everywhere. You can develop it on every hub in a different way, depending on the location of it and the functions, how the parties want to have there. You can stimulate that, but you do not have to force it, I think.

I: That is an interesting perspective, because I think a lot of people have different opinions on also how, what exactly a hub is, and what exactly you should do and what you do not have to do for it. So, I think that is an interesting perspective, also in comparison to other perspectives of experts I have already heard, so yeah.

E: I believe very much in, you can have a sort of vision, but not all of it is makeable. It is very fluid; it has to be very…

I: Flexible also?

E: Flexible, and there must be energy with other parties to cooperate. It is sort of a pull and push thing. As a government or a city, you do not have to create those things in the way you think yourselves, it has to be a sort of cooperation with society and the people. And I think the core business with the mobility hub is still the transfer from sort of mobility things, and for the neighborhood hubs, especially the shared mobility is the new function, I think. Because I have heard from some companies who work on mobility as a service, for shared mobility, shared cars, they need some strategical points, locations in the city, where people from the first mile and last mile have their kind of mobility. And that is very specific needs for how far it is from where people live or how far it is from where people work. And those things have to be…when you are too far from the destination, or too far from your origin, then maybe a mobipoint will not be used very well. The basic needs are from the mobility functions those locations have and the other aspects on it, like the energy hub, or the spatial planning hub function, I think is in the end second priority.

I: Secondary, yeah. You just said, it should not be too far, the distance from your origin to your hub, is there a number that is like a number of meters or minutes that you are not supposed to…

E: Well, there are some figures on that, but for me, I always find that sort of…how do you call that…it is about how people feel the distance. A few minutes, a few hundred meters, to the public transport, with the public transport stops, there was always 400 meters to the public bus stop. But sometimes, the 400 meters feels very long, and sometimes, it is a nice road, and then 400 meters it is acceptable. You should not push those figures too hard, I think. It is for what people like to accept for going to transfer points, for changing their mobility. And I think it has to be in their neighborhood, therefore neighborhood hubs. It has to be on the edge of the, the wijken, the part of the city, where people live and so on. And sometimes it is a few minutes and a few hundred meters, and sometimes a bit longer, but you have to consider that, for, well, will people accept it. So, you have maybe to test it, or maybe something like you develop it with the potential users, is this an acceptable place? If we have shared mobility here, would you use it, yes or no? Is it accessible for you, like distance or like time? So, you have to find out at each place, what the potential users will find acceptable.

I: Okay. Yeah, we touched upon that topic of vehicles sharing or shared mobility. What do you think is the future perspective for that in a city such as Zwolle, but cities generally?

E: Yeah, like I mentioned the mobility as a service development. Nowadays, you find a shared car on some street edges in some central places. But I think it will develop to more places, but then to more places like the neighborhood hubs. To places where those kind of shared cars or shared bikes will be parked, because then people know, when I have to use, then that point is, I can find it. And you do not have to need the app, like, where is the car, and then I will have to go there. It is more

easy and you also have more chance to find a vehicle when the scale with not one, but maybe 10 or some bikes. So, you do not have to worry that the car you want to use is not on the street edge.

I: It is not there anymore, yeah.

E: So, you have to go few hundred meters to another place. But you do not have the time at that day. So, for the accessibility and reliability, travel time of shared mobility, I think it will be necessary to upscale it, the shared mobility availability, to those kind of aggregation points, where there will be enough vehicles or bikes to use, so that you always have the reliability that there is one available. So, centralization, to those strategic and for the people accessible and acceptable distances is the key. And I think the scale, you had the card with all the nodes on the map for Zwolle, that are all potential places for shared mobility, I think. And again, maybe not on every hub shared cars is logical, because there is no market for a shared car on a certain spot. And at another spot there will be a lot of demand for those kinds of things. So, of course you have to make a sort of suitable, maatwerk, for every spot.

I: And one part of the conceptualization is also the electric vehicles, so shared electric vehicles for example. I have heard that until now there is only very little, like 10 electric cars in Zwolle, so not a lot, but do you see that changing in the future, or do you see it more as an eccentric part for really wealthy people?

E: No, I think it is very important to combine the goal to make the sustainable mobility that is also shared mobility combined with electric mobility. I think in the future, we will have to stimulate the market to deliver shared mobility with electric cars. And not longer with fossil engine cars. I think those two transitions to shared mobility and to electric can be made quicker when you combine that, and when you organize together with private parties who deliver shared mobility. And when you talk about the two aims you have to combine it, maybe you can sort of stimulate it a little with money or something like that, but also we do not accept fossil shared mobility at our mobipoints. So, we have to sort of stimulate those parties to use electric cars for those places. So, I think that is a very important new element in that shared mobility development I think, but it helps accelerating the electric mobility development.

I: So, you say that the vision would be to have only electrical shared cars, so no other diesel cars anymore in shared mobility? Okay. That is a good vision, I think. What do you think are the problems of finding a location for a hub? We discussed that the distance is one aspect. Do you see other problems with finding a location?

E: Well, the cities are nowadays developed for. So if you develop a new city, a new spatial design in the city, then you have to, as we have discussed before, sometimes you have to start with available locations and try if it works or not or something like that and if some logical available locations

do not function, because they still would be too far for the origin or there is nothing, then you have a problem, but then you learn from that, that you have to find another location, the first site will not be the first logical place. But when you have to, when demand asks from you, you have to create a new location, then you have to do that. And that is maybe more difficult, because sometimes there is no space, and sometimes there are other functions at that location. So that will be a sort of search in the city, for available, but also for what logical is for the mobility demand. I think when you design your cities, from now on, you really have to consider all those mobility aspects, and not just work aspects and living aspects, and shops and things. The traditional. And spatial planning was also, first spatial planning and mobility follows. So, you have to integrate that and for new developments from the start, think about the new mobility demand. But that is all, it is starting already. Because in the part, it was all, every woning?

I: Appartment or house?

E: Every house or apartment has its own parking place. So, in front of the door. But nowadays the bigger cities already think about less parking places per house and more to make it outside of the houses, so that people use public transport more, and have no own car anymore, and are stimulated to use shared cars if available, so cities like Amsterdam are already working on that kind of concept. And I think that will continue and then you might have more urgency for finding good alternatives, good neighborhood hubs. I think it will slowly grow into the spatial development thing. Also, with the provinces. But we are at the start of it. But if we work together in an integrated way, it will be more easy to find the most suitable and the most wanted places I think. But it will take a lot of time to make the whole concept [work], I think.

I: Yeah of course. It is still a vision, more or less. Also, the slides I showed you. It is not like if you build some of these, it is not like all of these functions are there already. It is just like a vision to which you can work, but not what you will implement in the next few years. Discussion also suitable locations: I would just like to talk about the energy side for a moment. There is the idea to use the electrical substations, I think trafostations is the Dutch word, as starting points for these mobihubs. What do you think about that?

E: As was in the report, study on Zwolle, you have to sort of make an optimum mobility network, and you combine it with the existing electricity network at the moment. And when those places match, more or less, then it is good to combine the two things. But when the things do not match, because the electricity network is not very good or not very near, where you want to have a mobility or neighborhood hub, then you have to think about maybe is it wise to have the mobility hub near to the electricity hub, the trafostation or something, or is it better to make an extension from the trafostation to the mobihub? Or maybe it is better on those places to make it a sort of self-supporting hub, to have more solar things on the roof, to make your own energy for the

neighborhood hub. And at that point it is more or less a sort of self-supporting mobipoint. But will the electricity storage function maybe not be there on that place. Because in the energy transition you will find sort of neighborhood e-hubs for storage for solar and wind to the houses, it will be on other strategic places, and if you can combine it with a hub, that is very fine, of course. but when there is no space, or it is the wrong location, they you have to make a sort of parallel network for energy storage hubs in the city and sometimes you can combine it and sometimes not. Like the spatial aspect, it is not essential for the hub, but it is a sort of combined thing what will be efficient for the city center for the space it takes. But when it is not possible to combine those functions then you do not have to force it, I think. The main thing is that you always, like the spatial things, that you consider what kind of electric, energy aspects are combined with it. What is the demand from the mobipoint itself but also for the surrounding, for the neighborhood itself? So, there will always be a tailor-made solution, you have to work on.

I: Okay. Do you have other concluding comments on these questions, otherwise we can move to the second part?

E: No, I do not think so, I think we touched the most things.

I: Yeah, I think so. Okay, so please do not open the link yet, because I will first share my screen again, and then we can…this part is also in two parts again. I hope you can see this now?

E: Yes.

I: The task I want to do with you is divided in two parts. First I would like to collect ideas about aspects that are important for finding a location, without showing you the list that I have, and afterwards we can have a look at the list that is derived from literature and other experts. And I will just collect these things here, and later on, you can open the link, and work on the platform as well, if you want. Otherwise I can also do that via screensharing. And now I will fill in things that you name. So, the question is, which indicators you find important for selecting a location for a neighborhood hub?

E: Yeah, I think the distance, the travel distance for the first last mile the distance in time for the potential users of the mobipoint.

I: So that is an important point, yeah.

E: The second is for shared mobility companies. Are they interested? The demand, from their business case, is it the most suitable place, places, because from their concept, they have a sort of own opinion, of which place will be the most suitable for their product. And that will be one of the key products on the, we talked about, on those neighborhood hubs.

I: Mhm, yeah. Yeah, we also talked about something else, I think you said it should be attractive, the distance, the attractive route.

E: To those points, to the, yeah, that is combined with the distance, yes. Yeah, maybe also the combination with the, with the parking lots from now, what are nowadays logical locations for people to park your car and things. So, it will be more easy to combine new functions with it. But just parking your own car will also be a function, I think.

I: Yeah, of course. so, that you have parking places for the shared vehicles, so these stay there, and you can put your private car there as well. Because that also has benefits for the streets.

E: More space on the streets for other functions, and green and more for the livable cities. What indicators…Well, we talked about the energy network, when you can combine, combination with the energy network, that can be also a selection aspect, I think. And the combination with the logistics network. As we talked about the parcels. When you have a sort of personen, for people mobility and you have logistic mobility. And when you combine it…and in the second row you have the mobility companies, but these are the for the package companies, the network.

I: So, you mean also in terms of where these package companies have their offices, not offices but places where you can go for…

E: Yeah, but like how do they think about the case for their consumers, what will be for them interesting points to deliver the packages, and also for the users, what is acceptable. Like with the first and last mile, it is also, is it too far or not to pick up your package or something like that.

I: Mhm, yeah. Yeah, if these are…it is totally okay if you do not come up with more…

E: Yeah, but I was thinking on the other aspects, social aspects, like coffee shop or something like that. Sometimes you can also search for, is there any possibility to make a neighborhood hub near an existing coffee shop or other function? Like you try to combine with the energy network, to combine with logistics, also to combine with other stores that are already existing. So, you do not have to organize it again. You can use the existing business there.

I: Yeah, of course. It might be easier to place it close to an existing amenity area than adding all the functions into the hub.

E: But I think from left to right, the first things we mentioned are the most important, I think, and sort of a going down now, for like urgency or so. They are all important, but for mobility, the two on the left, are the most important. The other side is, could you make it more efficient, could you maybe combine it and so on. But the basic is the mobility aspects for users and for providers.

I: Yeah, okay. Then you can open the link if you like. It is a bit easier if you zoom in an out yourself on the slide, that is why I am saying. So that is the second page here, I am now moving your aspects here. And here I prepared a list of things that other people said and the literature said and on the left hand side I have some definitions to make clear what I or the experts mean with that. And I think it is easier for you to open the link yourself, so work on it. So, if you open the link, you can also move things around and work in here.

E: Yeah, but how do I, I am working on my laptop now and how can I access to the link?

I: I have sent you an email, on Friday I think.

E: Yeah, but I am not very multitasking on that kind of things. I have most a meeting like this or I work on something, but the mixture I am not very used to.

I: Okay, I can also zoom in an out for you, if that is easier.

E: Yeah, maybe you can do it.

I: Okay, so the task is basically the same, what you already did is ranking your own aspects actually, and the idea now is to have a look at these potential indicators I named here. So, there is a lot of them, you can also add something, if you still come up with new ones, you can also take your own aspects, some of them are the same. And then I would ask you to decide which ones of these are the five most important aspects analyzing when searching for a location. And you can now read this list and I can then zoom in if you want into the definitions.

E: Yeah, my eye falls on public transport stops, because public transport stops and the public transport network is also, could be a very important aspect. Not for all the neighborhood hubs. But when you are in the city, you want to have a combination with shared mobility and also public transport, that is a very interesting thing. So, the public transport network should be…

I: Analyzed?

E: Analyzed and developed, and to have to combine with the stops. Nowadays, you see sort of on the city edge, where the city edge hubs, where they have to combine with public transport stops, I think. I do not think that it is on the first one, but I think it is an important thing. But for me, I do not know if it is on the other colored dots, but my dots, the left one with travel distance and the interest of the mobility companies are the most important, I think.

I: Okay, so I will put this one as the first (th*e interviewer points to the indicator travel distance / accessibility*), and this one connected to it (*the interviewer points to the indicator attractive route*).

E: Yeah. And then the interest of mobility companies. And maybe you can combine those with the public transport stops. Because there is also, they are also a mobility company, and maybe together they can develop a new sort of line in the city that starts at neighborhood hubs where possible.

I: So that it is easier to arrive there as well.

E: Yeah, first and last mile things, bereikbaarheid. The combination of public transport and bikes is of course very important, for the last mile a shared bike is very important, like nowadays, but the train you can extend that to the whole city, I think. Well, what kind of new things I see? I think some things are the same as I mentioned, I think. I think population density has also something to do with the distance. You can maybe combine it with the first one. It has something to do with travel distance but also more people, density. It gives more market for your hub, if there is more people living around your hub in an acceptable distance.

I: Would that be more important, so would you put that in place two, so instead of this one, so this on place three?

E: No, I think it is on the…it is not quite the same like travel distance…it is a combination from travel distance that is acceptable and accessible for people, and but when you have more people it is more attractive to develop a neighborhood hub. But if you have little people around, so the density is I think also a very important aspect for the development of these points. Yeah, it has more…but I do not know where to put it. You can make it a…I am hesitating…

I: You can also change the position later; we can now put it somewhere and discuss later whether it is on the right position.

E: Yeah, because there is also a blue one, the spatial density, combined with the other one.

I: That has of course something to do with this one (*the interviewer points at the indicator population density*).

E: Yeah, yes.

I: Because if the spatial density is high, normally there is also a lot of people living there.

E: Yeah. Or other aspects, like things like work or businesses, or things. If there is lots of things to do around, then it is better to have a point, a hub, in that kind of dense areas.

I: Okay, so this here then? (*the indicator puts the indicator spatial density on rank 3*)

E: Put it on three, both of it.

I: Both of it? (*the interviewer moves the indicator population density also to rank 3*)

E: Yes. *The expert is reading the other indicators.* Yeah, on top, maybe a little bit on top. Mixed use, the mixed use thing. I think it is important. All kind of mixed mobility, energy, like more, is better. More mixed use is better than to have just one or two aspects on it. And I think on five is all kinds of combining things. With the parking, with the logistics, and the energy we had. So that was my own blue things on the right, the three things. And they are also in the other colored balls. And the combination possibility with other functions. But also, the parking pressure has something to do with the parking thing. Yeah.

I: Would you say, one of these aspects is more important than the others? So, is parking pressure more important than logistics, or the existing amenities?

E: No, I do not have a priority on those for the moment.

I: So, these would all go for five.

E: Yeah, at this moment. Maybe if I had more time to study it would change, but I think it gives an indication, as I see it. It starts with the mobility and the people who use it. That is the most important. And it has more chance to develop in dense areas. You have to consider the use aspects on it, it will be interesting for multiple things, and then you have the combination thing, can you combine it with other things, can you make it more efficient…

I: Yeah, I think that already gives a good indication of the hierarchy of the aspects.

E: Yeah and the dots that are left on the left…yeah, the proximity to electrical substations, we have mentioned that one, to the energy network, the purple one, you can put it down, to the second one.

I: Oh yeah, right. Yeah, of course I mean, some of these aspects are named by other experts, some are from literature, but of course, people have the same, come up with the same aspects after a time, so someone else also named this aspect.

E: Yeah, it says proximity to new residential housing, that has to do with spatial density and population density. So you can build houses around, new houses…it has to sort of…I saw the link with priority three, where you have new locations to build houses, it has to do with…you have to sort of spatial density, population density…

I: But it also has to do, I think the idea behind this indicator was really to newly constructed residential housing, so it is easier to include a hub there, because you do not have an existing urban network, like if you develop…

E: Yeah, I understand, it is true. But it is not exactly what we mentioned there. It makes it more easy or something like that. Like ownership of the location, yeah when you have, sort of…it makes things

easier or something like that. But it is not really important for the role of the neighborhood hub, I think.

I: Yeah, I just included all the aspects that experts named, so for example someone said that draagvlak is very important, I mean, of course, because on the one hand you can build as much as you want, but if the people are not interested in it…

E: Yeah, but for me that is the same like on one. That aspect for draagvlak. But when the draagvlak it was meant like it is for the users or for the [companies] of the hub. That would be different.

I: Yeah okay, you have draagvlak here and there, both from the side of the users and from the side of the stakeholders.

E: And the third one is maybe for the surroundings, where you have to create the hubs. Maybe the people who live around it, are not fond of it, when it is getting too busy around where they live or something like that.

I: Mhm, so this has to do with both of the three aspects (*the interviewer positions the indicator draagvlak in between the first three ranks and draws an arrow*).

E: Yeah, I think so.

I: I put an arrow here. Yeah, I think we discussed…you do not have to include all of them! It is of course also a ranking. The idea is also to use these indicators then to analyze them. So for example accessibility, there is a GIS tool that you can use for example that is called Network Analyst, where you analyze the street network and see how far you can go. For example, if you say 250 meters distance from a hub, how far you actually can go also including, if there is a dead end, you cannot go further, for example. So, this is one of the analysis tools I will use. And for the others, I will now, in the end, when I have done all the expert interviews, I will take the median from all indicators, and then say okay these are the five ones, that are ranked most high, so if everybody says that the travel distance is very important, what I think, then I will analyze this one. And then if everybody says spatial density is important, I will analyze this one as well. In the end, the idea is to analyze the indicators that are chosen by the most experts. So, I think we did a good job in finding out which are important here. And if you do not have any other comments, we are actually already done with the interview.

E: Yeah and I think the time is up. I have my next meeting now.

I: Time is also up, and I do not want to take up more time than needed. I would like to thank you for taking the time, for taking part, for giving me so many answers. I can offer you to send you the thesis when I am done, this will not be before the beginning of October, I think, because it is taking a bit of time, because I am also working as well at &morgen, so it is a bit of a struggle, to do both

of it at the same time. But I will be happy to give you the result in the end, because you took the time to talk to me.

E: Yeah, we can use that.

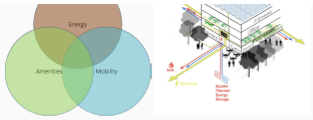
I: Yeah. I just hope to give something back to you as well, for helping me with the research and thanks again for your time and I am wishing you a nice rest of the day and a good week.

E: Yeah, same to you. Yeah. Bye bye.

I: Thank you.

E: Bye.

Appendix 25: Expert Interview MURAL board Expert 7



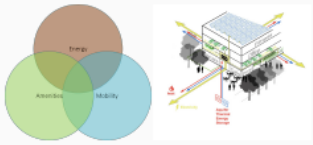
Which indicators do you find important for the selection of a location for a neighborhood hub?

travel distance / accessibility
Attractive route
Interest of mobility companies
Is it a business case?
Combination with parking lots from today
Where to people park their cars today?
Proximity to the energy network
Proximity to the logistics network
Interests of package companies
Proximity to existing amenities (e.g. coffee shop)

Potential locations of neighborhood hubs

In the neighborhoods Assendorp and Kamperpoort in Zwolle, the Netherlands

Expert interview with Lisa Knaack
Master student Spatial Planning
Radboud University Nijmegen
24/09/2020



Which of these indicators do you find important for the selection of a location for a neighbourhood hub?
Please select 5 items from the list. If there is something missing on the list, feel free to add it! Then please **organize** the 5 chosen indicators **in the order of their relevance** for choosing a location for a neighbourhood hub.

Definitions of the indicators

Mixed use describes a type of urban planning that blends residential, commercial, cultural, institutional or entertainment uses into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian connections.	(Social) amenities describe all types of services that inhabitants of an area need on a regular or irregular basis and that have potential to increase the social cohesion. Potential amenities are: Grocery stores, pharmacies, cafés / restaurants, package drop-off, fitness, meeting / conference rooms, community centers, other recreative functions, daycare, elderly care, schools.
There is a stop of a public transportation line, e.g. of bus, rail or of new forms of public transport (e.g. taxi bus), integrated or located in close proximity (e.g. within 100 meters) to the neighbourhood hub.	There are urban green spaces such as parks, playgrounds, facilities for children or lawn in close proximity (e.g. within 100 meters) to the neighbourhood hub.
The price of land and real estate at the location and in the surrounding area is low so that investment is easier and more profitable.	Newly constructed residential housing (e.g. appartments, houses) is situated in close proximity to the neighbourhood hub.
Demographic data refers to the study of a population based on factors such as age, race, and sex as well as socio-economic information (e.g. including employment, education, income, marriage rates, birth and death rates).	Population Density refers to the quantity of inhabitants living within a certain measuring area.
There are streets or areas that suffer from heat stress within medium proximity (e.g. within 250 meters) of the neighbourhood hub.	Spatial density refers to the quantity of buildings within a certain measuring area.
There are streets or areas in public space that suffer from high parking pressure within medium proximity (e.g. within 250 meters) of the neighborhood hub.	There are logistic facilities (e.g. delivery of goods, last mile delivery, lockers for delivery and collection of parcels) located in close proximity to the neighborhood hub.
The land (parcel, plot, building) in question is in the hands of the public body (e.g. the municipality, province or country) instead of a private company.	The neighborhood hubs are situated in close proximity to existing electrical substations of the energy network.
The neighborhood hubs are located in proximity to where the people live that have an interest in using them. This can for example be measured by analyzing the demographic structure of the neighborhood.	

List of potential indicators

Low Real Estate prices
Demographic Factors
(Social) Amenities
Proximity to Urban Green Spaces
Ownership of the location
Proximity to new residential housing
Proximity to heat stress
?

Ranking of indicators

1. travel distance / accessibility, Attractive route
2. interest of mobility companies, Is it a business case?, Public Transport Stops
3. Spatial Density, Population Density
4. Mixed Use

draagvlak (societal support base)

Proximity to parking pressure
Proximity to the energy network
Proximity to logistics
Proximity to existing amenities (e.g. coffee shop)
Combination with parking lots from today
Proximity to electrical substations (trafostations)
Proximity to the logistics network
Where to people park their cars today?
Interests of package companies

Appendix 26: Expert Interview Report Expert 8

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 28.08.2020

Place: Digital meeting

Time: 10.00 am

Duration: 57:26 min

Atmosphere

The interview atmosphere was very informal and the tone of conversation was friendly and open. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home. There were some problems with the internet connection with each of the interview partners in the course of the interview. These were solved and the interview continued partly via a telephone call, which was also recorded. The previously agreed time of one hour for the interview was adhered to and the expert was able to answer all questions. The interview was conducted in Dutch, because the expert claimed that his English was not good enough to do the interview in English.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

E: En verder dingen die voorbij komen, de Corona crisis bijvoorbeeld. Oh, je ga nu opnemen?

I: Ja, sorry.

E: En verder de Corona crisis.

I: Sorry, ik wilde je niet onderbreken.

E: Ja is goed.

I: Ja sorry, ik ben vergeten om te vragen of ik kan starten met het opnemen, daarom heb ik het nu even gedaan. Natuurlijk wordt het niet aan iemand gegeven of zo, het wordt alleen gebruikt om het op te schrijven. Maar sorry, ga door.

E: En je moet het nog vertalen, begrijp ik?

I: Ja, waarschijnlijk, maar misschien kan ik het zo opschrijven en dan alleen de dingen die ik eruit wil halen vertalen, want dan is het minder werk. Tot nu heb gewoon alles op Engels gedaan, maar ik had ook een ander persoon die ook echt niet zo goed Engels kon, en da hebben we dan ook een deel van het gesprek op Engels gedaan. Voor mij is het eigenlijk geen probleem, ik kan het wel goed verstaan, maar ik moet het dan volgens mij wél vertalen. Dat is een beetje lastig.

E: Ja. Maar dat is het voordeel, dan hoef je niet alles te vertalen, alleen de dingen die je belangrijk vindt, zeg maar. Daar blijft dan vast een klein deel van over. Ja, ten aanzien van, dus dat is wat ik doe, en dat onderzoek wat je net noemt, van &morgen over Assendorp en die stadsrandhub, daar ben ik ook bij betrokken geweest. Ik heb meegedaan in dat proces. En mijn aanleiding om daarin mee te doen was dat ik vond dat mobiliteit een hele grote bijdrage kan leveren aan de energietransitie. Schoon vervoer, minder auto's, zorgt voor de reductie van CO2, dus dat is goed voor het klimaat en dat help de energietransitie. Maar de linken daartussen, die waren dar eigenlijk nog nauwelijks. En dat vinden we wel een taak van onze afdeling ruimte en economie, dat je juist wel de connecties legt tussen de verschillende beleidsthema's. En met dit onderzoek gebeurt dat al. En het is een onderdeel die mobiliteitshubs, ze moeten ook niet als een doel op zich worden gezien, daarmee moet je ook een beetje rekening houden, denk ik. Maar het zou zeker kunnen helpen om meerdere doelen te realiseren. De bereikbaarheid van de stad te vergroten, zeker als we gaan verstedelijken, en daarmee ook schoner, stiller. En minder CO2 uitstoot. En als die hubs zichzelf ook nog energie kunnen opwekken, dan help het de energietransitie nog meer. Want dan is het niet alleen maar meer minder auto's en schoon vervoer, maar ook nog als een buffer, wat jezelf ok al schetste, waarmee het electriciteitsnetwerk zou kunnen worden verlicht. Dat weten we niet helemaal zeker, of het echt zo een groot impact zou kunnen hebben. Daar is wel een rekenexercitie voor gedaan, door expert 1, die heb jij misschien al gesproken?

I: Ja, heb ik, ja.

E: Ok. Daar was ik ook al even, maar moet je zo maar even vertellen, wie je allemaal gaat interviewen. Maar goed, dat is wat we gedaan hebben. En dat lijkt best wel perspectiefrijk te zijn, dit onderzoek. Maar het is natuurlijk nog maar een verkenning, en vervolgens staan we nu ook al, nou, hoe gaan we hier eigenlijk mee verder? We hebben ook eigenlijk nog best wel veel vragen. Wie gaat zo een hub bijvoorbeeld realiseren? Wie zijn de investeerders? Gaat de gemeente dat doen? Nee, waarschijnlijk niet. Dus, hoe krijg je zoiets aan de gang? En we hebben twee plekken, jij noemde al Assendorp, en daar is ook, daar zit ook een stadsrandhub aan de A28, die zag ik net ingetekend staan ook. Dit zijn de eerste twee waar we zelf als gemeente gaan kijken van nou, misschien moeten we daar zo een verdiepende verkenning op gaan doen. Maar dan nog: Wie gaat het dan doen? Is daar geld voor? Dus dat is ook een beetje dat los maken van enthousiasme om hierop door te gaan op kijken of je hier budgetten kan aantrekken of partijen (incomprehensible) om hieraan mee te doen.

I: En het wordt natuurlijk niet eenvoudiger door het inbrengen van meer en meer partijen. Dus, nog een stakeholder, nog een stakeholder, wordt natuurlijk nog een groter probleem, eigenlijk.

E: En het is best wel overheids-ingestoken, zo hebben we dat in het begin ook zelf wel geadresseerd, van de gemeente, de Provincie, en nog een paar van die overheidsinstituties die dan denken hey, dat is een goed idee. Maar dat heeft ook nog een groot maakbaarheidsverhaal in zich. Want wie wil dit nou? Zijn er bewoners, die er ook echt gebruik van gaan maken? Zijn ze bereid om hun kinderen als daar een dagopvang zit, of een kinderdagverblijf in zit, om ze daar naartoe te brengen. Dat weet je eigenlijk nog niet. En de gebruikersvraag, die zou eigenlijk wat meer voorop moeten staan. Maar waar in dat proces doe je dat? Dat kun je ook niet gelijk vanaf begin doen misschien. Daar is nu een globale verkenning en een inspiratie bookje gemaakt, en daar zouden we dan de boer me op kunnen gaan. Maar hoe dat proces precies moet…Ik hoop eigenlijk dat jouw onderzoek dat misschien ook een beetje gaat beantwoorden, zeg maar, wat moeten wij nu…wat is onze vervolgstap?

I: Ja, ik weet niet of ik dat echt kan beantwoorden, want ik focusseer me eigenlijk echt een beetje op de locaties. En tot nu toe heb ik ook geen bewoners interviewt, omdat ik gezegd heb, okay, ik ga wel expert interviews doen, en als ik wetenschappelijk bewoner interviews wil doe, dan moet ik eigenlijk alleen bewoners interviewen, dat ik me daar echt op richt. En dat heb ik nu niet gedaan. Mijn begeleider zei ook, ja je kunt ook twee of drie mensen die daar wonen nog interviewen, om de andere perspectieve binnen te krijgen. Maar daar moet ik even kijken of dat kwa capaciteit gaat. Want ik heb nu volgens mij 7 personen interviewt, dus expert 1, maar daar heb ik ook verschillende mensen van de gemeente Zwolle. Dus, expert 2, heb ik al interviewt.

E: Die heb je al geïnterviewd?

I: Ja.

E: Okay. Zeven mensen van de gemeente Zwolle?

I: Niet alle, niet iedereen van de gemeente Zwolle, maar expert 1, die is niet van Zwolle, maar die heeft wel daaraan gewerkt. Dan heb ik expert 4, die is nu mobiliteitsmakelaar in Assendorp. Om ook een beetje de deep democracy, sociale zaken kant binnen te krijgen. En de andere mensen zijn volgens mijn van de gemeente Zwolle.

E: En dat waren?

I: Even kijken, dat was expert 2, dat was expert 6, dat was expert 3, expert 5. En dan heb ik nog expert 7 van de Provincie geïnterviewd.

E: Ah, die heb je allemaal al gesproken?

I: Ja.

E: Oh mooi.

I: En ik heb nog, ik zou waarschijnlijk nog een gesprek voeren met iemand van Enexis, om ook die energienet kant binnen te krijgen voor de hubs.

E: Daar ben ik echt benieuwd naar, wat daaruit komt.

I: Ja, ik ook.

E: Want dat is best…ja, ze zijn een partij, ze zijn een beetje ongrijpbaar soms. Maar goed, dat zou expert 5 ook gezegd hebben. Expert 5 is mijn collega die veel meer aan de kant van energie heeft dan ik eigenlijk. Dus de techniek kant, hoe veel wekt een zonnepaneel op, en hoeveel energie heb je jaarlijks nodig om een elektrisch auto…dat weet hij allemaal, en hij weet ook hoe het met die netwerken zit, dat zul allemaal waarschijnlijk in zijn interview wel gehoord hebben. Wat is je indruk, als je die gesprekken hebt? Of heb je al conclusies?

I: Misschien. Ik kan in het algemeen al zeggen, dat ik de mensen van de Gemeente Zwolle echt heel vriendelijk en mooi vindt. Jullie zijn echt heel open en mooie gesprekken, dat kan ik al wel zeggen. Kwa inhoud is het soms lastig, omdat sommige mensen echt een heel ander beeld hebben van de realisatie van een hub. Dus, sommige mensen zeggen, oh ja, natuurlijk wordt dat binnen de volgende vijf tot tien jaar gedaan, en andere zeggen, nee, eigenlijk duurt dat nog twintig jaar, tot dat we zo een hub kunnen krijgen. En dat vind ik echt ingewikkeld, dat mensen die binnen dezelfde gemeente, die eigenlijk aan hetzelfde project ook werken, daar zo verschillende meningen over hebben.

E: Ja, ik vind dat ook interessant. Ja. Hee boeiend. Ik weet ook niet hoe snel het gaat. Ik geloof er wel heel erg in niet dat je eerst een heel masterplan gaat maken voor hoe het eindbeeld dan helemaal

uit moet zien, en dat je dan pas begint. Maar we hebben nu eigenlijk ook, zeg maar, de keuze gemaakt, om wel een soort globaal beeld te hebben, we hebben de eerste verkenning gedaan. Maar parallel daaraan wel al een paar plekken te hebben, waar al dynamiek zit, waar al de eerste experimenten gebeuren, te kijken of je dat kan versterken. En zo een soort toekomst stel ik me voor, zeg maar. De plekken waar het kan, dat die zich ontwikkelen, dat je daar ook stuurt, dat het kan groeien. En dat dat dan ook een effect heeft om op andere plekken aan de gang te gaan. Zoiets.

I: Maar dat je wel een droombeeld hebt, van waar je start?

E: Dat vind ik wel goed, hoor, om te hebben, een sort perspectief, een visie of zo.

I: Misschien begin ik dan even met een van de vragen. Kwa mobiliteit, dat is eigenlijk een vraag die ik iedereen gesteld heb. Wat is volgens jij de perspectief, of wat zijn de voordelen en nadelen van deelmobiliteit voor Zwolle?

E: De voor- en nadelen…Nou, ik denk, dat het voordeel is, autobezig zal zijn. Het voordeel is dat er veel meer ruimte vrijkomt voor andere functies. Je zult ook dit ook in je literatuuronderzoek hebben gedaan, in Parijs, ook vanwege Corona, dat ze dus zeggen van nou, we gaan een heel deel, ik geloof 60 percent of zo, 60 percent minder parkeerplaatsen in de stad. Om zo ruimte te creëren, ook om anderhalve meter te gaan, zeg maar. Dat vindt in een heel graf stap. En daar zijn nog meer steden die dat gedaan hebben. En ik geloof ook echt dat dat het voordeel is. Dus, dat het voordeel ook niet zo zeer in het, alleen in het auto zit, maar juist in ga naar andere ruimte, en die je anders kan invullen. Groener, blauwer, maar ja. Van beweegruimte, ontmoetingsruimte, die daarmee beschikbaar komt. Ik geloof dat dat een groot voordeel is. Dus het is minder ruimte, dat is denk ik een voordeel. Ter gelijk zul je ook kwa milieu, uitstoot, is het een voordeel. Want minder auto's is minder CO2. En je zou nog kunnen zeggen, dat is ook wat colleague 1 wel zei, ja je kunt ook gewoon een reset doen en alle auto's op elektriciteit zetten. En dan heb je wel schoon vervoer, maar dan heb je nog niet je ruimte beperkt, zeg maar, je ruimtevraag beperkt. En daar heb je een punt. Dus, dat vind ik ook. Alleen, het zal een proces zijn, het begint wel met, wanneer mensen auto's gaan delen, gaat die Co2 uitstoot laag en wordt de lucht schoon. Nou, hartstikke graf, precies wat we willen. Dus, dat vind ik wel de voordelen. En autodelen is een, maar je zou ook naar de fiets kunnen kijken. Natuurlijk, de mobihubs worden gezien als een auto oplossing voor deelmobiliteit auto, maar ik geloof ook net zo goed, dat je daar op de fiets kan overstappen, en OV, dus dat is breder dan auto.

I: Maar zie je daar wel ook mogelijkheden, omdat Nederlanders natuurlijk wel een fietsland zijn, zie je wel de mogelijkheden voor delen van fietsen?

E: Ja, ja, ja, ja. Van die, ja dat zie ik eigenlijk wel voor me. Ik weet niet of het al gebeurt eigenlijk…ja, Amsterdam of sommige grotere steden hebben wel van die fietsen, die je gewoon kan pakken en ergens anders weer kan neerzetten, dat soort…

I: Ja, volgens mij hebben vele steden ook die OV fiets? Maar die moet je natuurlijk terugbrengen naar het station, dat is natuurlijk niet zo mooi, als het ergens neer te zetten.

E: En iedere Nederlander heeft natuurlijk gewoon zijn eigen fiets. Dat is ook zo.

I: Je had het al, over de elektrische auto. Maar wat is dan de toekomst van dit als ontwikkeling? Zie je daar heel veel nieuwe elektrische auto's terugkomen in Zwolle, of niet in de volgende 20 jaar of zo?

E: Nou, het is wel een trend, dat steeds meer auto's alleen elektrisch worden. Ik zag dat Duitsland daar ook, of de Duitse regiering volgens mij, ook naar aanleiding van de Corona crisis hadden ze daar iets over. Dus, bedrijven, die alleen de elektrische auto hebben gestimuleerd. En dat daardoor de productie kan door blijven gaan. En de gewone fossiele auto, daar hebben ze geen steunde maatregel voor afgesproken. Dus, daarmee geven ze ook aan, de richting is duidelijk, elektrificeren. En ik denk wel dat dat ook de toekomst zal zijn, ik weet het niet, hoor, ik ben er geen expert op dit vlak. Wat ik van expert 7 bijvoorbeeld hoor, die heb je ook gesproken? Volgens mij ziet hij wel een heel, dat dat hele automobiliteit, en OV langzaam zal elektrificeren. Dat geloof ik ook wel, ja. Dus dat is wel een trend, en ik weet niet of het 100 percent worden, of dat ook nog anders…he, waterstof! Hoor je ook wel. Misschien dat dat nog iets zou kunnen zijn in de toekomst. Als waterstof wel iets wordt, dan zal het in der daad in het vervoerssector komen, als eerste. En misschien later, dat je het door de gasleiding kan sturen, en door de grond en zo. Maar het zou eerst de auto's worden, is de verwachting.

I: Dus, als we het hebben, over elektrische auto's, moeten we die ook laden. En hoe laden we die? En willen we die, waar willen we auto's laden? Wat is een geschikte plek? Want er zijn natuurlijk verschillende modellen voor het laden, je kunt het thuis laden, je kunt het op een laadplein laden, maar wat denk jij, kwa ruimte, kwa mobiliteit, is een mooie opzet van laadpalen van laadstations?

E: Ik weet het eigenlijk niet zo goed, ik heb daar niet zo veel verstand van.

I: Okay.

E: Ik vraag me af of iedereen zijn eigen laadpaal, dat zie ik ook niet zo snel gebeuren, dat dat kan. Dus je zult het op bepaalde plekken moeten doen. Dus ik kan me wel voorstellen, dat je laadplekken hebt, daar zou zo een hub ook voor geschikt kunnen zijn, denk ik, zo een mobiliteitshub. Laadpleinen waarbij je een beetje de openbare functies, parkeerterreinen, woonboulevards, dit soort plekken, dat die ook wel geschikt zouden kunnen zijn voor het laden. Ik kan me niet

voorstellen, dat het allemaal aan huis gaat gebeuren. Maar ik ben wel benieuwd hoe die netwerkbeheerders daartegenaan kijken. Ik weet wel in Zwolle gaat het aantal laadpunten heel sterk worden uitgebreid, daar is ook een nationaal programma voor, hoe heet het ook weer, de NAL of zo? Ik weet niet, het heeft een naam. Maar ik heb daar niet echt een heel duidelijke visie op.

I: Want volgens mij is een van de problemen voor thuisladen is dat het netwerk het niet zo goed, ja, het is niet zo goed voor het netwerk, omdat die dan, omdat dan eigenlijk het gehele energienetwerk moet uitgebouwd worden, zodat elke woning een betere aansluiting aan het netwerk heeft, en dat is natuurlijk eigenlijk niet wat je wilt.

E: Ne!

I: Dus, zie je daar dan ook het potentieel voor de hubs, of zie je dat niet zo?

E: Dat hoop ik wel erg. Kijk, het klopt, als iedereen zich zonnepanelen gaat aanleggen, op zijn daken, een iedereen gaat elektrische auto's aanschaffen, ja, daar kan het netwerk niet aan, want daar zijn nu al problemen. Dus het net zou echt verzwaard moeten worden. Dat zal Enexis ook gaan zeggen. Alleen de investeringen, die daar…dat zijn hele hoge investeringen, en zou je die op een slimmere manier kunnen voorkomen? Dat je dat net niet belast, dat je rechtstreeks de zonnepanelen naar je auto kan en andersom. En daar zouden die mobiliteitshubs dus ook zo een soort batterijfunctie in kunnen hebben. En daar heeft expert 1 ook wat in zitten rekenen, hoe je dat dan uitpakt. En het is natuurlijk niet zo, dat je het netwerk dan helemaal niet hoeft uit te verzwaren, maar wat er bij staat zijn dan haar conclusies. Dat je niet van een deel daarvan wegneemt, zeg maar. Dus dat, ik denk dat dat wel een hele mooie oplossing zou kunnen zijn. Maar het moet echt goed gerekend worden.

I: Ja, dat moet natuurlijk ook Enexis rekenen, of dat mogelijk is voor hen. Een van de ideeën is om de bestaande trafostations te gebruiken als startpunt van zo een hub. Ik heb nu de kaart niet hier, van waar de trafostations zijn, maar uit je hoofd, wat zeg je daarover? Denk je dat die plekken geschikt zijn voor mobihubs, mobipunten, waar de trafostations al staan?

E: Dat vindt, dat vraag ik me eigenlijk wel af. Het is misschien wel praktisch, omdat daar al een station staat. Volgens mij zie ik zeker ruimtelijk, stedenbouwkundelijk, is er veel mogelijk moeite gedaan, om die dingen op een plek neer te zetten, waar ze niet in de weg zitten. Voor andere functies. In die zin zijn ze de minst vrije plekken die je kan bedenken. Dus, als je ruimtelijk, stedenbouwkundig kijkt, dan zou je ze waarschijnlijk op een andere plek neerzetten. De vraag is even, hoe erg is dat, dat je dus een afstand hebt van het trafohuisje. Dat zijn van die technische vragen, daar heb ik eigenlijk ook geen antwoord op. Ik ben wel benieuwd hoe de andere daarover dachten ook.

I: Ja, expert 1 bijvoorbeeld zei dat het in zo een geval dan eigenlijk zinvoller is om de kavels, nieuwe kavels te maken, dus, van een bestaand trafostation naar de hub. Dat is dan beter dat te proberen

de hub daar in te stoppen, waar de trafo al is. Maar ik vond het ook een mooi idee om de trafo te gebruiken, daarom dacht ik dat ik ze wel kan meenemen in de analyse, van mijn GIS-analyse. Maar als dat niet, als het op die plekken niet gaat is het natuurlijk lastig dat te doen.

E: Ik woon hiernaast zeg maar, daar is zo een trafohuisje, en dat is best wel een leuk ding. Dat is oud, nog uit de tijd dat de energiemaatschappij in overheidshanden waren, dus nog zo een huisje met zo een dakje daarop, en… (*There occured a problem with the internet connection*).

I: Sorry, kun je dat misschien herhalen?

E: Hij zit helemaal tussen gepakt tussen de woningen. Waar wij wonen, dus tussen twee huizen in, zeg maar, zie je dat trafohuisje staan. Best wel een leuk dingetje, mar het is niet zo, dat het kwa ruimtebeslag…daar is helemaal geen ruimte voor. Dit dingetje, het staat daar, met een monofunctie, het is een trafohuis. En ik denk dat dat op heel veel plekken zo zou zijn, daar zijn die dingen daar ingepast, op leidelijke plekken, en er is helemaal niet zo veel ruimte omheen om daar nou, om dat te ontwikkelen tot iets meer, zeg maar.

I: Daar kun je misschien twee deelfietsen neerzetten, maar dat was het dan ook?

E: Ja, volgens mij wel, zeg maar, ja.

I: En over het concept, we hadden het ook een beetje over de hubs als buurtbatterij. Denk je, ja, je bent nu geen expert daarover, maar wat denk je over dit concept Vehicle to Grid is de Engelse term. Wat is de toekomst daarvan? Kunnen we dat meenemen in een conceptualisatie, of is dat eigenlijk te ver in de toekomst om da nu over na te denken?

E: En wat bedoel je daarmee, toevoegen, mee te nemen?

I: Ik bedoeld, dat…als ik nu kijk voor locaties, voor de hubs. Probeer ik natuurlijk in beeld te krijgen wat de hubs nodig hebben, om te functioneren. En daarvoor wil ik eigenlijk weten, welke functies ik daaraan kan verbinden. En kwa ruimte is het natuurlijk een verschil, of ik daar alleen deelauto's neerzet, of, of ik daar een buurtbatterij van maak. Die, bij een trafostation zou die misschien al binnen zitten, bij een trafoding, maar als ik daar dan deelauto's neerzet, die dan ook kunnen worden gebruikt als buurtbatterij, heeft dat misschien noch een beetje meer infrastructuur nodig, en dit vraagt ruimte af, daarom probeer ik in beeld te krijgen, welke van die concepten, dus deelmobiliteit, elektrische voertuigen, maar ook laden in gebruik als buurtbatterij, wanneer we kunnen verwachten, dat die ter realisatie komen.

E: Ja. Ik snap het. Nou, ik vind dat vanuit energieperspectief vrij urgente eigenlijk. Ik weet het niet goed, maar ik heb het idee, dat het juist een oplossingsrichting kan zijn voor wat net al even zeiden, voor de verlichting van het netwerk. Dus als je die auto's op die manier ook als een batterijfunctie kan werken en zo een hub dus ook. Dat is daar best wel dichtbij om daarmee te starten. Juist omdat

investeringen in het netwerk heel veel, naja, hoog zijn en tijd kosten, en dit wel een charmante manier is om zeg maar, om meerdere doelen ter gelijke tijd te realiseren. Dus ik zie hem wel wat dichterbij, ja. Volgens mij wel.

I: Okay, dan zou ik nu, als je daar geen verdere dingen over te zeggen hebt, nu, graag naar de tweede deel gaan, want daar hebben we dan volgens mij ook nog veel te spreken over, te discuteren. Ik ga nog een keer mijn scherm delen, ik hoop dat het werk. En ik laat het je weten, als je de link, die ik gisteren of zo gestuurd heb, kunt openen. Maar nu nog niet, want nu wil ik je mening hebben zonder dat we die gaan beïnvloeden met de anderen dingen die ik hier opgenomen heb. Maar, kun je dit nu zien?

E: Ja.

I: Top. De vraag is, we hebben het over een buurthub. We willen, of ik wil een, ik wil geschikte locaties vinden voor deze buurthubs, en we hebben nu verschillende dingen besproken. En de vraag is, welke aspecten, welke indicatoren vind jij heel belangrijk om een locatie uit te kiezen. En die wil ik nu even hier met jij samen brainstormen, en daarnaar gaan we naar de tweede deel van dit werkdingetje.

E: Ja. Welke indicatoren vindt u belangrijk voor de selectie van een locatie van een buurthub…indicatoren? En daar bedoel je bijvoorbeeld de afstand, die mensen moeten afleggen, voordat ze op zo een plek komen, ja? Dat zou ik belangrijk vinden. Ja het zijn allemaal [budeuren], eigenlijk, de beschikbare ruimte, wat je daar kan doen, behalve auto neerzetten…ja, ik denk steeds aan auto, maar dat hoef niet per se, he. Je kunt ook een fiets halen of op een bus stappen, dus het is ook een beetje de multifunctionaliteit. Kan ik er ook mee op het station komen? Dat ik niet alleen en auto hoef te pakken, maar ook op de fiets kan of OV of zo. Dat kan voor mij ook wel een…het moet ook wel aansluiten bij wat de omgeving van zo een hub eigenlijk nodig heeft. Dus ik denk, dat dat ook nog wel uitmaakt, hoe de selectie van… Dus de gebruikerskant, zeg maar. Wat willen mensen. Ik denk dat het ook nog wel uitmaakt, of er voorzieningen in de buurt zitten al, winkels bijvoorbeeld, of andere plekken, waar meer mensen komen. Dat dat ook een reden kan zijn om zo een hub in de buurt te zetten. Ja, misschien is het toch wel die netwerkcapaciteit, wel een indicator van, hoeveel ruimte zit er nog op het electriciteitsnetwerk. Dat zou ik mee voor kunnen stellen, dat dat nog een rol kan spelen. Anders, het is zo een gebouwtje, maar ik denk dat dat op zich…Jij zei al, ik doe daar niet heel veel mee, dat ding zelf moet natuurlijk ook verwarmd worden en elektriciteit. En dat je dan naar koude warmte opslag achtige dingen toegaat, of…daar zou je nog naar kunnen kijken, van, welke warmtebronnen liggen daar in de buurt, en is die plek daarvoor nog van belang, dat weet ik niet goed. Maar je zou het kunnen opzoeken. Warmtebronnen in de buurt. Ja… Is er al iets? Wat je in Assendorp bijvoorbeeld ziet is dat volgens mij al, en dat zou expert 4 ook gezegd hebben, daar is al een klein hub, en op Hanzeland ook, dus de eerste

concepten van deelauto's, en mobiliteitshubs zijn er al. Dat soort aanleidingen zouden ook een reiden kunnen zijn om je plek uit te zoeken. Dus, welke beweging, welke eerste tekenen zie je al? En dat zou je kunnen omdopen tot zo een hub. Ja, dat zijn zo de eerste dingen waar ik nu aan denk.

I: Ja. Het zijn ook al heel veel dingen. Dus, veel daarvan komt ook terug in de lijst, die ik je nu laat zien. Het is eenvoudiger als je nu zelf de link gaat openen, en hier meewerkt, maar ik weet niet of je dat wilt. Het is eigenlijk heel eenvoudig, je kunt deze dingen hier ook verschuiven en zo.

E: Ik ga even…dan moet ik een ding openen van jou?

I: Ja, ik had je gisteren volgens mij een link gestuurd, van een MURAL-board. En je hoeft je naam niet in te geven, je kunt dan ook zo een naam zoals ik weet niet, visiting koala of zo kiezen. Maar het is eenvoudiger om meetwerken als je daar zelf in gaat.

E: Nou, ik ga mee aanmelden.

I: En het is eigenlijk zoiets als een digitaal pinboard, waar je post it's op kunt zetten. En de meeste dingen zijn fixeert, dus, die kun je ook niet verschuiven, maar alleen de bubbels, die zijn te verschuiven. En je kunt… oh ja, het laat je ook iets vertellen over hoe het werkt, maar dat kun je eigenlijk overslaan.

E: Het lijkt een beetje op concept board, of niet? Ken je dat?

I: Ken ik niet, nee. Maar kan wel zijn. We hebben dit binnen &morgen gebruikt, en ik vond het zo mooi, en ik dacht, dat kan ik goed gebruiken voor de expert gesprekken.

E: Ja, zeker. Ja, ik heb alleen een laptop, dus ik kan niet op een andere laptop ter gelijk kijken, dus ik zit op dezelfde scherm nu ook te kijken naar je MURAL, dus dan zie je mij nog wel in beeld, maar ik jij niet meer, want ik zit dan wel in een ander programma.

I: Maar dat is voor mij geen probleem. Zolang je mee kunt horen, of ik kan jou horen, dan is het geen probleem. Als het gaat, want het is echt beter als je daar zelf in en uit kunt zoomen. En ja, de eerste deel, aan de bovenkant, die heb je al gezien, dus daar heb ik nu alles verzameld wat we hebben besproken, en als je daar beneden gaat, dat is deel twee nu. En daar zijn drie delen. In het midden, daar is een lijst van indicatoren die andere mensen of de literatuur, dus van andere mensen of van de literatuur komen en aan de linkerkant is opgeschreven, wat ik daarmee bedoel, dus een definitie daarvan.

E: Veel meer, ja.

I: Mh?

E: Ja, ik zie hier ook staan, real estate prices, ja, daar heb ik nu ook nog niet aan gedacht, maar dat is natuurlijk ook zo. Ownership of the location, daar kan ik mee ook iets mee voorstellen. Oh, je hebt daar al een hele brol.

I: Ja, in het begin had ik alleen zes of zeven, maar die zijn nu echt gegroeid door de gesprekken met de experts. Dus dat is ook mooi te zien, wat daaruit gekomen is, maar mijn vraag is nu vanuit deze lijst, maar ook van je eigen gekozen dingen hier beneden, wil ik je vragen om een ranking te maken. Dus, welke van deze dingen zijn echt zo belangrijk, waarmee moet je eigenlijk beginnen? Of zijn de voorzieningen bijvoorbeeld dat wat je echt moet onderzoeken, of zijn die alleen plaats vijf, en daar wil ik je nu vragen om een ranking te maken van de verzamelde indicatoren van een tot vijf, dus vijf te kiezen, die te ranken, en mee dan achteraf te vertellen waarom je die gekozen hebt. En dan laat ik je nu natuurlijk een momentje tijd om te lezen, wat daar alles staat.

E: Ja, ik zoek vooral dingen, die ja ook een beetje die urgentie kunnen aangeven. Dat is toch gewoon de proximity to parking pressure, kan ik die gewoon slepen, ja hoor? Deze kan ik me voorstellen. Wat is dan de letterlijke vertaling van proximity?

I: Iets is dichtbij. Dichtbijheid?

E: Oh ja.

The expert reads the list of potential indicators.

E: Ja, dit is natuurlijk ook een belangrijke. Wat zijn amenities ook weer?

I: Voorzieningen.

E: Wat zei je? Voorzieningen. Oh, ja.

I: Ik vind het Nederlandse woord ook veel beter dan het Engelse.

E: Maar je bent zelf Duitse volgens mij, of niet?

I: Ja.

E: Maar je spreekt gewoon wel heel goed Nederlands.

I: Oh, bedankt!

E: Hoe lang doe je dit al? Hoelang woon je al in Nederland? Of woon je niet in Nederland? Toch natuurlijk, je woont in Nijmegen.

I: Ik woon in Kleef op dit moment, dus direct over de grens in Duitsland. Maar ja, ik heb tijdens mijn Bachelor heb ik Nederlands geleerd, dus twee, drie cursussen of zo. Maar ik heb het al vroeger leren kennen, zo een beetje, omdat mijn vader op de TU Delft werkt.

E: Ah ja.

I: En daardoor zijn we ook heel veel in de zomer voor vakantie naar Nederland gegaan. Maar als je Duits praat, dan is Nederlands eigenlijk niet zo veer weg om te verstaan. Maar ik heb dan gezegd, voor studeren in Nederland wil ik ook graag de taal leren.

E: Nou heel goed, super.

I: Ja, ik vind het ook belangrijk, want ik wil ook in Nederland werken. En daarvoor vind ik het dan ook belangrijk, ook om bijvoorbeeld met bewoners of zo in Nederlands te kunnen praten. Want, als iemand geen Engels kan, dan is het eigenlijk volgens mij mijn plicht om de taal te leren om dan ook met iemand te kunnen spreken.

E: Ja.

The expert reads the list of potential indicators.

E: Ja, deze dan toch maar. Ja, ik vind dat best wel een rijke..oh!

Something on the board was moved around without purpose. The interviewer corrected this movement.

E: Het is een mooi programma.

I: Ja.

E: Toevallig had ik gisteren een sessie, daar moesten we in Concept board, ook met plakketjes, en comments, en zo aan de gang, dat werkte heel goed.

I: Ja, ik vind het ook.

E: Hoe maak je die bolletjes? Is dat gewoon een…

I: Aan de linkerkant, daar kun je, daar zijn tekst, en shapes and connectors toevoegen, dus je kunt ook zoiets toevoegen en dan veranderen.

E: Ik heb er nu eentje tussen gezet.

I: Ik heb het altijd zo gemaakt, dat ik die altijd ga kopiëren, en dan inzet, daar kun je de kleur ook veranderen en zo, dat doe ik dan meestal. Ik vind het ook een mooi manier om samen te werken.

E: Ja, ik vind het hartstikke leuk. Ik heb nooit een interview gehad waarbij ik dingen moest gaan doen. En een beetje werkende wijs. Daar ben je ook gelijk aan het denken.

I: Een beetje interactief ook.

E: Dat heb ik ook wel nodig. Het is meer een gevoel, dat je onderbouwd, dat je denkt, deze richting moeten we uit, en dit zou ons kunnen helpen, zonder dat ik daar echt een expert in ben of zo. Dat merk je al, ik heb er helemaal geen verstand van, maar, hoe zeg ik dat nou, je voelt aan dat er hier…

At this point, the internet connection of the interviewer broke down and the expert was thus not understood in the last sentences. The expert was then called by the interviewer on his phone, and the phone was set on loud. The remainder of the interview was the recorded by recording the interviewer and the phone that was put on loud mode.

E: Ik denk dat het belangrijk is, dat er een urgentie zit, anders gebeurt het niet, dus ik denk dat het parkeerdruk, zeg maar een urgentie heeft.

The recording was stopped again. in this time, the expert explained why he chose the indicators draagvlak and accessibility. He chose draagvlak because he thinks that it is really important to have enough people who are going to make use of the hubs. He chose accessibility, because it is one of the most important aspects in his opinion that it is easily possible to reach the hub by all modes of transport.

E: Heel graag de electriciteitskant, dus de energiekant daarin houden, anders blijft het wel heel veel mobiliteit. Dus, van daar, dat ik dacht, van nou, de nabijheid tot die nabijheid tot die substations. Ik weet niet of dat nou zo een heel belangrijk is, dat het dichtbij ligt. Ik kan het me voorstellen kwa investering, maar ik weet het niet zeker, maar ik vind het wel belangrijk dat er ook zo een soort laad- en bufferfunctie kunnen krijgen, omdat je daarmee de druk van het netwerk afhaalt. En nog een extra componenten voor de energietransitie toevoegt. Die vind ik eigenlijk belangrijker dan dat het plantje zelf op energieneutraal is. Dus, van daar heb ik die ook net genoemd, maar die interpreteer ik we breder, zoals je hordt. En de vijfde…ja, het is ook leuk, maar dat gehoord ook een beetje bij twee, draagvlak. Je moet er naartoe gaan. Je moet er ook naartoe willen. En dan is het handiger omdat het zelf voorzieningen heeft, dat er voorzieningen in de buurt zijn, dat het leuk is om er te zijn. En dat je er niet alleen maar stopt. He, wat je nu de elektriciteitshuisjes, die zijn allemaal verstopt, die zijn niet bedoeld om, ja, meer om mensen weg te houden dan mensen er naartoe te trekken. En dat wil je eigenlijk niet. Dus, het zou meer op een ontmoetingsplek kunnen zijn. Dat betekent, dat ze leuk moeten zijn, aantrekkelijk. Zodat je daar naartoe gaat. Dus dat. Dan staan deze vijf erin.

I: Ja, dat is eigenlijk een mooie samenvatting van wat we alles hebben besproken, maar ook goed dat je zegt je weet niet of het nu echt deze ranking is, maar je hebt nu wel ook ervoor gekozen ze in deze rangorde te zetten. Dus dat is mooi. Want, wat ik daarmee ga doen is eigenlijk vergelijken wat iedere expert zegt en dan in het eind deze kiezen, die daarvan het meeste woorden genoemd. En die probeer ik dan in een analyse te analyseren, in beeld te brengen, en dan hoop ik dat er in het eind geschikte locaties kunnen uitkomen. Dat is eigenlijk ook, had ik al gezegd, ik probeer daarmee eigenlijk te testen of zo een methodiek werkt of niet. Maar ik vind het ook mooi om al die belangrijke aspecten in beeld te brengen, dus dat is ook iets wat ik denk wat een bijdrage kan leveren aan Zwolle maar ook aan andere gemeenten. En aansluitend aan dit kan ik natuurlijk zeggen of wil ik zeggen, ik stuur mijn scriptie graag rond, nadat ik die afgemaakt heb, om jullie ook te laten zien, wat eruit gekomen is, en die resultaten natuurlijk ook van te gebruiken. Ik doe het natuurlijk niet alleen voor mij, maar ook voor, zo dat iedereen daar achteraf iets mee kan.

E: Dat is ook precies waarom ik dacht hier wil ik aan meewerken omdat wij ook nog zelf best wel veel vragen hebben zeg maar. Of waar we nog niet wetend zijn, of wel een bepaald trend zien maar nog niet ter recht tot in detail hebben uitgewerkt, wat je dan moet doen, ten minste ik niet. En dan helpt dit wel om daar wat meer gevoel bij te krijgen. Dus ik been heel…wanneer moet je klaar zijn?

I: Ja, aan de Radboud, ik weet niet of je dat aan andere Uni's in Nederland ook hebt, ik Duitsland heb je dat niet, in Duitsland krijg je normaal een deadline, maar in Nijmegen krijg je geen deadline, daar moet je zelf kijken wanneer je klaar bent. Maar mijn plannen zijn om eind Oktober ten laatste klaar te zijn. Ja, ik had al verteld, ik ben nu bij de expert gesprekken, die zijn drie kwartier afgemaakt, nog drie verdere personen, dan zijn die klaar, dan moet ik die natuurlijk verwerken, en dan komt die analyse en de resultaten daarvan. Dus dan moet ik nog alles opschrijven. Maar September, Oktober, daar ben ik waarschijnlijk nog bezig met deze dingen, en dan hopelijk eind Oktober. Maar ik stuur dan gewoon ook een e-mail rond van hey, ik ben klaar, hier is mijn scriptie, en bedankt voor de ondersteuning of zoiets.

E: Ja, precies. Ah ja mooi. Ik ben heel benieuwd wat er daarbij uitkomt. Zeker met jou, dat je best wel veel mensen gesproken hebt. En wat zijn nu leuke voorbeelden, wat heb je uit jouw literatuurstudie gedaan, dat je zegt van nou, dit is leuk als je daarnaar kijkt, of dat zou een goed voorbeeld zijn, of heb je niet zo een literatuuronderzoek gedaan?

I: Na, ik heb wel zo een literatuuronderzoek gedaan, ik moet die nog wel een beetje organiseren, kwa, wat ik wil opnemen in de scriptie. Wat eigenlijk eruit gekomen is, dat ik het best wel interessant vindt, dat iedereen eigenlijk een eigen concept, of een eigen idee heeft van wat is een hub. Ik heb ook voorbeelden, ik weet niet of je die kent, de Mobil.Punkte in Bremen, in Duitsland, daar zijn ook heel veel studies over gedaan, maar die zijn eigenlijk alleen een deelauto met een laadstation,

for example. En dan hebben ze in een stad in Engeland heb ik een voorbeeld gezien, die zijn eigenlijk ongeveer op dezelfde manier aan het kijken zoals in Nederland, in de Provincie Overijssel, maar ik vind ook bijvoorbeeld de Provincies Groningen en Drenthe die hebben ook weer een beetje een ander idee van een hub dan Noord-Brabant bijvoorbeeld, dus daar…iedereen verbindt verschillende functies aan zo een hub. Maar de gezamenlijke elementen zijn eigenlijk altijd mobiliteit en sociale aspecten faciliteren. Dus deelmobiliteit en ook de hub als een punt in het netwerk, dus wisselen van de fiets naar OV, of van de auto naar de voetganger, deze dingen. Dat is altijd natuurlijk belangrijk, maar ook het proberen, ja, iets anders daarin te krijgen, of het nu een waterpunt is, of het nu Wifi is…of het nu sportelementen zijn, dat is echt, hangt echt af van de situatie…

E: Dat denk ik ook echt, dat is echt locatie…

I: Maar, dit zijn echt eigenlijk de twee hoofdelementen van een hub in Nederland, maar ook in andere steden in…

E: Maar in Bremen hebben ze hem ook echt op de energiekant gericht? Niet alleen maar mobiliteit?

I: Ja volgens mijn zijn die auto's, of vijftig percent of zo zijn nog dieselauto's of normale auto's en de andere helft is elektrische auto's, en daar hebben ze ook een laadpaal neergezet. Voor elke Mobil.Punkt. En wat ze nu ook doen zijn Mobil.Pünktchen, dus kleinen puntjes, is het woord, daar proberen ze nu, of zetten ze dan alleen twee deelauto's in een straat, maar dat is dan echt, daar hebben ze dan zo een klein paal die daar staat, van okay, hier kunnen we een deelauto halen, maar dat is echt niet groot. Maar dat noemen ze wel ook hub of punt of mobilpunt. Maar dat is eigenlijk niet vergelijkbaar met wat het droombeeld van, ja…&morgen heeft het natuurlijk anders uitgewerkt, maar ook zoals ik het nu versta, van Zwolle, is het eigenlijk niet het droombeeld alleen twee deelauto's neer te zetten en dat was het dan. Dus daar liggen eigenlijk die verschillen, maar…

E: Ja, die diversiteit is wel heel erg groot.

I: Ja.

E: En misschien kan het ook allemaal. Het is dan meer een verzameling, dat je de uiterlijke, dat de, hoe zeg je dat, die definities heel erg verschillend kunnen zijn, per hub. Het kan een punt zijn, het kan een hub zijn, het kan ook meer zijn, wél of geen laadplek en zo anders. Maar je had het over Bremen, daar hebben ze ook echt laadpleinen, zo een mobil.punt, zoals je, nee, Mobil.Punkt, of?

I: Volgens mij zijn het dan echt plekken waar je dan twintig deelauto's hebt. Deelauto's die ook elektrisch auto's zijn, dus die worden daar ook geladen. En volgens mijn kun je dan een auto meenemen en dan die ook waar anders op een laadplein teruggeven.

E: Dat is ook wel mooi. Kun je daar nog meer op die plekken, of is dat echt alleen auto halen, opladen en weer wegrijden?

I: Ja, volgens mij is het tot nu toe alleen dit. Dat bedoel ik met Bremen heeft daar een ander beeld van wat een hub is, zij kijken daar alleen van de mobiliteit en energie kant, maar niet zo zeer van de sociale kant.

E: Nee. Ja, misschien hoeft het ook niet overal. Ik kan me best voorstellen, dat je op een bedrijventerrein bijvoorbeeld ook dat soort, dat je die echt koppelt aan, dat je dan wel vooral mobiliteits-laadpleinen hebt. Zonder dat mensen een lunchpauze daar hun broodje willen kunnen eten. Ja, dat is dan eigenlijk ondergeschikt. En meer dat die bedrijfsterrein het parkeren wilt laag hebben, dat mensen die forensen, zeg maar…die kant op. Ja, kan ik mee voorstellen. Maar ja, dat is geen buurthub, jij kijkt naar buurthubs.

I: Ja, maar ik zou het waarschijnlijk wel een beetje meenemen in het overzicht van wat is er eigenlijk aan programma's? Of wat noemen mensen een hub, op dit moment?

E: Maar, je hebt, je achtergrond is planologie, he? Of doe je dat nu in je master?

I: Dat doe ik nu in mijn master. Ik heb geografie gedaan in de bachelor. Met focus op, ja eigenlijk een beetje humane geografie met focus op ook zo een beetje planologie, maar in Duitsland is het zo een verschillend system. Je leert eigenlijk niet zo veel plannen, maar meer kijken van de ruimtelijke kant. Dus, het is een beetje ingewikkeld te vertellen wat de verschillen tussen Duitsland en Nederland zijn. Maar ik heb in mijn bachelor geografie gedaan en ook met focus op ontwikkelingslanden? Is dat een woord? Daar heb ik voor mijn scriptie een helemaal verschillend thema gehad, daar heb ik over nieuwe informele woongebieden in Syrië na de oorlog gekeken. Dus dat was helemaal anders, maar ook echt spannend, om eigenlijk infrastructuur, mobiliteit en wonen in beeld te krijgen voor een echt ingewikkeld situatie ook politiek echt opgeladen is. Ja, dat is eigenlijk mijn achtergrond. Ik ben ook veel stage gelopen in architectuurbureaus, en stedenbouwkundige bureaus, ook om een beetje een overzicht te krijgen van ja, wat wil ik eigenlijk, en nu ben ik aan de planologie kant, maar ik zal waarschijnlijk in de hoek van &morgen verder werken. Maar ik vind het ook interessant om bij gemeentes of provincies of zo te werken. Daar ben ik nog niet helemaal duidelijk over, maar ja.

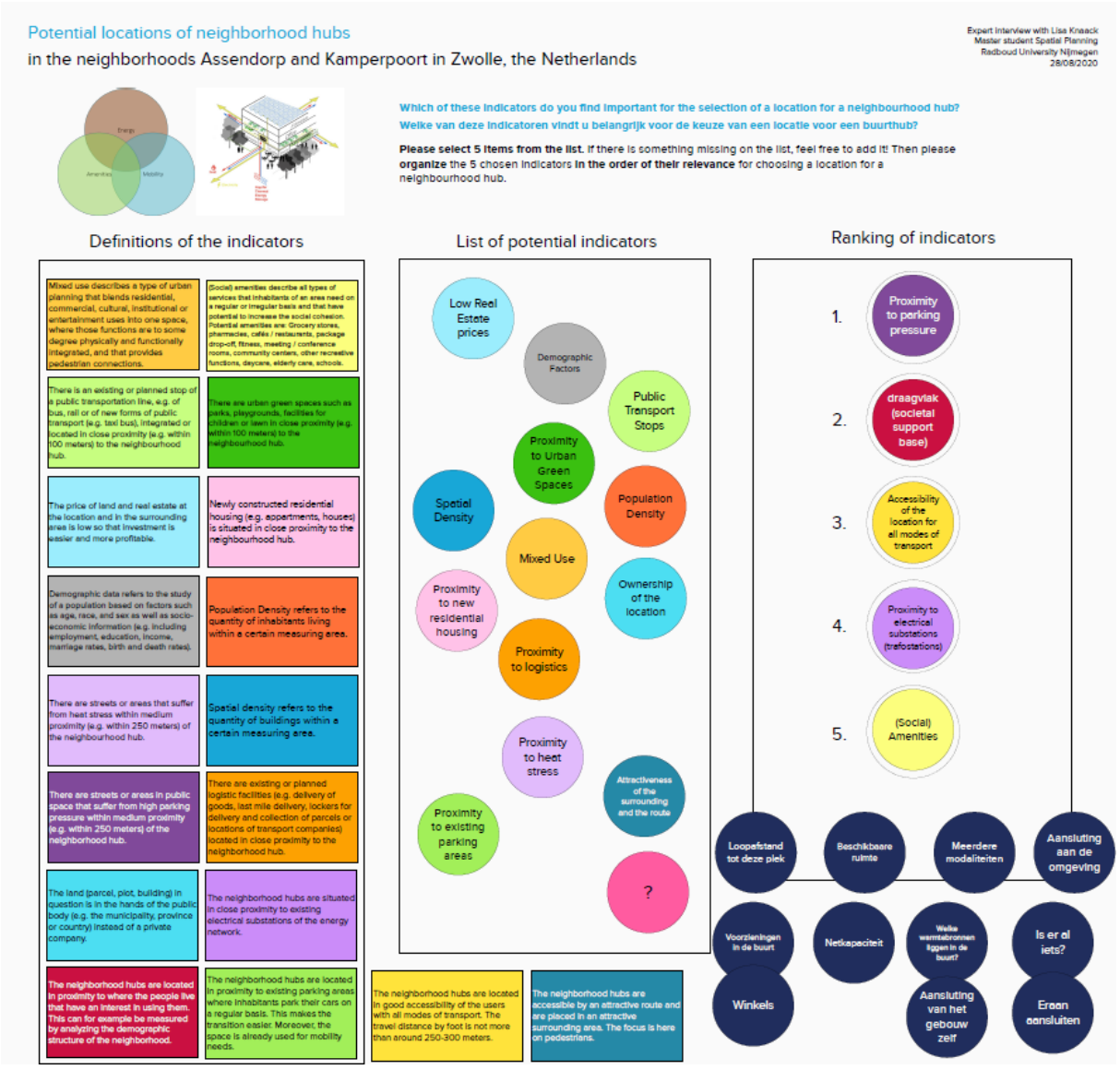
E: Maar deze hoek in ieder geval wel, dus meer de ruimtelijke ordening, architectuur, stedenbouw? Die kant?

I: Ja. Ja, mijn idee is eigenlijk op dit moment nu een beetje werkervaring te sammelen en daarnaar te kijken of ik nog echt stedenbouw wil studeren. Want, daar heb ik tot nu toe nog geen, ja, nix in gedaan, maar ik vind het best wel interessant. Maar ik wil nu kijken van hoever kom ik met de dingen die ik nu gedaan heb, met de master. En wat moet ik dan misschien nog leren. Maar dat

zou ik dan zien, misschien in een twee jaren, werkervaring sammelen. Omdat ik het ook belangrijk vind in de realiteit een beetje te kijken. Want aan de Uni leer je echt heel veel theorie dingen en zo, maar dat heeft niet altijd iets te maken met de problemen in de realiteit.

At this point, the interviewer stopped putting the phone on loud mode. The video was still running, but the conversation continued into the same direction, discussing the future job possibilities of the interviewer. As these are irrelevant for the research, the transcript is stopped at this point.

Appendix 27: Expert Interview MURAL board Expert 8



Appendix 28: Expert Interview Report Expert 9

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 02.09.2020

Place: Digital meeting

Time: 13.00 am

Duration: 01:39:28 min

Atmosphere

The interview atmosphere was informal and the tone of conversation was friendly and open. The interview was conducted using the video meeting platform Microsoft Teams and recorded using the audio recording function of the phone of the interviewer. The interviewer took part in the meeting from home, while the expert took part in it from his / her office. The previously agreed time of one hour for the interview was greatly expanded, after there were problems with recording the interview within the video meeting platform and after the expert was willing to invest more time than planned in explaining the interdependences in the topic.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

In the beginning of the interview, there occurred some minor problems because the program Microsoft Teams did not allow the interviewer to record the meeting. The expert and the interviewer left and joined the meeting and opened another meeting on order for it to work, but it was not that easy to do. Finally, they started talking and the interviewer recorded the meeting using the recoding function of her phone.

I: But I do not want to take up more of your time with trying to get this working. I do not want to waste your time, I want to start discussing the topic now, because I think it is just maybe a technical problem with my program, but this might not be easy to solve within the next hour, so I would think that we might just go through and start.

E: Is goed.

I: And normally I give a short introduction in the beginning, so I would do that now as well, if that is okay. Of the interviews and the afterwards, I have a, with this I also have an introduction of my master thesis, so I will share my screen then, so that should be working now, so that you see the presentation, that I have prepared.

E: Yes.

I: You see it already?

E: Yes.

I: That is perfect. So, as I already said, I am Lisa, Lisa Knaack, I am German, student of spatial planning at the Radboud University in Nijmegen, and I am currently working on my Master thesis on the topic of neighborhood hubs in the city of Zwolle. And I am also doing an internship at the mobility advisory office &morgen in Utrecht at the moment, and that is also where the concept of the buurthubs comes from, that I am focusing on, and also the contacts of people I, yeah, I am trying to interview, so I had contact to people from the Gemeente Zwolle, and Tim Idema was who recommended you as a further expert, so that is how I got to you as a new interviewee. My research topic is to find a methodology for finding suitable locations for neighborhood hubs in two case areas in Zwolle, Kamerpoort and Assendorp. And I would like to go through a bit of the conceptualization I use in my master thesis. So, here you see already, that there is three topics connected to it, energy, mobility and now I called it amenities, that is voorzieningen, but the third point is more like societal aspects of the hub. And on the right-hand side you see a conceptualization of what a hub could mean. But I would discuss that a bit more in detail later. In Zwolle, &morgen said that there is three layers or scales of hubs, there is the city edge hub, the stadsrandhubs, which mainly have a transfer function from, for logistics for example, but also for cars, so that you can go there, put your car there, and then by bicycle or even by foot for some places, can go on from there. Then there is public transport spots, which are here as red dots, in

the picture, and those have as well a transfer function but from public transport to other modes of transport. But what I am focusing on are the buurthubs, the neighborhood hubs, which are shown as blue dots here. This is just a conceptualization of how these hubs could be spread in the city. Because they are like the smallest scale hubs you can talk about, basically. And this is just to have a visualization of, okay, a stadsrandhub is very, like a big one, a big building, where you can have these logistic functions and transfer them into smaller sizes. And the same basically with the public transport hub, but the main focus of my research is the buurthub, the neighborhood hub, which is shown here. And there is a lot of topics connected to this, in my research. And what I am connecting to it is of course shared mobility, so that you can go there and get a shared car, a shared bicycle for example. And then bring it back to another hub, close to your destination. Then I am also combining it with electric vehicles, so these shared vehicles should be electric, if that is possible, so they are more sustainable. Then the idea is also to use those cars as a battery for the neighborhood, so that you can, you can charge them there, but you can also use them as a battery for generated energy that you have generated in the neighborhood. What you also see on the roof are the PV panels, solar panels, and the energy can then be stored, for example, in the cars. Of course, this is like a vision of what a hub could be. And then there is also amenities connected to it, so voorzieningen, there could be a café, there could be office spaces, a daycare, all kinds of amenities, that are needed, but that of course depends on the situation. And then there is also the discussion of maybe connecting it to geothermal heat production. Also warmte-koude opslag, but that is not so much in my topic, I am just discussing that because it is part of the conceptualization of &morgen, but it is not the focus of my research. And my research aim, as I said, is to find a methodology for finding locations for these hubs. And what I do for them, this is, I did a literature review, where I identified important aspects for it, now I am doing expert interviews, where I discuss the different topics, society, energy and mobility, and then I do an GIS analysis afterwards, of the two case neighborhoods. And just to give you an impression, this is a place in Assendorp, in Zwolle, and &morgen made a visual for this, like, okay, what could a hub mean for a neighborhood, so the idea is really to include it in the urban space. And that is basically the idea of my thesis. And the interview is structured in two parts. I would first like to discuss some general aspects, mainly focusing on the energy side of course, of the hubs, and then afterwards I have a small task for you, working on a platform called MURAL, I have sent you a link this morning. I hope this is working, but it should be. But this, we will come to later in the meeting. So, I would first like you to introduce yourself shortly, what you do, what your job is and yeah, so that we can start into the discussion about the topic.

E: Okay, do you see me? Because I think my camera is doing stuff.

I: No, I do not see you.

E: You do not see me, but you hear me?

I: Yes, I hear you. So, if the camera is not working, it is not…I mean it is nicer to see you of course, but it is not such a big issue.

E: Okay, I will start to introduce myself. I am Expert 9. Working for Enexis, for a long time, almost 20 years now, I think, yes. From origin, I am an electrotechniquist. I studied in Belgium. And in the 90s' I came to the Netherlands. I started as program manager with Enexis, but later they found out that they need more people going outside, to (incomprehensive), and they set up a new department, in the beginning of 2017, and I took that possibility to change from a program manager to area manager. And I am more responsible now to get in contact with the cities around, in our workspace, to help, to administrate the energy change to durable. I work, one of my bigger cities where I work is Zwolle, where I work a lot with expert 5, you know expert 5, you had a meeting with him. And he said you to get in contact with me. But because I have an electrotechnical background, and also a gas background, I did also something in the gas world, I am very able to help, in technical ways, to make, the government, about the energy, the transition to durable energy. So that is who I am in a short way. And I think I can help you how the energy and the grid system work, and how it affects your thesis. So, I do not know exactly what you want to know from me, or which direction you want to go, but I will try to help you as much I can.

I: Perfect. Okay. So, focusing on the energy network, is, like basically, there is two topics within the energy topic. There is of course the charging of the electric vehicles, but also there is the infrastructure side. And I am I think mostly struggling with the infrastructure side. Of course, I have a map for example of where the trafostations are in Zwolle. But the idea is, just to with this one directly, the idea is as well to conceptually, to think of these trafostations as starting points for the mobility hubs. Because you are directly close to the place where energy is, basically. And the question is whether that is a good idea, to start with these trafostations as starting points for neighborhood hubs.

E: Yeah. It depends, in fact. We have three levels of stations, going from the amount of energy they can handle. The little ones, bigger ones, and the very big ones. In an easy-going language, you know. If you go to the little ones, they are not able to handle that much energy. So, it depends if you are going to generate a lot of energy in that kind of places, there is almost no interaction possible between your hub and our infrastructure. So, I think, you need to make it scalable. Depending on the type of house, the transformation house, you need to scale, hm, you need to make a smaller energy hub, and if it is a bigger one, then you can make a bigger energy hub. But it works like the smallest, the more we have, the biggest, the less we have. So, if you go to the highest level of energy, then we call them the high voltage stations, we have in Zwolle three. They are divided Zwolle in parts, and they give power to the, a third part of Zwolle. That are the biggest one, but there are only three. If your energy hub makes such an amount of energy, that belongs to… (*The phone of the expert is ringing*) One moment. Well. That your energy hub makes that amount of

energy, that they need to be connected to big transformation stations, then you have not that much spaces, where you can start, with the energy. If you have the little ones, we have thousands of them in Zwolle, but then you need to keep it small. That is one of the first things I want to say to you. And there are limits, per station, and the little stations, they are able to handle around the 500 kwh. It is the same as like 1750 kwh you can bring to the little ones. The middle ones, they are able to go to 6.000 kVA (Kilovolt ampere). And the biggest ones, they go from 6.000 until (incomprehensible), that are the scales. If you put like 5.000 or 10.000 sun panels, then you go automatically to a bigger station, you need to be near a bigger station. If you do less sun panels, then you can stay in the lower grid network, you know. And that is for the stations, but the network that is behind the stations is also able to share, to divide more energy or less energy. So, the local network is also limited. So, you cannot go to an unlimited level of power in the lower gridwork. And that brings of course, the places where you can setup energy hubs, decrease or increase, depends on what you are going to do in your changement from energy to the grid or not. You understand a little bit?

I: Yeah.

E: In the opposite, there is also a solution. If for example, the net is capable to accept one MVA, and you have a battery that solves the problems for a part, then we do not need to make the network stronger. You can use your battery and deliver it to the grid; you can maximize to the maximum that the grid is able to operate. Then you can get a solution for us. It depends how you look to it. The setup from your hub, it is important, how you are going to manage that. You can bring the responsibility to manage your power delivery, you can bring completely to the grid operator, or, and there you need to invest in the network to make it able, or you can help with finding solutions that the pros, if you let the grid operator solve the problem, you do not need to invest. Because the grid operator works with the Dutch money, you know what I mean? It is like the government. If you need to make your investment by yourself, then you need to pay. That is always the discussions between the grid operator and the private company. If you want to set up the hub, it is private market. And the grid is non-private. So, there is a mismatch in between.

I: The question is always who is going to pay for it in the end.

E: Yeah. And you need to find a way to, that it is interesting for companies, for private companies, to invest. That they can earn without trying to put the problems on the shoulders of the grid operators, you know. That is in fact always the biggest problem until now. To find a good solution, in the private company.

I: Yeah, okay, that was a lot of information already, thank you. About the scales the small middle and big ones of the…

E: Transformation houses?

I: Energy stations can bear, you said that if you want to put a lot of solar panels on the roof for example, you need to either take a station that is big enough to bear it, or use a battery.

E: Yes.

I: But what is the capacity that the smallest stations are able to take? What is the limit of those stations right now?

E: Yeah, I told you, you have MVA, you know what MVA is? Megavolt ampere.

I: Yeah.

E: The smallest ones are able to get 1,7 MVA.

I: Okay, yeah.

E: I told you, that is 17.050 kilovolt ampere. The second one goes from 1,7 to 6 MVA. And the third goes from 6 MVA to 90 MVA. That are the three. So, if you have like in my example, two-hectare sun panels, this does not fit anymore in the smallest one. Because two hectares is two MVA. And the smallest ones is able to go to 1,7 MVA. Then you go automatically to the middle range, from 1,7 to 6. If you have two windmills, then you go directly to the highest level. But the further you are from the highest-level stations, the more you need to pay, because the distance is very important. The investor needs to pay the distance between the station and his hub. Or his windmill, or his sun panel field, you know. That distance, the further you are away from the station, the more you need to pay.

I: Because you have to put cables there.

E: Yes. And you need to pay the cables. The connection between the grid and where you are, your company, or your energy hub, that distance you need to pay, and that is very expensive. So, the closer you are with that point, the cheaper it is to get connected.

I: So, it is economically more viable to put the hubs closer to the stations, be it the smallest or the middles ones.

E: Or, and then you need to play with that. If you have two MVA. Sun panels, yeah. Then you need to go to the middle stations. The middle station is far away, or more far away, than the 1,7, because the grid is very small, from the small stations we have in every street one, the middle we have more in the environment of the part of the city, and the big ones we have only two or three. So, but if you are on two MVA, and you need to go to a faraway station, or you say okay, 0,3 I solve by myself, by putting in a battery, then I can stay on the lowest level. But then you need to invest

private in your own solutions. Or you can choose to go to the bigger stations and then you need to pay more to go to the bigger stations. So you can play a bit then. If it is interesting, to put a battery…but a battery is also very expensive, but if you can earn money with that, by example by the solutions you have for an energy hub, like trading with bicycles or charging cars, or whatever. Then it is maybe possible to make it interesting to install a battery and stay close to the lower net. But there are already a lot of people counting with that. And because there are no solutions until now. They are still busy with the conventional way to get connected to the grid. And all the solutions that are possible, think about batteries, smart grid solutions, there are not that many cases of it. So, it means, the solutions are still too expensive I think.

I: Is there, can you say, how much, if I say, I have a hub that I want to connect with the middle size station for example, and it is a kilometer away, can you give me an indication of the costs connecting it?

E: Yeah. It is 150 euros per meter.

I: 150?

E: Euro. Per meter.

I: Okay, that is interesting. Because then of course that makes it possible to calculate the distance, yeah.

E: Yeah. And it depends, that is a middle price. By example, the cables are able to transmit an, they are able to get a maximum load of 10 MVA. So, if you have like example 12 MVA, then you need to put two cables. Then it is 300 euros per meter. So, it depends also from the solutions. 150 is per cable per meter per cable. You can handle around 10 MVA per cable. So, if you have really big solutions with a lot of sun or wind, then you need two or maybe three cables. Then it makes it triple times so expensive.

I: Mhm, of course. and is a battery, in the long term, just to have an idea, is the battery in the long term the more sustainable or also economically viable solution than a cable? What is, battery or cable, what lasts longer?

E: Cable is still now the cheapest solution. The average price for a battery at this moment is like 100 euro per kW. So, if you have 1,750 kW, that we can solve with the grid and you want a battery, then you need to pay 1750 * 100. So that makes already a battery very expensive. In relation to a connection to the grid.

I: And…

E: And with the battery also, a battery you charge, you discharge, charge, discharge, charge discharge. I do not know if you have a phone, from three years old or something, your battery is already half

of the capacity of a new one. That is the same with the battery that you get as a switch between the grid and your installation, your sun panels. You charge, discharge, charge discharge all the time. So, the lifetime of a battery is ended.

I: Reduced.

E: Yeah. The net, the grid, if we do an investment in the grid, with a calculation with a calculation time from 50 years.

I: Mhm, wow, okay.

E: So, if we make that investment, we do once, that cable is able to have a technical life from at least 50 years. So, we can bring the money back in return in the time of 50 years. And with the battery it is less, much less than, after five years, maybe you need to install a new battery.

I: Okay, yeah.

E: So that makes it difficult to make it successful to install batteries. But I think also, you cannot solve everything with the grid. We cannot extend till the, you know, till unlimited.

I: But there is anyway, there will be extensions of the grid in the future I think, in most if the cities, but I guess also in Zwolle because of more demand of electricity from the households, but also from the mobility with electric vehicles. So, do you see possibilities, when the grid is already expanded, to connect it to those hubs then? Do you see the, that it is going to be easier to do that?

E: I think the cars by example, the electrical cars, they have one thing, that is a battery, and people have already spent the money for that, so you can use the batteries from bicycles, from cars to solve this. Then you do not need to buy the battery. You can use the batteries that exists already. But the point with the grid is, the grid is, the network is calculated on a maximum of a load. And if the batteries are not there when the sun panels give the maximum output of power, like by example at 12 in the noon, when the sun is coming up, then it goes to the grid. And if we need to build our grid in a way, that it is always possible to accept the maximum load, that otherwise we blow up the network. We need to be able to get all the sun panel power to our, if you are going to search for a solution, that we do not need to extend our grid, then we need to be sure for 100 percent, that by example, the cars are there at that moment. If they are not there, what is going to happen then? You know, that makes it very difficult. And we are regulated. Our purpose is, we need to be able in all cases, to accept the energy that comes to our grid. So, we need to build a sustainable, a system that works in every case. Even if your solution is not there, then our network needs to handle it. So that makes it also difficult.

I: Of course, yeah. When we are discussing, also, yeah you, I think you have also been discussing that a bit, so, what you have now been discussing is grid to vehicle, I would say, so for example, or I

understood it that way, that the energy comes from solar panels and then it goes to the parked electric vehicles, if they are there, and they are charged by this. I have also read about a concept that is called vehicle to grid. So that the cars give their energy back to the grid when there is, for example the prices of energy are high, or when there is a lot of demand for energy, I think. And where do you see the problems there? Or does this have a potential for these hubs, or is it only problematic in terms of the grid?

E: I understand your question. V2G, that is Vehicle to Grid, that is able to operate in ways, you know. You can support the grid, or you can take care that the grid stays, not goes over his maximum. If you have a price to play with, that you can put your energy from the sun panels for a cheap, in a cheap moment of the day into the batteries, and sell it, then it is able to make more profit and then it is also able to make the battery more interesting. So there are two cases, you can involve it, you can use the batteries from the cars. Or you can make maybe the battery apart, an apart battery, that you really buy for this purpose, you can setup this system also for an existing battery. Or for a battery that you buy for that. Because, with the cars, it still, the problem is still there, that V2G system only can work when there is a car. If the car is not there, it is not able to put energy in a battery. That system, yeah, I think, that is one of the problems you need to solve. The cars need to be at the place where the sun panels are at that moment. If they are not there, yeah, what then. So even for V2G, it is one of the biggest problems the cars are available or not.

I: Also because the cars are…the idea is of course that the cars are used as efficient as possible, so that would mean that there are away from the station a lot, because a lot of people use them, but then you have the problem with using them as a battery at the same time, that is not possible.

E: Yeah, but maybe it is more interesting to buy a battery, if you can negotiate with prices, or you can play with prices, then it is more, even more interesting to put a battery. Maybe this system will be a good way to setup batteries in an energy hub, because you can create more profit. You can sell energy for a higher price… Then you solve the problems that the cars are not there, and you solve maybe the problems that the batteries are too expensive, if you can generate more profit.

I: Yeah, okay. And maybe again back to the extension of the grid. I understood it from Tim Idema, that the grid in Zwolle is going to be extended probably in the next years. Because he said that, you also said that there are those trafostations, the smallest ones, they are already there in each street, because each street needs to have a connection with the houses and everything. But how much is the grid going to be extended in the next 10 years for example?

E: It depends, what Tim said, the industry they have already a heavy use of energy. So the grid in industry parts of the city are much heavier than by example the old city in Zwolle, the center of the city. Because that are only houses, and houses do not need that much energy. So, if you want a strong network, the industry part is by far much more interesting than the old center of the city.

But in the opposite, people are not on the industry parts, they are, and they want to go to hubs into the city. But the grid is, yeah, that is really a problem, the grid is in the old cities are very old, thin cables, and it is also very difficult, to extend it. You need to break up the streets, people cannot go to the stores anymore, etc. So, it effects each other. But for sure, the energy transition that we have now, with sun panels on roofs, and maybe go to heat, to go to electrical heat and cook electrical, the grid is not able anymore to solve all these requests of energy. So, we need to make our network stronger. That is for sure. But then is the second question, how much more energy you want to transport. And that are questions that we need to find out together with the government. Are we going to charge cars in every house? Or are we going to charge at every five houses? The answer on that question makes that we need to extend a lot, or less. I told you the little houses, the from 1,7 MVA, they are able to accept a limit of energy. And that is, at this moment, the same as around 400 houses, you can connect to one of the stations. But if every house doubles…

I: The demand.

E: Doubles the energy consumption, then we can only hang 200 houses at one station, or we need to build a new station. If they go four times, you can only serve 100 houses per station, then you need to build three new stations, for the same amount of houses. And the stations, the little ones, they are 25 square meters. And if you have been now in Zwolle or not, I do not know, but if you walk in the center of Zwolle, you need to put in a part of the city four new stations, from 25 square meters each, then you can already imagine the problems, the city will have in the future. So, it is a balance. We can go unlimited with the stations. 10 times more energy to the houses is perfectly able, but then we need to build every 30 houses a new station. And that does not fit in the streets anymore. So, there is, and also for your thesis, (incomprehensible) be a solution for this problem. Because if we can take care that the sun panels in the street, that are one of the reasons that we need to make a heavier grid in our ground, from a number of stations, if this gives a solution for that, and we do not need to build that much stations anymore, the city is happy, and we are happy, because we need to invest a lot. And this solution can make, can help us to invest less. And of course, we are a non-profit organization, we are paid by the Dutch people every month they pay us. It is a kind of tax system. It is better to find also solutions for this. The big problem with that is only, because we are government, we cannot find solutions in the private part of the market. you know? So, the market needs to find solutions but then they need to invest. That is a little bit the playing field between the grid operator and the private market. but I think, if you look to Zwolle, and with kind of solutions, you are looking for, if you only go to the grid with your solutions, it is really a difficult way to get a result, you know. So you, we need the market for that. We need to find a way that they can earn money with that. Then I think you can explore that if you go.

I: Okay. You said that at the beginning of the explanation, at the moment 400 houses are getting their energy from one station, you explained that there is a discussion whether you charge the cars for

example, the new electric cars, at every house or every five houses, for example. That is also where the hub idea comes from, I think. And my question there is, is it really better to charge at centered places? Instead of at each house? I think it would be better, because then you do not have to extend for each of the houses, but is that actually true, for the grid?

E: Like, if you go work with central places, you can say by example we put ten chargers in one place and all the cars go to there. But then you are not connected anymore to the local grid, then you go to a higher-level grid, you know, that is what I explained. But then it is again, how far you are from that station. Because you need to bring a cable to that charge place. And I give you a little example, in Zwolle, the province, the state, they are busy with electrical busses on the train station. They need two cables from our highest-level stations to the bus. Because they need more than 6000, or 6 MVA to charge the busses. You know Zwolle a little bit?

I: Yeah, a little bit.

E: You know the central station.

I: Yeah.

E: You know also where Enexis is, in Zwolle?

I: Mhm, no.

E: The state, the province, provinciehuis.

I: Yeah.

E: A little bit further we are, there is a park, they always start with the balloons there, you know. From there to the central station there needs to go two cables. That 10 MVA that they need. And it is 1,3 million euros.

I: Wow.

E: From there to the center. To give you a little bit of an idea. So, your question, for us, it is better. As grid operator. Because we only need to bring a cable from our highest voltage transformation station to a place. And that cable is paid by the requester. So for us, it is better. But if it is for you better, that depends on the distance. And if it is cheaper, with the distance included, than other solutions, then it is for you also…but if it is not, then it is the system, every house, a better one. It depends on the distance to the bigger centers.

I: Yeah okay. So, if I want to place 10 charging spots for cars, then I have to connect it to the bigger stations, okay. So that might cost me a lot of money. I am just concluding what we just discussed. What is then then the, like, how many cars can you connect to the, or can you charge at the small

spots, at the moment? Is that possible at all? Because you said there is already the 400 houses on average connected to them? Is that, like, can I then add two electric car charging spots to the small stations, or is that already too much for those?

E: Yeah, but if you…that smaller station is able to send or receive 500 kWh. 400 houses, 500 houses, that mean one kW per house. Our grid is able to give every house at the same moment one kW. One kW is 1000 watt. I do not know if you are a little bit electrotechnical. If you clean your house with that, how do you call that machine?

I: The vacuum cleaner?

E: Yeah, vacuum cleaner. A vacuum cleaner is 750 watts at the moment. That is almost 1000 watt. So, in all houses, at the same moment, clean their houses, then in fact, the net is already at its maximum. But happy us, nobody goes at the same moment using the vacuum cleaner. So, because of that, we are able to put 1 kW or 1000 watt per house. You know, the station, 500 kW is 500 houses. Imagine, a car, you want to charge a car. The cheap, the lowest amount of charging a car, is 3,6 kW. If you put one house with the charge, then you have the 500 kW for all the houses, minus 3,6 kW for that one house, of course it is going to charge, then the other 499 houses are still 497 kW. If you do 10 houses with a charger then it is 36 kW. Then you have 490 houses, but still 464 kW over. The more chargers at a certain moment, the other houses have no kW anymore. You eat the kW per house from 3,6 other houses, you know. And that is for the lowest one. There are chargers from 7,2 kW. Or from 11 kW. Or 22 kW. So, if 10 people say, we put a charger in our house, we do not need to do something. If 100 people do that, yeah, then our grid is…

I: Then they cannot vacuum clean anymore at the same time.

E: Ja. So, an answer on your question is, if we need to invest in the network, then we need to invest in a) the cables in the ground and we need to put more trafostations. And that costs a lot of money, that all the inhabitants from the Netherlands need to pay. If you build a charge station, with 10 charge units, and we need to bring a cable to there, and you need to pay that cable, then you pay. And not the inhabitants from the Netherlands.

I: So, in that case, I need to make enough money from it afterwards, or I need to see that there is money in it for it afterwards, so that I invest in it, in doing that. Because as far as I understand you it is less expensive, if we do not look at who is paying, but the total sum, it is less expensive to bring a cable than to extend the grid and put more trafostations.

E: But what is the problem in that. What we do is payed by the government. What you do, you need to pay by yourself. And that is an unfair system, in fact. Because why should I invest money, if there is someone doing it for free for me? And that is all the time. But what you need to realize, if the government pays for it, it comes back to the people. Because they need to pay with taxes. But you

do not see immediately. You need to invest directly, in your own battery, that you need to spend money at that moment, and with the government, you see back this money mountain from the taxes. That is the thing I told every time. So, it is in fact, for the inhabitants from the Netherlands, it is better, that the private companies find solutions for this.

I: Mhm, yeah. Okay.

E: And one of the solutions is find places near then you make it cheaper, because of the distance of the cable. But that limits you, because if there are six places in Zwolle, where you can go, and you want the solution somewhere else, then it is already not possible anymore. Or, you need to find… You understand a little bit the dilemma?

I: Yeah, of course. because I think that is a very important part of the mobility hub idea. Because what I am trying to do is, I explained it a bit in the beginning, I am trying to identify like the most important aspects, that really need to be taken into account. And I think the grid or like how you are going to charge cars there, how this is going to function, this is so important. It is the baseline of whether it is working or not. You can put a building there, but if there is no possibility to charge, then it is not a hub in that sense. That is a really interesting to hear all of that. Because I think it makes the locations already quite, like, narrows down the places where you can do that. In a neighborhood like Assendorp or Kamperpoort. Yeah, I think, I just have to check whether I have other questions.

E: There is a relation also with the public space. That is also I think very important for you to realize. If you go for a solution that asks a lot of the grid, you need to have a lot of space, that is not available at the places you want to set up your energy hubs. So, I think that is also a very important thing you need to consider.

I: Yeah, I do not know whether you can answer that concluding this, but if we now think about two options. One option would be putting I do not know, two charging spots into every street, or putting bigger hubs, every I do not know, every 600, 700 meters, where you can then charge ten cars maybe or 20. And then you have the difference between having to connect to the bigger stations, or to the smaller stations, but maybe having to extend the smaller stations as well. Is there a financial difference? Is one of these less expensive than the other one?

E: I, yeah. I can answer this question from my feelings. Because we do not calculate this. As grid operators. Because it is not our job. If someone requests a cable, we put a cable in the ground. That is our, we have to do that. It is defined by law. But we know in fact, the solutions for us, as net operators, but we cannot tell the market. is in fact the bigger stations, with 10 or 20 chargers in one place. With one cable, that they need to pay for. That is for us the most effective way. But we cannot say that, because we are government, and everyone has the right to ask for connection to

the grid. So, if they do, we need to do it. So, we cannot suggest something, because that is not our job. Our job is to connect people. But it is easy in fact to calculate this. You can take a few examples and do by yourself. Okay, I go to a charger station from 10 chargers from one place in the distance from there to there. And what it costs. And you can calculate what it costs to go to the local grid. But I can tell you already, the local grid will be the cheapest, for you. But not for us. You understand? That is the problem. And next to that, if you go to the local grid, you need space. Because we need to build that stations. And that is difficult. So, there are a lot of ingredients to find out a good solution, the best solution. Because that space, if the government says, there is no space in Zwolle to build this. And you can also not build your local grid solutions. You need to take everything, consider everything, not only the costs, but also the space. Tim Idema will tell you from his point of view, I do not want that local solutions. Because then I need to make space in my city and there is no space. Or I need to stop with the play gardens for children and build…yeah. That is his point of view. But Enexis's point of view is, build one big supercharge station, we put one cable to it, and we are done. The best for us. For the customers, they have another point of view. They want the cheapest solution, and that is not the solution from a big station. And something in between, somewhere in between, your solution will be helpful. But you need to find out, which one is now the best one. And then you need smart grid solutions, earning money with trading energy with the battery, V2G, all that kind of things, somewhere, there must be a solution that is good for the customer, good for the city and good for Enexis in fact. But I cannot say you which one, because I am not able to do that. Because we are a government company. We cannot think in the market solutions. We are not allowed to do that.

I: Yeah okay. So, in the end, it is…that was actually a very clear picture of, not the positions, but the possibilities. Because for me that was not so clear to me, so that was good. So it is in the end it is more of a stakeholder discussion. It comes down to a stakeholder discussion and who pays for it than discussing what… (*The phone of the interviewer is ringing*). I just have to check, my phone is going, I just have to check whether the, oh yeah, it is still going, the recording, I wanted to check whether the recording is there. Sorry. So, in the end it comes down to a stakeholder…

E: Analysis.

I: Analysis as well. So that is not what I am doing, but I think that for this topic, it should be done. I do not know whether someone is doing that, probably, but it is a very interesting outcome of our talk, I think.

E: Yeah. The question you have about where the situation, location of these energy hubs, you see now it depends on whether you want to stay in the local grid with low possibilities or you go to a higher level with more possibilities. That is something you can and does relate to how much space is

available in where I want to set up these energy hubs? That is an important one, that for you is very interesting to do research for, I think.

I: Yeah. So, what would you recommend me to do, so, my methodology until now would be to select certain things I want to analyze, not in terms of the grid now, but also other aspects for example, you know, where is the density the highest, so that you can reach, so that a lot of people can reach the hub, so in terms of spatial aspects but also in terms of societal aspects. And should I start with these aspects and then try to combine it with the grid, like…then I would have the outcome of okay, these would be three potential locations, and then have a look at what is the situation there with the grid, can I, how much does it cost to connect to this or that station? Or do you think I should start from the stations, from the grid, and think about where the best places are to start such a hub.

E: I think you need to start from your point of view first without the grid. Find the places. But then I think you find a lot of possibilities. And then after you can put the grid next to it. And then you can see if there is a connection or not. And if there are connections, then you can tell that are the, wij noemen het, we call it, laaghangend fruit. The easy collectable parts. You know, places? And more difficult. And you can work with colors. Related to the grid and this three station places are easy going and fast to build or to set up, this kind of places are more far away from the grid, more expensive and less interesting, you can, and then you can give an advise to the, to Zwolle. I think that is the best way for you.

I: Okay, yeah. So that is also, has been the idea until now to do that. So that is good to hear that you would agree in doing that, because the idea is also to have, the outcome should be a map of the two neighborhoods, with, you know, with the colors indicating, where you can, where are good locations for the hubs. That is very interesting.

E: You have a map with the equipment from Enexis, he? You are saying?

I: Yeah, I have, Zwolle has a map from where the small trafostations are. I have to check whether the bigger ones are on there as well.

E: I have the map, I have also a map. So, if you do not find the, you do not have, then you can ask me and I will send you.

I: Okay, perfect.

E: And I can also help you, the small ones means till this level, this one means this level. I can also tell you that.

I: Okay. If you still have the time, we can also go to the next task I did until now with the people. It is not focusing on energy, but it is focusing on the spatial and societal aspects a bit more. But I think

you could also improve that with your opinion, but that depends on, I mean we are, also, we already have been talking a lot, if you still have the time.

E: Yeah it is okay. I can do.

I: Okay.

E: You sent a mail. Toch?

I: Yes.

E: Are you going to do something now?

I: Yes, I would share my screen again. because the task is divided in two parts. I think you should see this now.

E: Not yet. Ah yeah, now I see.

I: Ah okay. And I will later, like in five minutes or so, ask you to open this as well, but for now we can discuss it so that I can move this around and add things here. Because later I will show you some indicators, that I derived from literature, and also what other experts said. But first, I would like you to think, or brainstorm with me, about what you think are the most important aspects to take into account when you want to select a location for a hub.

E: Okay. I understand. But are these…in general, yeah?

I: In general. Just to brainstorm some ideas now.

E: Yeah. I think the…what important is I think is how much, and I think the city Zwolle can tell you already more about, investigate the interest of people living in the neighborhoods, in by example having an electrical vehicle. Because your energy hubs need them. Using it, yeah. That is an interesting one, I think. Also, but that is a little bit another topic. You can also use energy hubs to transform electrical to another…

I: Voltage?

E: Yeah, I am looking for the word. By example, we need to heat our houses in the winter, now we are using gas at this moment. You can also make gas from electricity. If you have too much energy from your energy hub, you can also find a solution in transforming to a gas, to a biogas and then warm up the houses. But then it is interesting that you know where in the city we need gas to warm up our houses. Because an electrical solution is not possible. Because the houses are old or something. The third one is, I think, the connectivity in a part of the city. I think if you see to the places Assendorp and Kamperpoort, I know, I live in Assendorp, the people are very connected to

it, so it is more easy in solutions like, I want a shared car, by example, because then, you are more able to work with vehicle to grid operation systems. If the people are more open to that. So, the type of the neighborhood is important, I think.

I: Okay, yeah. So basically, also depending on demographic factors for example?

E: Yes.

I: Okay, so also maybe younger people or something like that.

E: How they think about…My, I do not know if I color now things, but people that live near a station, train station, are also most of the time more interested in public transport. And they are more interested in solutions that they share cars. Then you go to a villa part of Zwolle, with rich people, that are very individual and do not have that much interest in this type of solutions. And if the neighbors are also, they are also more open to solutions like a charge station, instead of charging by your own place. And the people that live in big houses and are very rich and drive a Tesla, they want their solutions at their own driveway. That kind of things I think it is important to see if your energy hub will work or not.

I: So, demographics, but also income of the people living there.

E: Maybe also interesting in a certain part of the politics. People from the green left are more interested that far right. By example.

I: Okay, yeah, interesting ideas. Because I think I did not, like the political aspect is of course a good indicator because it is easy to measure, I think Zwolle also has numbers on that, I would say.

E: I know, Assendorp is a very green left part of Zwolle. And there are also, there are a lot of movements about energy and that transition.

I: Yeah, there is also these initiatives, for making the streets more green.

E: And that is also one of the answers. What kind of movements are already in the neighborhood? If they are already busy with things, then it is much easier to get in contact with them and suggest new solutions.

I: Yeah, yeah okay.

E: Yeah. And then… At least then, but then more to the, less important is then at the end the possibilities from the network, possibilities from the environment in the neighborhood, the space that is still there. You can find any place to build, I do not know if you have any idea about the size of the energy hubs. But if you have chargers and if you have things for your bikes and if you have sun panels, is it 50 square meters, or 100 square meters, or, he?

I: Yeah, I think it of course depends, also the size you decide on, but they have, I think &morgen did a calculation, and for the bigger ones where they, like, they think in terms of like 80 shared cars, that is a bigger size of course, but I think for those they thought about 600 square meters in three, like in total and the in three layers. So, I think 200 square meters ground needed, but that is already a lot for a small scale neighborhood.

E: Yeah. What is an indicator is how big you want your solution, he?

I: Yeah, of course.

E: But by example, we are thinking much about the way we live now. Everyone has his own car, everyone, yeah. If you keep that in mind and you need 600 square meters, because everyone… But if you start thinking about okay, we can share that thing, because he, (incomprehensive). The whole day, that thing is in front of my house and I use it maybe a half hour a day. Then it is maybe more interesting in thinking about, okay, if I use it half an hour a day, and my neighbor too, and maybe we can share this car with three households, yeah, then you do not need that much space.

I: That will also be part of my calculation of my idea. Because the first chapter of my thesis is filled with, okay, how much space do we need for a hub, and then I also have a look at how much, how many private cars can be replaced by a shared car. So how many households can share one car. So that, that will also go into the calculation later, so that is important as well.

E: Okay.

I: Changing habits, I would name that.

E: Yeah.

I: Yeah, I think we can now go to the second part of this? And we are also close to the end now.

E: Yes, it is fine.

I: If you like, you can now open the link, I have sent you this morning. Because then you can also access this thing I have been working on, and it makes it easier for you, I think, to work with me. It is not very complicated; you just have to move around these bubbles.

E: Yeah, I go in now. I hope it works. I see it now, yes okay. Your name for this session?

I: Yeah, you can just join without putting a name, then you get a name anonymous, the name is then I think, visiting giraffe or something.

E: Enter as a visitor, okay, I will do. Before you begin…well, okay. Ik ben daar nu in, ja?

I: Ja.

E: What I need to do?

I: So yeah, I see your mouse. So the task is now, we collected some aspects together, but I also have a list of things other people said on the topic, and also from literature, and this is the list of the colored bubbles, you see here in the middle. And on the left-hand side the boxes are descriptions of what I mean by these points. But I can of course also explain that to you, it is more to have a background. You can zoom in and out with your mouse, because it is written in small letters. So that it is easier to read. And the task is now, to rank the indicators, the bubbles in the middle in terms of their importance for selecting a location. So, you can either use those in the middle, but you can also use your, the ones you chose yourself, like the blue ones, I moved them here. And I would give you some time now to look at this and decide which of the aspects you find most important.

E: Is the list of potential indicators, I need to rank?

I: Yeah, of course, yeah.

E: And the definitions of indicators are in the left, yeah. Okay. And they are the same color?

I: Yeah, they are the same color as the definitions, so for example for the low real estate prices, it is this one.

E: Ah yeah, I see. Okay. I need a little time then.

I: Yeah of course.

The expert is working on the task. The second part of the recording is without speaking until minute 04:30.

E: I think I did it.

I: Okay, let us see. Okay. And the last thing I would like to ask you then to shortly explain for each of the five things you chose, why you chose them.

E: I need to fill in somewhere, or?

I: Sorry?

E: I need to type it somewhere, or?

I: Oh, no, you can just explain it to me.

E: Ah okay. Okay, I start with five. I was thinking about the capacity of the electricity network and the substations. But I think the substations are more important than the network, because the

substations are above the ground and the network is under the ground, so if we need to change things, it affects more the public, with substations than with the network. So that is why, I do not want the network in these five, in this rank of five. I found also everything related to the network is in fact less important than the other subjects. I found really important that you first think about the environment, about the neighborhood and then the network I consider as less important. And that is from the view from the network, so... (*The expert laughs*). The ownership of the location, I put on four, because I think this energy hubs needs to be…the property of the ground, I found important it is in public hands, and not in private hands. Also, because it is difficult to explain. What we see by example, I explained you about the different stations we have. And of course, the closer you are with the big stations, the better it is for the distance and the better it is for your output, you need to spend. But we see that there are big companies, with a lot of money, that buy all the ground around our big stations, to put sun panels on it. But the profit from that sun panels goes to the big companies and the people that have problems with the sun panels and the windmills in their backyard, they are, they get nothing. So, in that relation I see also the energy hubs. It is something for the neighbor. The neighborhood. So, I think it is very important that the neighborhood has also the profit. So that makes that the ownership of the location must be a public. For me.

I: Mhm. So that the returns can also be given back to the neighborhood, to the people who live there.

E: Yes, exactly. Yeah, public transport stops, that I put on three, because I think the energy hubs also need to change the way of life. The way we do now from there is always a car or there is always energy, or, that will change in the future, and I think you need to be able to adapt the new, that new way of life. And I think public transport is helpful, a good public transport system is helpful in setting up energy hubs. If you are very individual and the energy hubs will work less, I think. This one I found very important, because I think when you set up something new, in a neighborhood, you need to be careful, that the balance is still there. The most of the city parts are already fully build. And if you put even more buildings like an energy hub, then it affects maybe the green space in the city. And that I found very, that I would find a pity. If you put even more buildings inside the city and it costs green spaces. So, I think if you do chose then a part in the city where there is enough green space. Or be able to create new green parts.

I: That could also be a benefit of the hub, that if you need less cars, then you can put more green.

E: By example. Yeah. And then the accessibility of the stations…That was this one, no?

I: I think it is here, it is here.

E: I do not see you.

I: Here?

E: Ah, I see. I think I need…ah yeah. That is a little bit connected to this one, in fact. If you set up something like that but if they need to walk five kilometers to the nearest station, then it does not work too, I think. That is what I said already now, in our discussion before, Assendorp is close to the train station, and there are also a lot of bus possibilities. I think in, to get a result with your energy hub, you will have a bigger change in this kind of areas, than outside the city.

I: Yeah, nice. I think it is a good selection of indicators. And just to give you an idea, like I already explained a lot about the thesis, but this ranking I will now, like, this ranking and also your explanation of it, I will take and then I have in total I think 12 interviews. And I will weight the different indicators against each other. So, until now a lot of people said accessibility, because I think, I also think it is a very important point. A lot of people named that until now, so I think it will be in the final ranking as well. Because I will weight the amount of times an indicator was named by an expert, and then in the end…Because I cannot analyze everything. And then I will analyze the five most important aspects. But I will I think anyway have a discussion and also analysis of the energy system. Because like you said, I will first have a look at the spatial aspects and social aspects and then later have a look at how to connect that with the energy system. Yeah. So just to give you an indication of what I will do with the interview. And now we have finally reached the point, finally reached the ending of the interview, so if you have other comments you can still of course say that?

E: I go close this. Then I see you back. I think the most things are said. I told you everything, I think. Yeah. I have no additional things in fact. But if you want maybe the map or an explanation about, please feel free to call me again or to write to me, and then it will be fine.

I: Thank you, thank you a lot. Yeah, I would like to also thank you for your time, it was a lot of time you took for explaining all of this for me and it will form an important part of my thesis, so thank you a lot for your time. And I can offer you, what I also offered everybody else, as the experts you will of course be anonymous in the thesis, but I can offer you to send the final result, so when I am finished with my thesis, I can send it to you, so that you see what the end result is of what you have taken part in also in terms of, it is probably interesting for you to see what I did with all the information.

E: Yeah, I would like to accept, to receive your thesis. Yes. So please!

I: Yeah, I will do that. It will not be I guess before the end of October, because as you see, I am now doing expert interviews, I still have to analyse those and afterwards go to the GIS analysis. So it is of course taking a lot of time still. But I hope to be finished at the end of October, at last. So I will send an email with the document as soon as it is finished and possible to send it. And yeah, so thanks again for your time.

E: Your welcome.

I: And it was very nice to speak to you.

E: And I wish you all the luck with your thesis and I hope you will graduate with it.

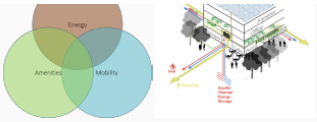
I: Thank you, I hope so too, but I think with all the good input from a lot of people I will do a good job. Yeah.

E: Okay, yeah see you later, bye.

I: Perfect, thank you, goodbye.

E: Goodbye.

Appendix 29: Expert Interview MURAL board Expert 9



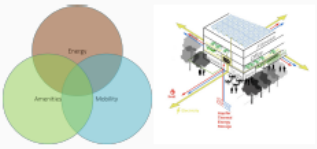
Which indicators do you find important for the selection of a location for a neighborhood hub?

Interest of people in using it
Who wants to have an electric vehicle?
Use energy hubs to transform energy e.g. to gas
Where in the city do we need gas?
Involvement of people / interest of people
Type of the neighborhood
Demographics, income of the people living there
Politicalorientation of people
what kind of initiatives are there already?
Capacity of the electricity network
Space in the neighborhood
Changing habits

Potential locations of neighborhood hubs

in the neighborhoods Assendorp and Kamperpoort in Zwolle, the Netherlands

Expert Interview with Lisa Knaack
Master student Spatial Planning
Radboud University Nijmegen
02/09/2020



Which of these indicators do you find important for the selection of a location for a neighbourhood hub?

Please select 5 items from the list. If there is something missing on the list, feel free to add it! Then please **organize** the 5 chosen indicators **in the order of their relevance** for choosing a location for a neighbourhood hub.

Definitions of the indicators

Mixed use describes a type of urban planning that blends residential, commercial, cultural, institutional or entertainment uses into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian connections.	(Social) amenities describe all types of services that inhabitants of an area need on a regular or irregular basis and that have potential to increase the social cohesion. Potential amenities are: Grocery stores, pharmacies, cafés / restaurants, package drop-off, fitness, meeting / conference rooms, community centers, other recreative functions, daycare, elderly care, schools.
There is an existing or planned stop of a public transportation line, e.g. of bus, rail or of new forms of public transport (e.g. taxi bus), integrated or located in close proximity (e.g. within 100 meters) to the neighbourhood hub.	There are urban green spaces such as parks, playgrounds, facilities for children or lawn in close proximity (e.g. within 100 meters) to the neighbourhood hub.
The price of land and real estate at the location and in the surrounding area is low so that investment is easier and more profitable.	Newly constructed residential housing (e.g. appartments, houses) is situated in close proximity to the neighbourhood hub.
Demographic data refers to the study of a population based on factors such as age, race, and sex as well as socio-economic information (e.g. including employment, education, income, marriage rates, birth and death rates).	Population Density refers to the quantity of inhabitants living within a certain measuring area.
There are streets or areas that suffer from heat stress within medium proximity (e.g. within 250 meters) of the neighbourhood hub.	Spatial density refers to the quantity of buildings within a certain measuring area.
There are streets or areas in public space that suffer from high parking pressure within medium proximity (e.g. within 250 meters) of the neighborhood hub.	There are existing or planned logistic facilities (e.g. delivery of goods, last mile delivery, lockers for delivery and collection of parcels or locations of transport companies) located in close proximity to the neighborhood hub.
The land (parcel, plot, building) in question is in the hands of the public body (e.g. the municipality, province or country) instead of a private company.	The neighborhood hubs are situated in close proximity to existing electrical substations of the energy network.
The neighborhood hubs are located in proximity to where the people live that have an interest in using them. This can for example be measured by analyzing the demographic structure of the neighborhood.	The neighborhood hubs are located in proximity to existing parking areas where inhabitants park their cars on a regular basis. This makes the transition easier. Moreover, the space is already used for mobility needs.

List of potential indicators

Low Real Estate prices
Proximity to parking pressure
Demographic Factors
draagvlak (societal support base)
Spatial Density
Population Density
Mixed Use
Proximity to new residential housing
Proximity to logistics
Attractiveness of the surrounding and the route
Proximity to heat stress
Proximity to existing parking areas
Available space (e.g. vacant lots)
?
Capacity of the electricity network
(Social) Amenities

Ranking of indicators

1. Accessibility of the location for all modes of transport
2. Proximity to Urban Green Spaces
3. Public Transport Stops
4. Ownership of the location
5. Proximity to electrical substations (trafostations)

The neighborhood hubs are located in good accessibility of the users with all modes of transport. The travel distance by foot is not more than around 250-300 meters.

The neighborhood hubs are accessible by an attractive route and are placed in an attractive surrounding area. The focus is here on pedestrians.

There is space available where the building of the hub can be placed. This can be vacant lots, unused (public) space or buildings that will be reconstructed.

The neighborhood hubs are placed in proximity to areas where the electrical network has the capacity to support the hub (e.g. charging of electric vehicles).

Appendix 30: Expert Interview Report Expert 10

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 07.09.2020

Place: Digital meeting

Time: 10.00 am

Duration: 57:07 min

Atmosphere

The interview atmosphere was informal and the tone of conversation was friendly and open. The interview was conducted and recorded using the video meeting platform Zoom. The interviewer took part in the meeting from home, while the expert took part from his / her working space. Due to the unexpected intrusion of colleagues of the expert into the room he / she was working in, the interview was disturbed several times. The previously agreed time of one hour for the interview was adhered to, but because of the disturbances and the problems of the expert with opening the MURAL link, there was not enough time to explain the choice of the indicators for the last task.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: So, I start recording now, and then I will share my screen. I have to check where that is possible…here. I do not know in how far you have been involved in the two projects of &morgen in Kamperpoort and Assendorp, I think partly.

E: Kamperpoort not, but I work in Assendorp, with colleague 3 a lot. I think you are working together with colleague 3?

I: Yes, yes.

E: Okay, with colleague 3 and expert 4, so I know what they know.

I: Yeah, okay. So it might be that you already know some of the pictures I will show you now, but it is more to show you as well the connection between the work of &morgen and my thesis, which is built upon the work, but also to show you what my conceptualization of the topic I am studying is. So, the topic, I am focusing on, or sorry, I will start with myself first. I am Lisa, Lisa Knaack, Master student of Radboud University. Master student of spatial planning, with focus on urban and regional mobility and I am doing my master thesis on the topic of neighborhood hubs. That is the English term I gave to them, but there is a lot of words of course for them. So, mobipunten, mobihubs, buurthubs, everyone has their own word for it I think, but that is my focus. And my topic of my research is to find a methodology for finding suitable locations for these hubs. And there I am focusing on the three topics or trying to integrate the three topics, of course mobility, energy aspects and societal aspects into the concept of a hub. And on the right hand side, you see a picture &morgen made of what a hub could mean to the people living in the area but also to the surrounding, so if you include a lot of amenities in a hub, then there could of course be some space that is given free for other functions. And in Zwolle, &morgen saw three scale levels of hubs, the biggest ones are the Stadsrandhubs, so the city edge hubs, which have a big transfer function, from, for example also for logistics, where you come with the big trucks an then transfer the things from there to smaller scale transportation modes. But also, the public transport hubs, where you have the same with transferring from the train to for example bicycle, or walking even. And then the focus of my research are the small ones, the blue dots you see here, the buurthubs, where they have a centralized place in a neighborhood, but still only have a small range or area that they cover with their functions. But they are still very important in this conceptualization, in the network of the city, if you think about all kinds of concepts such as shared mobility for example. And here are different pictures &morgen made for how these hubs could look like. So, the bigger ones are of course the city edge hubs, and the public transport hubs, but what I am focusing on is the buurthubs. Very nice picture, to explain what I am focusing on. So of course, on the mobility side, there is shared mobility in there, the idea is for example that there is shared cars that you can go and take, there is shared bicycles, these shared vehicles can also be electric, so that you are no longer using fossil fuels, but then electric vehicles. Then the idea of connecting it with electricity

is to maybe charge these cars even there, so put solar panels on the roof and charge these vehicles at the spots. And then use the vehicles as well as a battery for the neighborhood. So, these are all of course concepts that is more of a vision, that go into this conceptualization. And there is also the concept of geothermal heat production connected to it, although this is not really the focus of my research, but it is in this picture, so I just name it, that it might be part of some of the hubs. And then from the social side, of course, there is also, there can be a lot of functions connected to it, of course depending on the situation, the place, the people living there. But functions such as office space, a fitness studio, a daycare, a café, a grocery store, a lot of functions that could be connected to it. And this is, so, what I see as a neighborhood hub, a neighborhood hub can be such a building, at a centralized place, where these functions come together in the combination that is needed for the specific spot. And yeah, I am trying to find a methodology for finding locations for these hubs. And doing that for the neighborhoods of Assendorp and Kamperpoort. And that is also why I wanted to interview you. Because of the local knowledge about Assendorp, then. And what I do, is, or what I have done until now, I have done a literature analysis, of important indicators, of important factors that could influence a location, now I am doing expert interviews, and after these expert interviews then I will do a GIS analysis of the two neighborhoods. And take into account the indicators that have been discussed in the expert interviews. And then hopefully come up with like a map, where you see where the potential for hubs is the highest. So, I am really trying to find, how you can do that in a scientific way. And this is just, I think you have seen this maybe, this is the picture &morgen made from yeah, this is what a hub could bring, but of course it is more of a vision than actually, it is not there of course, and it is not the actual thing…

E: It is not a plan.

I: Yeah, it is not a plan. Yeah that was the word I was searching for. So, I will stop screensharing now. And I would really like you to give me a short introduction of what you do. Of course, I have done a bit of research, there is also a short text on the website of Zwolle, but just shortly from your point of view, what your tasks are in Zwolle.

E: Okay, I try my best to explain that in English. Because in Dutch it is really complicated to explain what I really do. When people ask me, what are you doing all day? I really do not know what to say. But I mainly work with expert 4, who you have already spoken, as Mobility Real Estater…

I: Makelaar.

E: Yeah, makelaar. So, we connect people who want to make their environment a lot of greener and they…so we stimulate them to use deelauto…shared, shared car. And of course, we think about how we can do this in…how do you call wijk?

I: Neighborhood.

E: Neighborhood. Assendorp.

I: Yeah, it is a bit difficult because in English you do not have the, like, stadsdeel, wijk, buurt, you do not have that in English. So, it is a bit difficult to name it, but maybe you can just say neighborhood? Or area?

E: Yeah. Neighborhood. Neighborhood is buurt. Okay, I work only in Assendorp, as a neighborhood, so I know a lot of people, not only people who live there, but organizations, and the shops, and the governments. Everyone who lives and works in Assendorp, I know. And we try to connect all the wishes of the people who live there and who work there and how we can, oh, that is difficult…how we can organize things smarter. Thus, with less energy, and more green, and how can we work together to organize this. So, mainly my goal is to participate with the citizens. To have all…

I: Stakeholders?

E: Om bereik mijn doel. Om mijn doel te bereiken.

I: To reach your goal.

E: Yes, to reach my goal, thank you. And the goal is to have all the cars, an ideal plan is to have all cars outside of the neighborhood. At the edge of the neighborhood. And no more in the streets. So, the streets are green and we walk there, and play there, and have coffee together, but there are no cars, they are on a a central point. Which also can be a hub in the area, in the neighborhood. And next to that I am wijkbeheerder. Which is a very weird term for doing all the participation with the citizens. When they have an idea, they call me, I want to do this, who can I call, who also likes this? I also have a small budget to give to them, to buy a tree, or plants or whatever. Also, I handle complaints. So the pavement is..naja, whatever. The pavement is broken, or everything they are irritated about. Someone parked a bus in front of my window and…that kind of things. That comes to me. So, I am the one they come to if they have a question or an idea for their environment. And it is only about the outside, not the inside, not their own territory, but the public territory.

I: Yeah because about their own territory there is another legislation, they have other laws to work to. Like if they want to change something in their house, that is a different law I think, than in public space.

E: Yeah, or they own it, because they have, they own their house and the ground of it is owned by some real estate company or woningbouwcooperatie. Housing cooperation?

I: Yeah, what is the translation? There is not really, sometimes there is not a word for it in English. But yeah, I know the word.

E: There is a cooperation where people with not a lot of money can rent houses from there.

I: Yeah…I cannot come up with the English term. But I will have to look that up in the course of my Thesis.

E: Okay. We call it woningbouw.

I: Yeah. Okay. Yeah I think that is like a twofold job then, that you do, so on the one hand, the wijkbeheerder, but on the other hand also the first part you just mentioned, so it is a twofold part of the job. Twofold job.

E: Yeah, it is a sort of extra job. The other wijkbeheerders do not do that. But I am interested in mobility, and doing it differently and smarter, so that is why I do that with expert 4.

I: Cool. So, I think, I would like to focus in the course of the interview more on the societal, and mobility aspects of the hubs, the concept of the hubs. And maybe we can start with the societal aspects of the concept directly. Where do you see, like in the conceptualization I have shown you and you have also worked with expert 4 and colleague 3 on, so where do you see today the potentials and problems of this concept? Of implementing that?

E: The potentials of the problem?

I: No, the potentials and the problems. So where are the potentials of it, you just said, you think we need to go smarter, but where do you sort of see the potentials in that, but also where do you see the problems connected to it still? Because we are not there yet.

E: Yes. The potentials. No, I start with the problems. The problem is in Assendorp and also Kamperpoort, that it is mainly stone and not a lot of space. So, you have to look for places outside, central places where there really is space or you can transform certain buildings like you have shown into a central place. A problem is also, the people are not familiar with the possibilities, like sharing cars. We really promote it, but a lot of people do not know it yet. And they think it costs a lot, or it is very complicated. Especially people with little children, they have the need to know that their car is right outside of their house. So, when there something happens, I have to go to the car, and I have to go to the hospital, or whatever. And I do not want to search for a car. And in Assendorp there live a lot of people who have two cars. It was a, how do you say that, it was a neighborhood where there was a working class. But now it is very close to the center, the binnenstad. And people are moving from the binnenstad, the center, the historical center, to Assendorp.

I: Because it is more affordable to live there?

E: Yes, it is more like Manhattan.

I: Oh yeah.

E: It is changing. So the people who live there are changing, they have two or three cars, they have a Tesla and they need loading space. And there are still the people who used to live there, so the older generation. That is really a struggle in that area. And I think the potentials are, with the buurthub, that people are, people always want a place to meet. So that…and when they have a place to meet each other, they talk to each other and think, oh, did you use the sharing car? Oh yes, it is very easy, and it does not cost a lot, and there is a person who can say from, does…hoe zeg je dat? You can make money with it! If you are smart, you share a car, you have an electric sharing car and you apply it the right way, you can make money. And then you meet, have a coffee and talk about it. And then it becomes a place where you come, if you go to the pharmacy, or to the gym, or to the childcare, daycare. Then you see the cars, they are available, I think that is…then it becomes a more normal and natural thing to do, to use. But it has to be there, ready. I think.

I: But for making it, like, for doing it, there has also to, like, I think, a lot of people say there also has to be the demand there. So that you place it there. So that is a bit of a vicious circle. Because you need it, to have the demand, but you need the demand to make it? Right?

E: There… A lot of people need it there to see it. How easy it is, and what it is and how you use it. That there is always someone with an orange bright jacket, you can ask, how do I do this, how do I do that? And only the smart and interested people can see it while it is not there yet. That is really a vicious circle.

I: You said that the people always like to meet. Do you think that it also has this potential of improving the social cohesion, that the people feel closer? That there is a social connection between different people? Do you think the hubs have the potential do that?

E: I really do. Because, if you only have a daycare, only the people go there who need to be there. And if you have all sorts of shops and things together, the people who use that are meeting. How else do you get them together, if they do not live in a certain street or in a certain area, they do not come together, because why would they?

I: So, you say the mixture function is an important part, are there other aspects that are very important for making the hub function as a social hub? So that people really lead there…is it only the functions? So, is it enough to put enough functions there and then it is working, or is there other parts connected to it that you need to include?

E: Of course, there has to be something that they do not already have at home. Because there is not a lot of space in the neighborhoods, they always… they can meet at the streets and talk to each other and have coffee, oh, my garden and your garden. But they always want a central place to do handcrafts together. Or knitting or whatever they like to do, play games, or just have a coffee or have a party. That is not available in Assendorp at the moment.

I: So there would also be, it is also important to have like, community rooms in the hub?

E: Yeah, particularly for Assendorp. It is a different kind of people who live there, it is a different kind of vibe than in other neighborhoods. There is really a need to do things together and help each other and have parties outside. Sometimes you see an old caravan where people drink beer, and whatever.

I: So, there is a lot of community feeling, but they do not have a place for it until now.

E: Yes! Yes! So, they have done neighborhood apps. So we see now, the people who know each other, the number of people who know each other in the street grows, because you have an app, and the connection is more easily, but there is still not enough space to meet.

I: Okay. So that is also in terms of actual community groups? So, it is not only the neighbors are meeting, but it is also the knitting people are meeting and the…

E: People with the green fingers, and…all the younger people. So, when ideally we have clean streets with only gardens and no cars, you already have a lot of more space.

I: Of course, yeah. Cars take up so much space in the streets. That is also one of the reasons why I wanted to focus on the topic, because I think it is so important to make that change in the next years.

E: So.

I: Yeah, sorry?

E: Yeah, I was trying to say that you have to take little baby steps at the time, to go to something big like that. So, we are preparing the people already, to make small steps to make a bigger garden, and put your car 100 meters further than your own house etc. so we are working to a place like a buurthub.

I: So, it also involves a lot of communication between you for example and the people living there to support such a concept?

E: Yes, and changing the culture. A cultural change. A very big change. Then we slowly let people use the things…that the world is changing, and we need to make other arrangements, maatregelen, actions. We need to take bigger actions. To make the world a better place together.

I: Yeah, if we can maybe now talk a bit about the mobility side of the concept. So, we have already talked about shared cars, shared vehicles already. Do you see potential for these in the neighborhood Assendorp? Also, in terms of the way people look towards it now, and how they will look towards it in the future? What do you think is the potential for shared cars in Assendorp?

E: I think there is a very big potential, because of the location of the neighborhood. It is really close to the train station and really close to the center. And the highways. So, I think that is…you can see it as a central point for your starting point, or your ending point of your journey.

I: So, you see it also that in Assendorp there is also a bigger potential than in Stadshagen, is that the name?

E: Stadshagen, also a neighborhood yes.

I: Yeah, there is of course a difference between the two. So, you see that there is higher potential in such a neighborhood than in Stadshagen?

E: Yeah, because of the people who live there and the way they think about it. In Stadshagen for example, there live only mostly families, they go out of the neighborhood at 9 o'clock, and they come home at 5 o'clock, they go to the same supermarket, and they go to the same daycare and they are only busy with themselves. I say it in black and white of course. And in Assendorp, they think ahead. They think about how we can do the things together. We do not have to find out everything ourselves. Cultural differences. Zwolle is a really small city, but in neighborhoods we have a lot of cultural differences. When they are not even black and white.

I: Wow! I think that is very interesting, because I of course chose Assendorp and Kamperpoort because of the social climate, I would say, that is leaning towards the future, towards these developments. And of course, also of course Zwolle is also with the task towards &morgen is focusing on these neighborhoods with the topic. I think it is such an interesting difference between these neighborhoods and other neighborhoods in terms of culture, in terms of behavior of inhabitants. It is just interesting to see that, although the city is so small.

E: And they are almost the only people who ask, where are we going to? What does the government want to be in 2030, or 2050? And what do we need to do now to make some steps already to get there? Someone in Stadshagen…they are not interested. They will follow, when they need to do something, they will do something, and they will follow when they really need to.

I: Mhm. So, these were also the people that were more, were these people also more participating in the Omgevingsvisie process? Just on a, I find that just interesting…

E: That is a good question, I have not really thought about that. That is a really, really a vague plan, the Omgevingsvisie. A lot of people do not know what to think of it…but what we are doing is to filter the relevant items for them out. So I think they are really interested in a few themes, but not in everything. So they like to, how do you say duurzaam?

I: Sustainable.

E: Oh yeah. Sustainable. Sustainability, and green and mobility. And socially of course. that is it. So, they really only want to know what is relevant for me and what do I have to know. And make it very easy for them to do. So you translate it. Do you know what I mean? It is like a pyramid turned around.

I: Inverse pyramid, I think.

E: Yes.

I: I think connected to shared vehicles is also electric vehicles. I discussed that in the beginning with the concept. I have heard from the other experts that there is until now like, not a lot of electric vehicles in Zwolle. Do you see, or, where do you see the potential of this? Is it, what is the time horizon also of electric vehicles, also for Assendorp? Do you think there is going to be a lot of electric vehicles in the next ten years, or is that more on a longer time horizon? Or not at all? That would be the question, yeah.

E: Yes, interesting question. I thought it would go faster. But that is not the case, I think because of the people who are working in the city center and go live in Assendorp, they bring the kinds of job with them, they can get an electric car from their boss. But in Assendorp there are only a few people who would buy an electric car just for their own.

I: Also because of the costs of the electric car?

E: Because of the costs, yes. And it would almost always be a second car, or the first car and they would have a second car. And there is already so less parking space. And it costs a lot, we do not have a lot of loading spaces right now. We are working on that, but no. I think only the people who are, who have to, who can buy them for their jobs, they are the most potential to have an electric car. And the normal working class, who do not really need a car for their work, why would they buy an electric car?

I: And do you see a potential, like if they are not buying an electric car, maybe they do not need to buy a car at all because they can use shared cars. Do you think there would be a lot of people using shared electric car if they are there? If the company that is supplying the shared cars, if this company would be supplying electric cars, do you think the people would use them?

E: Yes.

I: Okay, so if they are there, that is…

E: Yes. If they are there, and they have to make a choice, they will always choose the electric car. I think.

I: Okay, interesting.

E: Yes.

I: Because then it is more on the side of how do we make it financially possible for the company to put electric cars there. I think that is interesting. Because I think there is a lot of potential in people, people would like to change, but they do not want to, they do not want to have to do so much for that.

E: Precies. And it has to be easy. As you are forced to make a choice, of course you want to think green and make the right choices. If it is there and it does not cost a lot of more money, or it might even be cheaper, it is really easy to choose electric. I think I read it, when someone has a car on gas, and they need a new car, that they rather chose an electric bike, or a cargo bike, than an electric car.

I: Because it is cheaper and it is also perceived as more sustainable, or?

E: Yes, and when you do not really need it for your work, so you do not need to travel a lot, it is really…it is, hoe zeg je dat? Kost minder tijd. You have time, shorter time to travel.

I: Yeah, because the bicycle paths are normally not so full as the street.

E: No, and in Assendorp in Zwolle, we are focused on bicycles. When I go to work with the bicycle, I will be there within maximum five minutes. If I go by car, I almost need half an hour.

I: Wow!

E: And then find a parking space.

I: And then it takes another half hour because all the parking spaces are full.

E: Yes, and we are a very small city. It is just a full and focused on bicycle. So, we are busy, we are working on people who drive a car, and all the logistics, like lorries, and big busses, to go, to not come in the city again. so they have to stop at this stadsrandhub.

I: City edge hub.

E: City edge, yes. So, we are driving the cars away from the town. If you want to buy a new car, why would you buy an electric car?

I: Yeah.

E: Or you will not come, in 2030, you might not come to your house with the car, or only just to load the car, drop off something and then park it somewhere else. And then it is a very big investment.

I: For you as a person, right. What would be your final conclusion on the concept of hubs? Because then I would like to move to the task, afterwards.

E: The final conclusion is, why are they not already there?

I: Why are they not already there, what do you think?

E: I think it is very expensive, not a lot of space, and very complicated, like you said, with warmth, water, charging. And I think it is not even possible for cars to charge with solar panels.

I: I think, so as far as I understand it, it is possible, but it is of course again complicated. Because of the differences in the production. Because at some point in the summer, there is a lot of production, and in the winter there is not a lot of production, so you have the problem that you still need to have a connection to the electricity grid, and then this grid needs to support it, I think. So that is one of the problems, then.

E: Yeah. Because the provider of the energy, energy provider said that if everyone was doing that, it is possible, but if we all are doing that, we do not have enough capacity at the moment. So they have to make really big changes and really big investments first, for us to be able to do that.

I: Yeah, I also had an interview with expert 5, from the municipality of Zwolle, but also with someone from Enexis.

E: Enexis, yeah.

I: So we discussed the problems there, and he actually told me about the problems with the smallest, the bigger ones, of the trafostations, because that is of course also a big part of, like, if you want to charge electric vehicles, you need to have the energy there. So that is also a big part of it. Okay, I will now share my screen again, you do not need to open the link yet. I will tell you in about five minutes.

E: Okay.

I: So I would first like you to ask you to think about, brainstorm, which aspects you think are most important for selecting a location of a neighborhood hub, of a buurthub. And I would like you to just brainstorm, just name some of the things, maybe we have discussed a lot of them already. Just to collect them here.

E: Mhm.

I: And I will write them down.

E: Okay. An indicator is bereikbaarheid. You have to reach it very easily, by car, by bike, by foot. And also, it has to be a certain amount of meters from your house. And we are working at the moment with 250 meters, 300 meters from your house is the maximum to walk. Facilities of course.

I: What do you mean by facilities? Should they already be there, in the surrounding of the hub? or they should be at the hubs?

E: They should be at the hubs. Like, a pharmacy, a daycare. Maybe a supermarket. Or a small night shop. So, I think it is good to have different facilities, like I said earlier before, like not only a daycare and a supermarket, but also a combination with the cars and the gym. Together they make that you meet, the different persons meet. Otherwise, if there is a social space for older people, only the older people go there and the people who work there. So, you want a combination of facilities that stimulate people to meet while they otherwise would not.

I: So that you also have for example older people see the children at the daycare, or…

E: Yes, yes.

I: So that there is also a societal contact. Not that every age group, every societal group is in their own bubble. And…

E: Exactly, and if there is a little bench, and it is green, there is a little small waterfall, and people can sit on the bench, and watch the daycare, and watch people go, they have little talks like, say, they also have the social needs. You provide them socially and there is a…they have everything close by. All the busses, or the most busses are disappearing, so it is really more complicated for older people to get from A to B. and I think it is, if I think about my children later, how great will it be, if they can go to a hub and they can travel from there to there. So, I do not have to drive them far away and pick them up later again. I think the combination makes it strong. If you only made a hub with electric cars, and bicycles and a bike shop who fixes them, who would go there?

I: Yeah, only the people who need the service at that moment. And you are not inviting them to stay as well, right?

E: Yeah, you do not see how easy it is and that your neighbor who is living nect to you is also using a shared car. Or an electric car.

I: Yeah, okay. Yeah if that are the…I think that are already a lot of points. Then you can now, if you like, open the link. That makes it a bit easier, so then you are also on the page that I am working on right now.

E: Can I open the link on my telephone, or do I need to do that on my screen?

I: I think you should be able to open it on the telephone as well. Might be a problem with the browser. One of the other experts had a problem with the browser. He was saying that he was using chrome and chrome was working. So, you might just check any try what is working or not.

E: No. it is not. Open in Iphone App. So, I have to download the app?

I: It might be that you have to download the app if you are trying to open it on the phone, I never tried that.

E: I try on my screen.

I: Maybe it is easier to try it on the screen.

E: I do not know where it went.

I: If that is not working, we can also do it via the screenshare mode. It is just easier I think for you to see it as well, so that is why.

E: Open in Ipad App.

I: It also tries to open the App?

E: Mhm. It says I have to download the app, as well on my telephone as on my tablet.

I: Yeah if you do not want to do that, I totally understand that..

The interview is interrupted at this point by a person entering the room in which the expert is sitting with a question about the next meeting the expert has.

E: I see it is almost already 11 o'clock. I try to download really quick. It goes very fast. Open it says.

I: I am sorry that you have to download it. I think the other people until now did not use a tablet, but rather used a computer for that. So, on a computer you only open a website, you do not have to download.

E: It says, enter your work email, sign in.

I: Oh…then you do not need to do that. Like, with the normal link, on a computer, you enter as a visitor, you do not have to sign in…so maybe it is easier…like, I do not want you to download it if you do not want to or want you to sign in, if you do not want to do that, so maybe you can just go on with the screenshare and you just direct me. Because I do not want you to sign up for something you do not like.

E: Enter your name for the session, visiting elephant.

I: Oh, you are already there!

E: I think I signed in, but I do not see it on my screen.

I: I think you are already in here, but you are not moving.

E: I see a small elephant on the screen. I do not see you; I see you using your mouse. Ranking of indicators.

I: So that is the site you are supposed to see.

E: Okay, then I am with you.

I: And the task here is, you see three columns. The one in the middle is a list of indicators that are from scientific research but also from other experts. On the left-hand side there is a definition of these indicators. And the task is now to select five of these indicators and rank them in the order of their relevance for choosing a location. And you can of course also use those you have named yourself. But also, there is a lot of other aspects you might find important. And you can easily move these bubbles around. But you can also tell me to move one of the aspects ot the ranking if you like.

E: Mhm. Okay. I unterstand. I see availability. Availability is also very important. Can you see I am doing something? I am trying to do?

I: Yeah, that is the idea also of the platform, that you can work together easily. So that I see what you do. That is perfect I already see what you are doing.

E: And mixed use, is that what I mean by all the different facilities to let people meet?

I: Mhm. So, the definition that is use is that it is a type of urban planning, that blends different residential, commercial, cultural, institutional or entertainment uses. So not only facilities in the narrow sense, but all other kinds. Mixed use is normally the ratio of residential to facility. Like, how big is the part of residential housing and how big is the part of facilities there? So, the amenities, the facilities you named are part of that.

E: Okay.

The expert is working on the ranking.

E: Hehe, that is very cool. I feel old when I do this. It seems so easy for younger people to make the digital apps and interviews.

I: But you can do that as well right? You can use this website as well, right?

E: Of course, of course, but I am used to other manners.

I: Yeah okay.

E: We did not grow up with this.

I: Yeah, I understand that.

E: Yeah, I think it is a very nice way of doing that. I have only seen this platform from one of the meeting in my, at the office at &morgen, because some of the other people organized this and I just thought hey, that is useful for my thesis, so I will use that for that.

E: Yeah. When you say attractiveness of the surrounding and the route, do you mean that it has to be already there, or that you can make it attractive for people to come to there?

I: In this sense at the moment, I mean that it should be already attractive. But of course, you can make it more attractive or you can make it attractive later. The idea is that these indicators you used now, or you ranked now, are connected with those that the other experts said, and those that ate the most named, most often, will then be analyzed in a GIS analysis. And there of course I will try to look for example of attractiveness is ranked as one of the highest. Then I will try to measure that. Also, with all kinds of measurements. And then I can say, there is this area for example, that is Assendorperstraat, in Assendorp, that is the main shopping…

E: Yeah, one moment… (*The interview is again interrupted by people entering the room in which the expert is sitting*). Okay, thank you, I have to go to the next meeting.

I: Yeah of course, thank you for your time, thank you for ranking these aspects. Just to inform you, I will be happy to send you the Master thesis when I am finished, so that you see what I have done, what the result is.

E: Yeah, I would really like to see it.

I: But other from that I do not want to keep you from the other meeting.

E: Yeah, I am sorry.

I: No, we said an hour, so the hour is up. So I am wishing you good luck with the next meeting and have a nice day!

E: I wish you good luck with your research. And I really would like to read your…how do say it, thesis?

I: Thesis, yeah.

E: Good luck and if you need something else from me, then you know where to find me.

I: Yes, thank you.

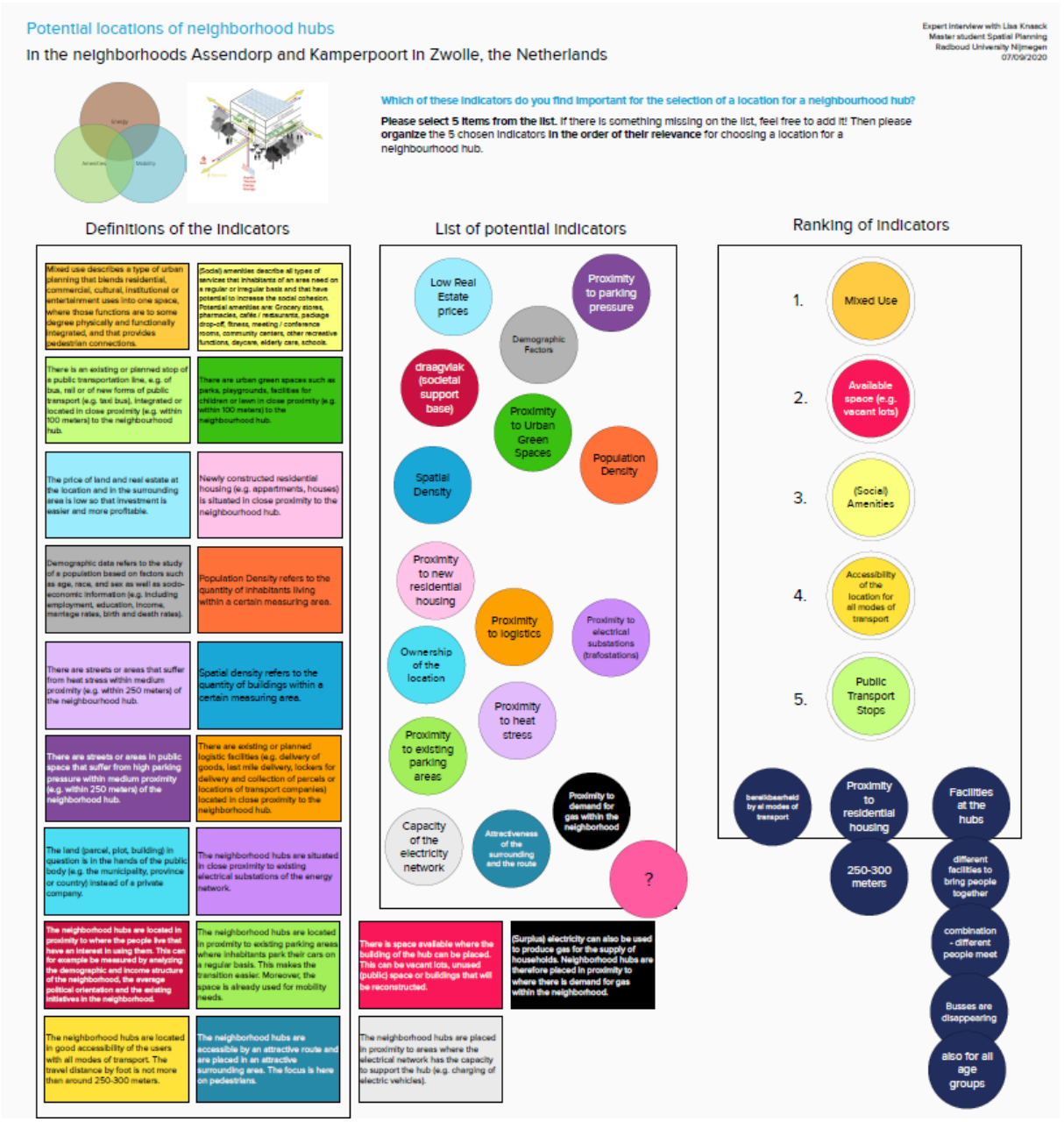
E: Okay, have a nice day.

I: Have a nice day.

E: Goodbye.

I: Bye.

Appendix 31: Expert Interview MURAL board Expert 10



Appendix 32: Expert Interview Report Expert 11

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 09.09.2020

Place: Digital meeting

Time: 3.00 pm

Duration: about one hour

Atmosphere

The interview atmosphere was informal and the tone of conversation was friendly and open. The interview was conducted using the video meeting platform Microsoft Teams and recorded using the a recording program on the computer of the interviewer. The interviewer took part in the meeting from home, while the expert took part from his / her office room. The previously agreed time of one hour for the interview was adhered to and the expert was able to answer all questions.
The expert interview was conducted in Dutch, because the expert said that his English was not good enough to have a good conversation in English. The interview was recorded such as all other meetings. However, something with the recording software went wrong and there is only a recording of the first three minutes available for typing this interview down. There were however a lot of notes taken directly after the interview, when the interviewer realized that the recording did not work, and these are typed down and described in this document. Therefore, the notes about this expert interview are taken in English, as the analysis of these will also be done in English.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer

E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: Ja, ik ga even mijn scherm delen, zodat je ook…ik heb een korte presentatie voorbereid…ik moet even kijken, ik heb nog niet zo veel met teams gewerkt, dus even zien, deze. Kun je die al zien?

E: Ik zie hem, hoor!

I: Ja, ik ga het even kort uitleggen, ik ben Lisa, heb ik al gezegd, maar ik ben studente aan de Radboud, studente van de master planologie, met focus op Urban and Regional Mobility, is de specialisatie. En ik focusseer me eigenlijk binnen de scriptie op het thema mobiliteitshubs, buurthubs, mobipunten, wahtever the name is. En ik ben stagiair bij &morgen en veel van de graphics die je nu ook ziet, die zijn eigenlijk ook allemaal van &morgen, dus, de opdracht van de scriptie is ook in line met wat &morgen aan het doen is. En het thema zijn buurthubs, daar heb ik een perceptie van, dat ze, ja, de drie thema's mobiliteit, energie en sociale aspecten daarin kunnen gebundeld worden. En aan de rechterkant zie je een verbeelding van wat een buurthub dan kan zijn of kan bedoelen voor een wijk, voor een buurt. Alleen even ter, om het in het stadsbeeld in te brengen. Er zijn volgens &morgen drie verschillende schaalniveaus voor hubs, de stadsrandhubs, waar je eigenlijk de transferfunctie hebt eigenlijk van dingen zoals logistiek, maar ook parkeren. Dus als je dan bij de A28 parkeert en dan een fiets pakt, dan kun je goed naar de binnenstad, zonder dat je met een auto naar de binnenstad moet. Maar hetzelfde geld eigenlijk ook voor de ov-hubs. Dus die kunnen ook een, hebben ook een transferfunctie. En waar ik het over heb in de scriptie zijn de kleinschalige buurthubs, die overal in een stad kunnen zijn, en in de toekomst misschien ook komen. En wat deze eigenlijk bedoelen, en welke aspecten en locaties van zo een hub.

E: Hebben.

At this point, the recording unfortunately stopped. The rest of the interview is typed down from notes and the remembering of the interviewer and is therefore not written in the format of a talk, but in the third person perspective. The answers of the expert are reconstructed as good as possible.

First, the interviewer introduced herself and the Master thesis further, using the same PowerPoint presentation that has been used to explain the topic to the other experts (see Appendix 7). Then the expert was asked to introduce himself.

The expert is expert 11, himself inhabitant of Assendorp, Zwolle. He is working at the university of applied sciences in Windesheim close to Zwolle as Manager Real Estate and Facilities. He explained that in his job there are a lot of different aspects involved and interconnected with each other, especially in the current times of Corona. He elaborated that topics such as real estate and mobility really influence each other and that their relationship needs to be closely monitored to understand what the effects will be. Moreover, the expert is board member of a community initiative called 50 Tinten groen in the neighborhood Assendorp, which tries to turn the neighborhood into a more livable, green place. The initiative does not implement the changes themselves, but they mediate between the different

stakeholders of the process: such as a group of inhabitants who want to apply a specific change, and the city of Zwolle. The expert was asked whether he was directly involved in the organization of the leefstraat projects in the neighborhood. He said that he was not directly involved in this, but he followed the development and was happy about it. For him, the main focus is about small to medium-size projects which are about making the neighborhood greener. One of the projects they are doing now is that several people group together and try to empty a parking spot. They agree not to use this place anymore for parking and they get a green plot for this in exchange. Thus, the organization is trying to support all kinds of wishes of the inhabitants of the neighborhood, that belong into the areas of livability, greenness, but also playing areas for children etc. From his position at the University, he is also interested in the topic of neighborhood hubs, because it touches on the topics of real estate management and mobility.

The first question asked to the expert was: "What do you think is the future of shared vehicles, deelmobiliteit, for the neighborhood Assendorp?"

The expert answered that he does see a future for this in Assendorp, but it will take some time. It is a process, where a change of behavior (gedragsverandering) is needed and that is happening. He gave an example from himself: He did buy a new car four years ago and today he would not do that anymore. Today he would be more inclined to share a car. He thinks that the change of behavior is happening, but today it is still a lot about ownership. Although the inhabitants of Assendorp are very progressive in general, they are focused on new developments and sustainability, they are cautious about the topic of sharing vehicles. They see the advantages of having a car of their own, over which they can fully dispose. It is nice to have the car standing right in front of the door. The distances of course do make a difference. Shared cars are generally a possibility for the neighborhood, but this might at least take the coming next ten years to see major developments. This is not going to happen from today to tomorrow. Advantages of this he sees in more flexibility, but the disadvantage is of course that you cannot just go outside and start your journey with the car of which you know it will always be there. He stressed this point and that people still have issues with the development because of this.

The expert was then asked about his opinion on advantages and disadvantages of electric vehicles for the neighborhood. He did not really answer the question. However, the expert said about electric bicycles that he does not really see the use in electric bicycles for Assendorp, as the distances are so short, that you can easily do them with normal bicycles. But it might be useful to put in place a good combination of electric and normal bicycles, especially for those people who will use bicycles in the future to go further distances. On electric car he did not say anything, but he was positive about the concept of sharing vehicles in general.

The next question asked was in how far the inhabitants would be willing to make use of such a neighborhood hub. Also, the question of what could be done in order to make people make use of it was connected to the first question. The opinion of the expert on this was that the neighborhood hubs would

need to have an added value for the inhabitants; meaning that there is an additional advantage connected with reducing parking places in the streets for example. And he is very positive about transforming the streets; reducing the amount of parking spots in a street, maybe not remove all parking spots, but reduce the verharding, introduce more green into the street, more water. Moreover, he said that it is important for the inhabitants to directly see the advantages it brings to park the car on distance. Also, it is important that the usability is given. With this he meant that you should be able to rely on the shared cars, and that you hear and see from other people that they also rely on this.

In the streets, they organized already that people should park their bikes in nicely made parking recks. Before, they had issues with parked bikes everywhere, because a lot of people do not have a garden, where they could park their bike. An additional benefit is that people have to worry less about the bike being stolen (this last past was proposed by the interviewer and the expert verified it).

The expert said that it is more important in terms of distance to the hubs to have the shared bicycles close by than shared cars, because the inhabitants would otherwise rather use their private bicycle. But shared bicycles could be an advantage for people who do not have a garden. They typically then have to take the bicycle with them into the house or leave it outside on the sidewalk, which can take up a lot of space and can lead to quite some chaos on the street.

Then, the topic of society was started. The expert was asked about which functions should be predominantly connected to the hub. The reply was that a café might not be the first choice everywhere. Moreover, the expert was critical about the size of the hubs in the conceptualization shown to him in the presentation at the beginning of the interview. He said that hubs should be smaller for some sites. It does not add value if you put these sizes of hubs everywhere. This has to do with rentability of the hubs. For a café, you need a certain amount of people that make use of it. If you are talking about maybe 500 people using one of the hubs in the upset used in your conceptualization, they are not rentable. So, it might be useful to make one or two of the bigger ones on the outer edges, to also have an additional place for community activity. However, in the inner areas of the neighborhood, there is no space for it and maybe not even the demand for these sizes. You can then make the smaller versions of hubs there. There is no space for bigger hubs in the inner area of the wijk, if you want such a hub, it has to be more on the edges.

Moreover, the expert talked about the adjustment of the functions of a hub to the age structure (leeftijdsopbouw) of the neighborhood. If there is a lot of older people living there, you need different functions than if it is mainly students or mainly families living there. He connected this again to the rentability of the functions, meaning that functions that are placed there need a certain number of customers, otherwise they are not rentable. And if the “wrong” functions are in place for most of the inhabitants, then these functions will not be used. Concludingly, the expert said that he really believes

in the combination of mobility and social aspects, but they have to be organized the right way, maybe with the bigger mobility and society hubs on the outskirts of the neighborhood, and in the inner areas of the neighborhood there would rather be small spots where shared bicycles can be taken from. He also said that this should be done at strategic points, which are logical and easy to use. An aspect that was very much stressed was that attention should be drawn to what exactly it is that inhabitants of the neighborhood actually need, which functions should be put there.

As a next step, the interviewer asked the expert the following question: “I have heard that there is a strong community feeling in Assendorp, but there is no place for it. Would you say that is true?”. The expert replied to that: “Not completely. The Assendorperplein is a place, where a lot of things are happening. And if something is planned, then it is mostly done there. But an additional place would be nice”.

In the course of the interview, the expert named a place, which earlier did function as a safe home for the elderly, but which is now changed into a community center. He himself would not visit this place.

The place they chose now for the first “hub” is the parking place at the molenhof, it is a place in from of a church and it is now used as a distance parking spot for a part of the area. He thinks that it is not a good place, before it was empty and there could have been better ways to use that place, e.g. more green. A hub could be a possibility for such a place.

About the location of this new hub, that the expert did not like very much, he said, it would be more of an advantage, if the land there was in the hands of the municipality, which it does not seem to be.

Moreover, the expert said that the sharing of cars needs to be organized in a flexible way. Already today, there are quite some people who are sharing cars, but this is mainly happening on a personal level, with private cars being shared by people who know each other. It should be organized more flexible. He can imagine, that in the future, there are still some cars standing in the streets, maybe of those people who really use their cars very often, such as every day. But he for example is someone who uses his car so little that he then goes out of the door and does not know where it is standing, because he is using his car only once a week at maximum. And thus, he would be the perfect person for a hub, and also for sharing a car, because he actually does not need his car that often.

The expert also discussed that he really finds the combination with the energy in the hub concept very interesting. This was explained a bit more to the expert by the interviewer. The interviewer explained for example that she has had interviews about the energy topic with someone from Enexis and the energy person from the municipality Zwolle. Moreover, the interviewer explained that it seems to be a very good vision, but that it seems to be quite complicated because the Dutch system of trafostations is not adjusted to the development, but seems to be on the way towards this. The expert said that he finds this interesting, because it has a lot of potential for warmth-distribution or electricity within the

neighborhood. The hub as a distributer within the neighborhood is a remarkably interesting possibility according to the expert. Maybe the neighborhood could become completely self-sustaining within the course of this development.

MURAL

In the second part of the interview, as in the previous interviews, the expert was first shown the upper part of the MURAL board, with the question: “Which indicators do you find important for the selection of a location for a neighborhood hub?”. The overview of the answers of the expert are visible in the MURAL download. The expert first said that it is very important to know, how many people live in the surrounding area of the hub and whether there is a minimal amount of people that has to live around it to make the hub viable and rentable. It is moreover especially important to have enough support from the inhabitants of the area (draagvlak). There need to be enough people who want to use it. The accessibility of the hub is important; it should be situated in proximity or on main routes through the neighborhood. The distance between the hubs, referring to the map from the beginning presentation, is important. The expert was critical about the density of the hubs. He wondered if there should come hubs at all the proposed spots from the presentation. At this size it would not be rentable. It was explained to the expert that the picture shown to him would be the biggest possible version, and that &morgen has developed different smaller typologies of these houses as well. The expert then elaborated that distances between the hubs really need to be big enough to make the concept work. Further, the expert proposed that it might be useful to do a neighborhood survey (wijkonderzoek) to find out, which functions are in place already and which functions might be lacking and where is demand for this. This he connected to the topic of age structure, which he named before in the interview. In western countries, a major point is the aging (vergrijsing) of communities, which is why there should be certain functions present at these hubs.

Security – during asking people in the wijk, there are several women who live alone, and they do not want to park their car at the distance and then have to walk, for example in the dark, to their homes. So, it also depends on how the route from the hub / parking place Is to the houses. Is it lightened? Is it save? How nice is it to walk this route? The route should not go along dark backyards of the houses, but rather alongside main routes within the area.

The ownership of the location is also very important. It is according to the expert very important that the owner of the land is willing to cooperate towards the hub. The questions then are whether the building or land can be bought from the land owner, or whether there can a deal be made, or which other things could be done in order to convince the owner. Maybe the owner himself has the ideas and shares some visions for these hubs.

Then, the expert was asked to read the list of potential indicators and the definitions for the second part of the MURAL board task. In the end, the ranking that is displayed in the respective PDF came out of the discussion.

The expert did not use his own indicators, but rather chose several from the available list. In the course of the discussion, the expert was not directly sure which indicator he wanted to place where, but in the end he came up with the final ranking. In this, population density is the first and most important indicator according to him. This is the case because of the minimal amount of people that is needed for making the hubs function, as discussed before as well during the interview. Moreover, the demographic factors were included for this indicator as well. Thus, it is important to have a look at which type of people might have which demand for the hub. draagvlak was named as well for the second indicator. This is close to his own list of indicators. Then, the expert combined the indicators availability of the space and ownership of the location for the third indicator. There is a specific demand of space a hub needs, and if there is no space at all for something like this, then the hub cannot be built. Especially in a dense neighborhood as Assendorp, this might be very difficult. And the question of whether the land is owned by the municipality or by private persons, is also of high importance. The expert was also asked whether he would prefer a location if it is in the hands of the municipality. The expert answered that it is of course easier if the municipality is the owner of the land, because with a private person you might always have discussions and problems. On the other hand, if the private person or investor was planning to do something similar anyway, or is willing to support the hub, then it is very good. Then, the expert named the attractiveness, which is of course also connected to safety again, but the expert discussed that it goes into the direction of where people are heading anyway, like, the main routes. The question is whether the route towards the hub is going to be on an already existing route. For this, the definition of the indicator attractiveness of the surrounding and the route was read loud for the expert and it was explained that the focus is on pedestrians, because what is good for pedestrians, is mostly also good for cyclists. On the other hand, car drivers normally think mainly about where to park, instead of the attractiveness of the route etc. As the last indicator, the expert chose proximity to parking pressure. It was shortly explained to the expert, what is exactly meant with this indicator.

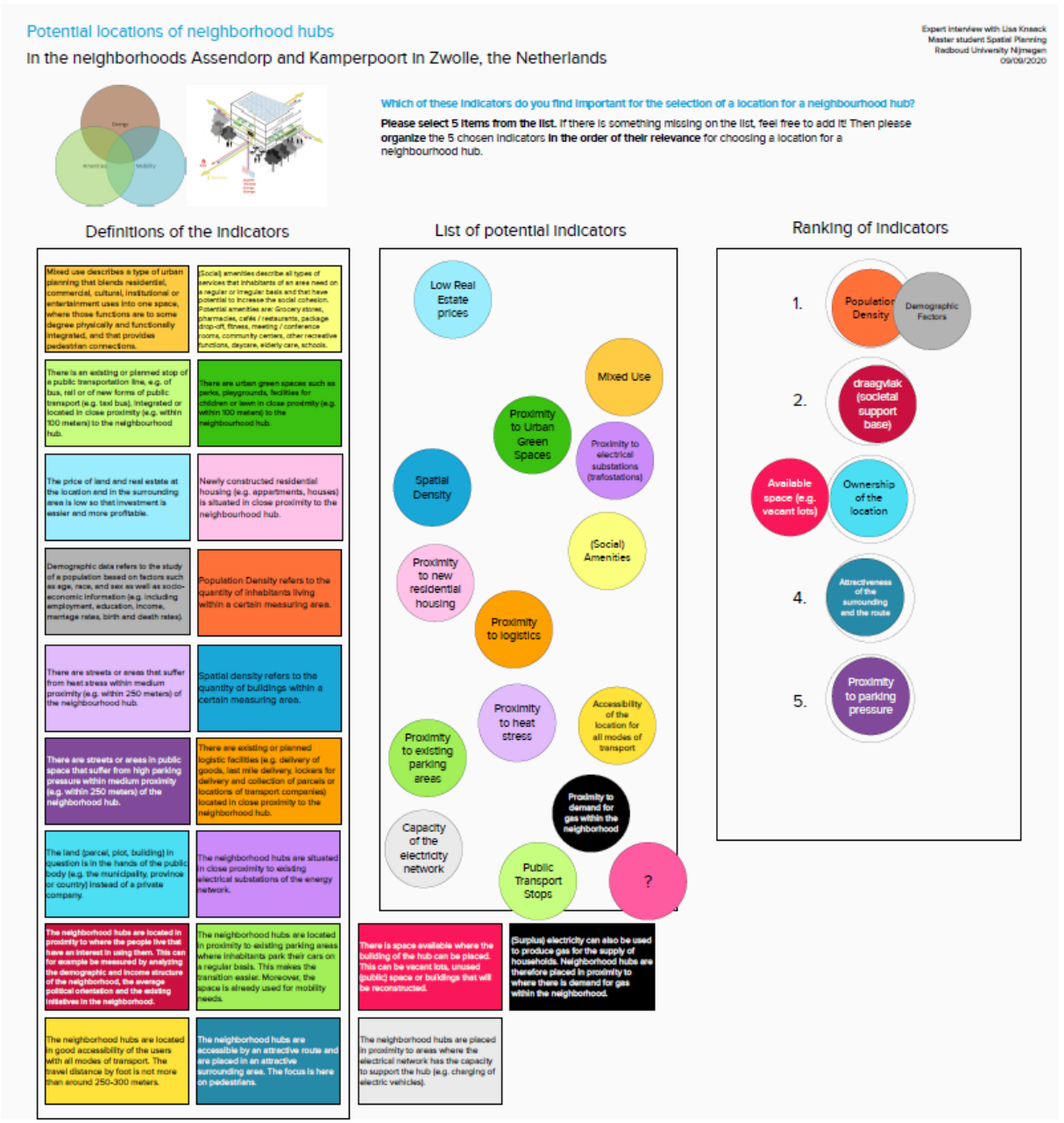
As a conclusion of the second part of the MURAL board task, the expert said that almost all the indicators are important, but that he finally decided for those five in the ranking, because he thinks that these are the most important for it.

After the task was done, the interview continued for a while. The expert said that the interviewer would be welcome to contact him if she had more questions. It was offered to the expert that the final result, the Master thesis, could be send to him, which he replied positively to. Moreover, the interviewer explained, that she will also provide a short report of the main points of the thesis, because that makes it easier to work with the results. Then the interview carried on about the origin of the interest of the interviewer because the expert was interested in it. He asked, why the interviewer does speak Dutch,

and why she chose for the master program. This information was discussed for about five minutes, also referring to the father of the interviewer, who is the reason why the interviewer came in touch with the Netherlands very early and ultimately the reason why she chose to learn Dutch and study in the Netherlands.

The interview was concluded with thanks to the expert.

Appendix 33: Expert Interview MURAL board Expert 11



Appendix 34: Expert Interview Report Expert 12

Interview report

Institution: Radboud University Nijmegen, Nijmegen School of Management

Date: 18.09.2020

Place: Digital meeting

Time: 09.30 am

Duration: 01:06:43 min

Atmosphere

The interview atmosphere was informal and the tone of conversation was friendly and open. The interview was conducted and recorded using the video meeting platform Zoom. Both participants took part in the meeting from home, thus ensuring an undisturbed conversation. The previously agreed time of one hour for the interview was minimally exceeded and the expert was able to answer all questions.

In the course of the interview, there was a short interruption due to a lacking internet connection of the interviewer. This was easily solved and the interview continued afterwards.

Interview process

A short introduction into the topic of the work and the aim of the interview was followed by a discussion about the background of the expert. Afterwards, the prepared open-ended general questions of the interview guide were asked to the expert. In the last part of the interview, the interviewer asked the expert which indicators he / she would find most important for the selection of a neighborhood hub. After these ideas were collected by the interviewer on the MURAL board, the interviewer asked the expert to also open the link to the MURAL board previously send to him/her. The expert was then asked to fulfil the task on the website and discuss about his / her decisions with the interviewer.

Annotations

I: Interviewer
E: Expert

(incomprehensible): The word the expert said was incomprehensible.

(xy): The word the expert said was not completely understandable, but the word that was probably meant is added.

XY: Events during the interview, such as breaks, interruptions or visual events are described.

Expert x: The expert refers to another expert interviewed for this research.

Neglectable expert 1 and 2: These two people are colleagues of some the interviewed experts, who were discussed as further interview partners, but were finally not interviewed for this research.

Colleague 1, 2 and 3: These three people are colleagues of the interviewer at the office where she is doing an internship. Some of the experts have worked together with these colleagues for common projects.

General remark: Filler words were shortened to improve the flow of reading where their shortening had no effect on the content of the statement.

I: But maybe first some introduction. How are you, are you feeling well, are you good for an interview now?

E: Yeah, I feel fine.

I: That is good. And is English okay for you?

E: Yeah, I think. It might be that some terminology I have to think for, but I will manage.

I: Yeah okay, if you have to say some words in Dutch, that is not a problem. I could have also done the interview in Dutch, but then I have to translate it afterwards, which is why of course it is easier to do it in English. Because then I do not have to translate it as the thesis is in English as well. It is less work.

E: Yeah, I understand. You have to do it efficient. No, I understand.

I: That is the point.

E: How far are you in your research?

I: Well, I will elaborate that a bit in the course of the talk, but I first did a literature review of course, some sources and dived into the topic. And now I am doing the expert interviews. And then I am doing a GIS analysis, later. So, you are the last expert I am interviewing. I still have someone who does not have the time to do the interview in person, but who wants to just write the answers, so I am still waiting on the answers for that. But you are the last one I a m talking to. So, I am almost finished with the expert interviews. I still have to write down, type them down, like half of it. And then I have to do the analysis of the expert interviews. So that is also going to be a lot of work still. But out of that I get some starting points for the GIS analysis and that is end of the thesis then.

E: And when is that, when should you finish?

I: My planning was to finish at the end of October. But that is a bit…like, I will try to do that, but I am also an intern at the moment, at &morgen, in Utrecht. So, I also working for them, like, part-time, on projects. So, it is sometimes a bit much to handle.

E: To cope.

I: To cope, because sometimes there is a deadline, and you have to finish that project. And there is, oh, I did another week nothing for the thesis. So that is always a big of a organizational thing. It is probably end of October; I hope at last then to be finished in the middle of November. But the good thing about the Dutch universities, I think that is everywhere, is that you do not get a deadline. So, in Germany, like for my Bachelor, I had it like, you have to say when you start and then you

get a deadline assigned three months later. Like you have to hand it in at that day. Otherwise you fail.

E: Okay, that is a different approach.

I: So it is also because of the Corona situation, that I am very happy that I do not have a deadline, so that I can easily shift also priorities…like next month, we are moving to another apartment, so that I can do first this and then afterwards the thesis, so that is another aspects.

E: Management.

I: Management aspect, that is easier than if you do have deadlines. Very nice. But yeah, maybe I just start. I have a short presentation, that also introduces myself and my thesis a bit. So that is what I always did as a starting point. Because that makes it easier of course. I will share my screen with you. (*There occurred a problem while opening the PowerPoint*). I seem to have some issues with MS teams, like, I do not know why but Zoom for example is working perfectly and this program is sometimes having issues…

E: I see it.

I: That is good. So, as I said, I am currently intern at &morgen but I am actually also master student at the Radboud, of the Master spatial planning with the focus in Urban and Regional Mobility. And my focus in my master thesis is the topic of neighborhood hubs. Or the Dutch buurthubs. That is what Zwolle and &morgen call them. And in my research, I define neighborhood hubs as centralized places in a neighborhood where different functions can be combined, so the energy, the mobility and the social aspects of this can be combined at this hub. and there is a conceptualization on the right-hand side, you see already, so there can be a lot of aspects connected to it. And I will elaborate a bit further on that in the flow of this presentation. You might have seen some of the slides already because I think Willem also said that you were at one of the workshops? So, this is a map of Zwolle, where &morgen, also Zwolle themselves, define three scale levels of hubs that are present, or can be present in the future in the city. And there are the city edge hubs, which can be logistical centers at the outer edges of the city, where you for example transfer bigger units, like big trucks, to maybe bicycles for example, so that you have not so much of pressure in the city. Then there are the public transport hubs, they are very typical as the main station of Zwolle where you transfer from train to walking, cycling, but even to the car. And then there is the buurthubs, the neighborhood hubs, which can be everywhere in the city and have a very small areas they are focused on, but they can provide a sort of first and last mile service in terms of mobility. And then there is these conceptualizations &morgen worked out, so there is the city edge hub, where the scale is of course different and the big transport hub, you see the trains go in and the person on a bike comes out. So that is basically the idea of hubs. And the neighborhood hub,

the buurthub, is a big of a different conceptualization, but it still has some aspects of this. So it is still a centralized spot, and in the conceptualization of &morgen, and also the one that Zwolle now uses, which is also the one that is am using for my thesis as well, there is these different aspects connected to it. So, first of all, of course the mobility function, mobility in terms of shared mobility, also shared electric vehicles, which are situated at this hub and then can for example also be charged at the hub. and might as well be charged using sustainably generated energy. You see the solar panels on the roof. So that is one idea. Then there is of course the societal aspects, that is what I call them now, so amenities, a daycare, a café, a parcel delivery. So, all kinds of things that specific part of the neighborhood might be lacking at the moment, that could be situated at the hub, so that you can easily combine things, when you go there. And then also with charging the idea is to store energy at the hub. maybe in vehicles, so in the batteries of the vehicles. And &morgen also connected the topic of geothermal heat production to the topic of neighborhood hubs. That is not so much of my focus in the thesis, so I am more on the energy side but not on the heat side. But it is still a part of the conceptualization, which is why I did take that into my picture here. And what I do, is I am trying to find a methodology for finding suitable locations for these hubs. So, where should we put them? Where do they have the most value? Where would the be used the most? As I said, I am doing that with a lot of literature review, where I derive potential indicators. Now I am doing the expert interviews, where we talk about first some general aspects and then about these indicators. I then get a ranking out if the expert interviews of the indicators and these indicators will then be tested in the city of Zwolle in two neighborhoods Kamperpoort and Assendorp, to find out, if you apply these specific indicators, which spots come out if the analysis in the end? And this is a picture that &morgen also made from a place in Assendorp, so that is before, and this is how it could look afterwards, if you include a hub there. Of course, it is just a vision, but it is easier to understand the idea. I mean, I guess you have an idea already, but I think it is easier to explain what I am talking about if I use some pictures. And the outline of the interview is now that I would like to ask you as a next step to introduce yourself in short and then I have these general questions and then we can go to another… I have sent you a link yesterday evening and we can then go to that platform called MURAL, but that will be later in the talk. So first, I would like to ask you to introduce yourself in short, a few sentences.

E: Yeah, I will try. My name is Expert 12, I work as manager innovation for the company VolkerWessel iCity, not ICT. And iCity is responsible for developing smart cities, smart regions within cities. And we do it, by doing, also by giving advice to municipalities, also as project developers, area developers. How to integrate themes such as mobility, energy and connectivity. And in Stripe S, we have a test lab, where we test all sorts of products and solutions, which we think should fit in the smart city approach. So that is related to sharing, bikes, cars, but also to store energy, to use it in different ways, different time frames. And we are really looking for which technology does work; how do we cope with rules and regulations. What do you have to adjust? Based on our

learning, we advise municipalities, but also, what makes us different I think, we also do it. So, we implement it and then we see, it does work indeed or maybe we should shift a bit, or adjust it in a way, and that is really, yeah, what we do. So, from having our test bed, and we still keep, we use it, we keep on developing new technologies, new services, and the good thing in stripe S is, it is a district, so it is not a real city…well of course it is part of a bigger city, but within this district you have different typologies of people who live there, work there, they go for a big event or theatre or, so it is…it has the ingredients of a small city. So that is why we think it is a very good test bed, and you see that a lot of municipalities but also project developers find us and ask us, okay, how do you do that and please help us out. So that is what we do.

I: So the services you provide, is it more in terms of just to have an understanding, is it more in terms of an app, a smartphone app, or is it more in terms of you search for…or do you provide shared cars, or do you search for a company who does that then?

E: It can be both. For Stripe S, the region, we have the philosophy to improve, the vision is that we want to improve quality of life. And this whole district is being redeveloped by VolkerWessels, the construction company and the municipality. And we think we also involved community, what is for you a good quality of life, so what should we adjust? Based on preferences and our own vision, we implement new services, and some services we are provided via service providers, but some services, for example data connection, it is something VolkerWessels is very good at, I might say, to manage it, so that is something that we as VolkerWessels company do. But the cars for example, the shared cars, it is via a provider. Because Stripe S in itself is too small to set up a real own carsharing solution.

I: Of course, yeah.

E: But we collect data from that provider, see okay, does it function, which type of people use it, why do they use it, how do they do it, how do you get more people using it…yeah.

I: Yeah cool, okay. So maybe we can already start with that, you gave me a good starting point already. You are collecting the data about it because that is I think an important point, how do you get people to use it. That is also what I feel with the people I talked already to, with Zwolle, a lot of them are enthusiastic about it, like about the neighborhood hubs, but how do you get people to use it. And yeah, the question then would be, which type of people use shared cars for example? In your experience?

E: Yeah, so there is a lot of research done on it, but what you see on Stripe, there is one big building, which has over 150 small companies, startups, some scale ups, and you see that the companies are quite new, and the employees use it, and that is also what we looked for. So we looked at who is present, so we knew who the group was and we searched for okay, which car provider, which car

solution does fit best for them? Because we have Greenwheels, free2Go, but the people did not use it. And we used another approach to implement Amber, Amber mobility, and when…so what we see, but it is also, we did test it in a way…in the building we have a community manager…yeah, maybe I go too far in detail, but it is a building of several floors, and on each floor there is a representative, a company, who represents the rest of the floor, so to say. And they have a meeting each month or so. So, we went to the meeting and asked, what does carsharing mean for you? How should it work? First thought was, okay, we are going to do additional interviews, but we thought also yeah, but then people are going to give the social answer instead of the real answer, so we changed it and again we did it, so again we started with two or three days in the morning or during the lunch, we rolled out the orange carpet, to the people, the cars were there, electric cars, and they were a bit fancy, so BMW I3, nice colors, and people, they were invited by the providers, yeah, please hop in and do you want to have a test drive, let us say. And people really, it took away the barrier to step in the car later on. That is also the feedback which we got. By really approaching the customer, knowing what they want, and addressing their problems, or maybe their constraints, they stepped in. So, we had a real exponential growth of users with that specific provider. So, in that sense it was really, we really focused on, who are sitting there, who are living there, who are working there, and which solution might fit best for them. And there we find a specific service provider for and now we see that this service provider…because at that time, they were only hub to hub. and now they are, since a week or two, free-floating, but also for consumers to use the cars. So, it is also being evolved within the (incomprehensible).

I: Would you say that free-floating is preferable above hub to hub systems?

E: No, it depends on users, I think. For example if you have a hub at a nearer station, a railway station and also at a big campus site, then hub to hub would be good to a lot of people and then it could be good for students, but also for employees, but maybe in a way, to the consumers or the residents. But it is related to location and target groups, I think.

I: Yeah, okay. Yeah, because that is also a big topic in terms of, if you talk about, also sharing bicycles, sharing scooters, should they be free-floating or should they be concentrated on specific places? I think the science is also not as far as one would wish in terms of which system is the best and fits the best for which user groups.

E: Yeah, I think it is a mix. But what I see, if you have hub to hub, so not free-floating, then the control, so to say, is better organized. You see a lot of citizens, they have a problem with free-floating, because the bikes are everywhere, and it is up to the provider to pick them up and to change it. In some cases, some places they do it quite well, but others they struggle, or they go bankrupt, and then you have a problem.

I: Yeah okay. We talked about user groups, so where do you see, also in a city such as Zwolle, which is of course in a development, but still, it is not Utrecht, it is not Amsterdam of course, they have a lot of families as well, also in these neighborhoods I am focusing on. Where do you see the future of shared cars, shared vehicles in general in these neighborhoods? Do you think there is, in a time span of the next ten years, for example? Do these groups start to use it?

E: Yeah, I think, it can be the case, but so, we see different, you have two different typologies I think, so already…for Zwolle it is already settled, so to say. And then it is quite, it takes quite a time to convince people to build up a community, because people have to get a feeling, okay, we are part of a community, we are part of a bigger picture so to say. And if you, and with VolkerWessel we also do a lot of new constructions, for development also, then it is a bit more easy to start with community building. So that is also what we advise to our project developers. Even if you are starting with construction, you can start with a small hub, maybe with, it can be for your own employees for example. But to see it, to start building a community. And in a current location such as Zwolle, you have to look for, are there already initiatives from communities, then it is quite easy I think to start. But if you really have to start within a district or region or within a small part of the city which people do not know each other for example, a shared car, a shared bike concept might not…it will take time for people to use it. And also, the Dutch they have a lot, they all have their own bikes so to say, shared bike does not fit for them, probably.

I: So, you see more the future in shared cars then? So that you reduce private cars, in the streets?

E: Yeah, in those regions I think, yeah. So, if you look at Stripe for example, there are a lot of experts who work for ASML for example, they live there, so they do not, of course they do not have their own bike, they do not bring their bike from where they come from. So, there, a hub with bikes, it is a good solution. So, it really depends on who lives there, do they have their own bike, are they willing to share or not. Because you can…you also have your different car sharing solutions, okay, you can share your own car, or you can use a provider for it. And I think that in some local sites, also even in Zwolle, even, it might be more easy to share your own car than to get a good business case for a new car sharing provider.

I: Yeah, I think they have some shared cars in Zwolle right now, but only a really small number. So from a provider. I think there is also people sharing like private cars. But of course, that is not as far as in a lot of other places.

E: No, so you really have to, we call it the customer journey, also on Stripe, you have to think, okay, if somebody goes from their house to their work, where does the majority go to? Because that is something you have to focus on, I think, to get the best solution that fits the most of them at least.

I: You also touched upon the topic if there is social, like if there is a bit of a community feeling already, it is easier to implement such an idea, such a hub. what do you think does the hub bring in terms of community as well? So, what can the hub give back to the community? Does it have potentials, or are there, or do you not see any positive side effects the hubs can have on the community?

E: No, I really think it is a social point, it should be. Else it is not a hub, then it is a parking garage. If you want to make it a hub, different functions should intervene, so that you get a mix. And that would be very useful, but knowing Zwolle, then the locations which, in which you can create such a combined space, hub, it might be a challenge, I think. But I think it really can add value. But that is also why we think, when you start with developing, redeveloping, designing, thinking of what you have to look for, how can we start very early with the low hanging fruit, maybe one or two bikes, if people get enthusiastic about it, you get it spinning, I do not know what is the right term, the accelerator. To start.

I: And what do you think would be the first functions that you should include? Or you could include at such a place? Like if you first have the bike and then upscaling what is the next thing?

E: Yeah, it really depends on the location, so to say. I cannot give a…because if you already have a parking garage, you can skip some parking places and build in a daycare center. But maybe ten meters next to the parking garage is already a daycare center. Maybe you should challenge a bakery, or a pickup point, or…so it really depends on the location, on what to incorporate first, I think.

I: Yeah, okay. Do you think it is useful to put hubs where there is already other functions? Like if you have a neighborhood and then there is areas where there is only residential use and then there is areas where there is already functions like a bakery, a daycare. Do you think it is more useful to put a hub there, or somewhere else in the residential area?

E: I think a hub should not be a goal in itself. It should have added value for the region. So if there is a parking problem, how can you solve the parking problem? A hub might be the solution, but maybe better public transport also does the, solve as a solution. So, sorry I do not have that much of a specific answer. Yeah it is really depending on the location, on what is present, and also indeed, are the people, is it only residential, then you have to look, okay, what do the people, what is their daily routine, for example. Indeed, do they all use the car to bring children to the daycare at first, then a hub might be a good solution where you combine parking the bike, people can use the stroller to walk five minutes to the daycare, pick up a shared bike and they can continue their ride. But it really depends on the typology. And if you have a mixed area, yeah, mixed functions will be probably more easy to combine in a hub.

I: There was also the idea, and I have gotten quite some different reactions on that, the idea to use the existing electricity net substations, so the trafostations, as a starting point for the hubs. So the idea was to, okay, because we want to connect it to the network, because we need to charge the electric vehicles, why do we not put them where the trafos are already? What is your opinion on that?

E: It could work, I think, but again, yeah, then you, I think you approach the wrong side. You have to look where is a problem? And if you put it next to a trafo, it could already create a problem for the trafo or the hub. so, if you have some, a trafohouse which has a lot of capacity to expand, then it might be good to build something next to it. But what I also believe in is, because you also do not have a fuel station in every backyard, so charging your car, if you have a fossil car, you also have to plan when you, or you have to fill up your gas. So, because I think that it is a Utopia to think that every, you are able to charge your car on every time without trouble for every car. Then the DSO, so Enexis, the power…

I: Operator?

E: Yeah, not operator, the owner.

I: The owner, yeah.

E: Then they have an even bigger challenge than they already have. So, it is related to if there is capacity and there is the necessity to create additional parking space and yeah, it could be a good one, but if not, then you might also think about what you showed in your presentation, to store energy. And to challenge people to…or even not allow people to charge their car in a specific time during the day. Because it is needed for other systems.

I: Yeah, connected to this is I think also the topic Vehicle to Grid. I think you might be able to tell me a bit more about the…I think it is a very good concept, but about the real…how realistic it is in the next ten years or something. Because I did not really get a feeling of how soon we can expect it to work in a wider scale?

E: Yeah. So, I think in a technological way, it can be, it is already there. So, that is not the case, it is more about regulations, laws, how do you call it, uitsprakelijkheid, the liability, who is responsible, for example if you put power from the grid to your car and you blow up the car? Or the battery for example, who is responsible? Is it the charging point operator, is it the grid operator, is it the car? So, it is more, I think there are the problems, because also if you look at the whole stakeholder field of the charging stations. There are a lot of stakeholders. And manage that, it is more complex than to technically implement it. But if you have your…if you have your own house, you have your own parking spot next to the house, and you can have solar panels on the roofs, maybe you have a battery. Then Vehicle to Grid can be a good solution. And I think there it will arise more early, Tesla already has all the ingredients, they have the car, they have the battery for your home,

the pv on your roof. So the step to that side, to that specific type of houses, that will happen within two, three, maybe four years. But to really implement that in cities, where you have to park in a parking garage, who owns the parking garage, how will you install the charging station, who is responsible for the charging station? Yeah, it is more about stakeholder management than about technology.

I: Yeah okay. But the first scenario with the micro system, with the car, the battery, the solar panels, this is again what you do not want in spatial planning terms, I think, because then everybody has their, everybody has to have a charging station in or in front of their house, right? And that is what you do not want in terms of network capacity?

E: No, in a way you do not, I think. But if you are able to charge your car with a low current during the night, and because then…and you can store your energy during the day for that, then it should not be a problem. It should not be the case that everybody, if they try to create their own grid, they still use the same capacity from the grid which they are on right now.

I: Yeah because I think someone told me that if two people on the same street are charging their cars right now on the normal electricity system, then that is the capacity you have for the whole street? They are using it up? But this of course is a different system then.

E: Yeah, if you, so then the house is the grid, so to say. If you are able to manage it in your own, you are autarch, so you can cut your power cables, so to say, then it should work, or could work. But also there, yeah, there also a lot of subsidies, financial impulses to create PV systems. But you cannot all connect it right now to the grid. Because it is quite, it does not have enough capacity.

I: Okay. I just have to check for my other questions. Yeah, in terms of charging rates, you already said that a low charging rate at the night for this type of smaller system. If we are talking about the hubs, of course that also depends on the people and the situation. But do you think…oh! (*There is a problem with the video connection. The interviewer stopped the video conversation and entered it anew.*) Hello again!

E: Yeah?

I: The internet was gone, shortly, like for a few seconds, it seems. I am sorry.

E: No problem.

I: Yeah, I was already through with asking the question, when I realized the internet was gone, so…

E: I did not hear anything of it, so...

I: Yeah, I wanted to ask you, you said in terms of charging, in the microsystem you could use very low charging rates. But there are also fast charging and super fast charging which is also being developed still, I think. But would these be the rates you would want to have at a hub? Or should you provide all different types of charging rates, or what do you think?

E: I would say, different types. So, you have a…if you look at Stripe for example, we did a few tests, so there were charging stations…because, let us see how to put it…So, we have charging stations and what we see is that some EV users, they come around 9 o'clock in the morning, so they come to the company and they plug in the power and then they start charging. And after maybe an hour or two, almost all cars are, they almost all started at the same time with charging, they all at the same time are ready. So we did a test with Interflex, and there was the challenge, or not a challenge, that if people would use the flexibility of the grid, or their cars, they would say, I am here until 4 o'clock in the afternoon for example, then they would look in the peaks of the power grid, when is the best solution to charge your car? Because then you can charge at the moment when the prices are lower for example, and the financial benefit goes back to the people who charge their car. And there were quite some, quite a few users, who used it in a good way, so you are able to shift. So, also there, you have different…yeah, I think, you should have…on some hubs, you need different charging capacities. Because if you have a, maybe, I do not know, a barber shop for example, or a doctor, then you know people will be there for only a short time. It could be that they need…

I: A higher charging rate.

E: Yeah, fast charging. Yeah, but again, also when you use your fossil car, you know you have to drive to a gas station. So, if you really need to charge your car very fast, then maybe one hub could be a hub full with fast chargers, but then you should look at, okay, who is interested in using it in that site or location,

I: I think it is interesting to let people decide on that on their own, like, with the Interflex thing you said. So it was really, that they could decide on the time the car would charge then themselves?

E: No, not the consumer. So the aggregator, so Jetlegs. They looked for okay what is the price planning for the next couple of hours, and based on that, then they would start charging the cars on the most financial interesting moment. Because that is why the prices of the energy grid are related to the capacity which is still available or not.

I: Yeah also the prices go up I think in the evening, because everybody is turning on their lights, and starting cooking, that is also in the future, what I have heard from people…

E: Yeah, but it is real, like stock exchange, about price and volume. You have to look up the APAX, A, P, A, X. so that is the, there you see the prices. Maybe I share my screen…

I: I might have to allow you that…

E: Let us see… for example here you see the different prices just for today, this is yesterday, so this is the peak yesterday. The highest price was 8 cent per kWh, the cheapest was 3. So, it is quite a big difference. Especially if you charge your car, because there you use quite some kWhs. But there are also times, and that is what we, as VolkerWessel, are going to…this is what we really find interesting, this train, so to say. To facilitate it. We do not want to be the energy trader, or at least not yet. But there are moments in time, especially in the weekends for example, when you even get paid to use power.

I: Because otherwise it is, because there is too much power in the system at that moment.

E: Yeah. Exactly. And that is what…it is always related to this market.

I: Very interesting mechanism, yeah. Okay, in terms of time, I would also now go to the task. Do not open the link yet, first I have to, I will first show you the…oh, that is interesting…so, I first have, do you see that now?

E: Yeah.

I: Okay, so the task I have for you is in two parts. Maybe the first part we already did a bit but maybe we can collect the things very fast. So, in the second part which you see here already, you can then open the link and we discuss the indicators I have from the literature and what other experts said. But first, without the influence of that, I would like you to just brainstorm some things that you think are important for selecting a location of a neighborhood hub. And I will write that down.

E: Yes, I think the necessity. So, problems or not. Is there a demand? The local circumstances. So, who is living there, which companies are present, which retailers are present or not. Yeah, so the persona, are they students, are they elderly…yeah, space. How do you call it?

I: Available space?

E: Yeah, availability, space, yeah. Available infrastructure. So, are there, is there public transport or not, is there water, is there a rail station close by?

I: Mhm.

E: Ownership of the potential location but also in the surroundings. Is it all owned by individual consumers or are there big investors?

I: And what do you think is better for the hub?

E: No, I do not think it is better, but based on who is present you might use a different approach, a different philosophy. Because if you have an investor, if you build a parking garage for example, that might conflict their interest, if they have other parking spaces already.

I: Yeah, of course. but of course, if you have one big investor, it is easier maybe to talk to that person?

E: Yeah, exactly. Or is it owned by the municipality and they have a social ambition to do it?

I: Okay. Totally fine if that are your ideas, because some of them are also reflected in the indicators on the list I have already. If you want, you can now open the link that I have send you. Then you should be able to end up at this place I am now also working on. If that is not working, for some reason I can just keep on sharing the screen. You…

E: Log in, enter as a visitor?

I: Enter as a visitor, because then you do not have to sign up or anything.

E: Yeah. I am in.

I: Yeah, I see your mouse. And I have now moved the things you said to the lower part of the diagram thing I have created here. And what I did here, is actually just collect aspects that literature, I got from literature, so on the topic also on TOD, Transit Oriented Development, but also from the other experts, so what the other experts said on the topic. And the list grew with the expert interviews. So, in the beginning, I only had seven, eight indicators. And the task is now to choose from the whole list, but also from your own things, some of them might overlap, so for example the ownership is as well here, on the list already. Choose five of these indicators and rank them in the order of their importance for choosing a location. And I have also included some definitions, what the literature meant with this indicator, but also what the expert that named this indicator meant with it. So, you can now have a look at the list and you do not need to read all definitions, but they are there for clarifying what exactly is meant with the indicator.

E: But I already have to rank them from one to five, right?

I: You can also just move ones to the side, you think are important, and then later rank them. So if you say, okay, I know that this is important, but I do not know which place to give it, you can also put it here for now, so that you know it is on the side. But…you can do that however you want, just in the end the goal is to have five selected and then discuss why you selected those five as well.

The expert works on the list.

E: Yeah, I have some doubts about the indicators, but okay. Those I might…yeah…

I: Why do you feel doubts?

E: Yeah well, maybe a general mark, now for me it feels like, creating a hub is a goal in itself. I do not think that is the way to approach it. So that is why, so there needs to be, we need to improve the quality of the region, you want to improve the quality of the region. But that, so that is something that…if there is no necessity, and that is why I used it, then why should you even start…

I: Of course, yeah. Yeah, I totally understand what you mean. It might…it might look like that. I think, so where the idea as well came from is that we discussed, okay, hubs can have potentials, and they can only be useful if they are situated at the right places for the people there and you know, connect all aspects that are needed there, maybe. So that is why I said, okay, let us try to find out which aspects are important for selecting a location. But of course, the most important point is that there is people who want it. If there is nobody using it, after you have invested in it, after you have built it, that is a waste of money, so of course the most important point is that people want to use it, yeah.

E: Yeah, so and then you look, ready to that then it should be, so the people, at first, so that is why I used the demographic, and also public, population density, so that is why I used the, I think it should be on top. But I cannot do anything anymore, I see? I cannot move them, right?

I: What? You cannot…? Why is it? Oh, strange!

E: It is blocked.

I: It is blocked. Why is it blocked? That is strange.

E: Also for you?

I: Yeah, I cannot move it. Yeah, so the rest, the box is blocked for example, so that it is not moving without you wanting it to. But…

E: Yeah, oh, okay. But I cannot move it out of the box anymore.

I: Yeah, like, if it is on the edge of the box, you can still grab it, but…yeah, that is strange, that never happened before. Still learning new things with this platform.

E: So, I say, number one is okay, then demographic factors…yeah population density might…yeah. Might be. New residential? I think that is also related to community building.

I: Yeah, that is also what you have discussed, like if you are building a new, rebuilding an area, that is easier to already include a hub there also in the discussion also with the people who want to live there.

E: Yeah, and also, I think, draagvlak. So, the societal support. I think it is related to the people who live there. So, it is not, it is important, but I think it is a part of the people who live there. So that is

why…yeah. I think, on forehand, you cannot say there is a good support base on location x, y, z. you have to really look, who is living there…okay. Parking pressure it is more or less the creator of the necessity, I think. So that is also an important indicator. And in that matter, if there is no space, you cannot do anything. But, or you have to transform buildings. Yeah maybe this is what I…I would see it like this. If it is allowed in this way?

I: Yeah of course. of course. yeah, I think one of the, the person who introduced the draagvlak, also said that you should, or you might measure draagvlak in terms of demographic factors. So that specific groups might be more willing to support or might be more willing to use it than other groups, yeah. Yeah of course it is allowed to do it this way. And yeah, the accessibility of course is because of, if you build a hub, it should be accessible for everyone.

E: Yeah, but also, I think it is, you, if you look for, in the, within the city, it should be in a way multifunctional. And that can be related to the services you provide or the transport modes. If you build a hub for an office location for example, then it needs to be much more multifunctional, sorry, monofunctional than multifunctional.

I: So that also depends on…

E: Yeah, different people. Some people they hate the public transport, others they hate the bike. Others do not want to sit in a shared car with somebody else. So that is a different way to get from A to B, because it also depends on traffic for example, which solution you want, that is important I think.

I: Okay, perfect. So, we did this task. And just to explain that. I said I will get to a ranking, with the expert interviews. So now you did a ranking of five and I think I have 12 experts in total. And this I will now go through and check what everybody said about the indicators, and then the end result will be as well a ranking of the five most important aspects. Like, from everybody. And these five I will then try to measure in a GIS analysis. So, for example for the accessibility, there is a tool called network analyst in GIS, which you can use to basically have a look at how far you get from a certain point into every direction, 250 meters for example. But there is also tools where you can connect for example the population points, like the population density, with other functions. So, I will try to get that into the picture. And the idea is to have in the end a map, where you see, like, for example, red, green and yellow, so areas which are very good, potentially okay and not so good for a hub. and that is basically, hopefully the end result of the thesis. So that was also the end of my questions and of the expert interview part and also, we reached the end of the time. So, I do not want to take much more of your time. I can offer you to send you the thesis when I am done. Because I think it might be interesting for you to see what the end result is.

E: Yeah! Please do!

I: And yeah, thank you for taking the time. I hope it was interesting as well for you.

E: Yeah for sure. It was good to see…Yeah maybe a tip from my side, I do not know, maybe, yesterday, there was a hub congress.

I: Okay.

E: Online, with all, I do not know, maybe 20, 30 speakers. I can, so it is, I can put it in the chat I think. And so all those sessions were recorded, and you are able to download them later on I think. So it is a bit about hub people. In my opinion, it is a lot of visioning. There should be hubs, and they are the best thing to do, but yeah…they use very great artist impressions, but it is not done anywhere. So that is a bit my…But there are some specific topics that are also related to the energy, which might be interesting for you. The combination of mobility and energy.

I: Did you put that into the chat already?

E: Yeah, on the…

I: Oh, yeah I see. Perfect, thank you. Yeah, I think the only place where it is implemented in a way until now, there is the provinces of Groningen and Drenthe. They have sort of a mobipunt project thing, where they have these hubs. But I am not sure, like, I did not visit all of them yet, like a saw some picture, but I think it is more of a vision still. Like, some already have an icon and a bus stop maybe, but that is it, I think.

E: No, but also there I put in another link, so that is called ByMoves. Because I am also active in Zwolle and we are going to start with small mobipunten, or we call them Movespots, in Zwolle. They will be built the coming few weeks. And there will be shared cars, shared bikes, charging…and it is only again to start with low, to get people enthusiastic about the car sharing solution. To see it growing, to see how many people will change their behavior. And step by step.

I: And this area in Zwolle, did you choose it because it is close to the station?

E: Yeah, so with the whole, this whole area is going to be redeveloped. It is called Spoorzoneontwikkeling. It will take then next ten to fifteen years. So, and in that, in the district, we looked at okay, what is already there, so one location will be on Windesheim Campus, where there are a lot of students. But what we try to do is that the teachers, who go out maybe once a day for visiting a student outside the campus, to provide them with carsharing, shared cars. But normally they would come by car, they live in Zwolle, they come by car, only they have to do one visit. That is strange, because they better should use their bikes for that. So based on location, we decided, or based on stakeholders, we decided where the location should be.

I: Okay, interesting. Yeah, I will have a look at this. Very cool. Okay.

E: Yeah, good luck for you.

I: Thank you! And thanks again for taking the time to talk to me.

E: Yeah and apologies that it was with delay.

I: Oh, no worries! I think the first appointment, I tried to make you were on holidays, I hope you had nice holidays!

E: Yes, I did.

I: So, it is really not a problem, I just forgot to, like, because I had the other expert interviews, I was like, oh, I have to get back and ask for another meeting. But no problem at all, we managed to do it very on time, so everything fine.

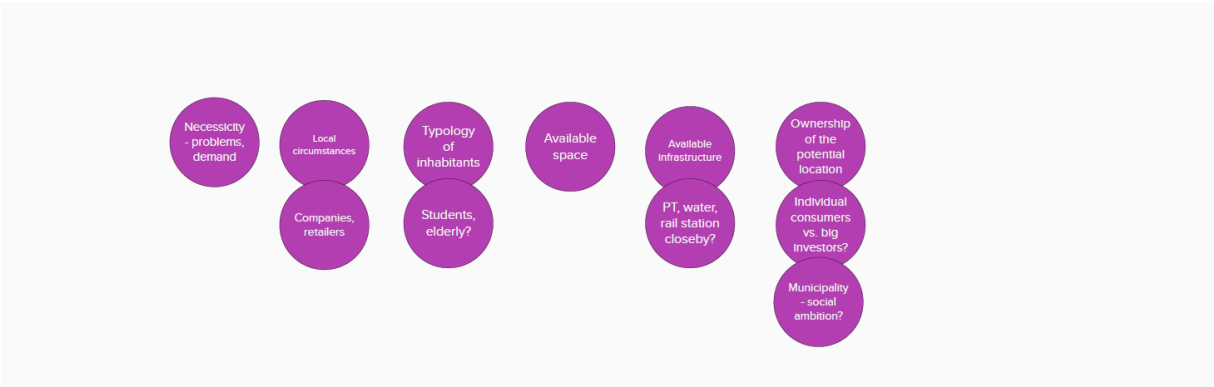
E: Okay, all the best to you then and yeah, when you are finished, we are glad to receive your vision and report.

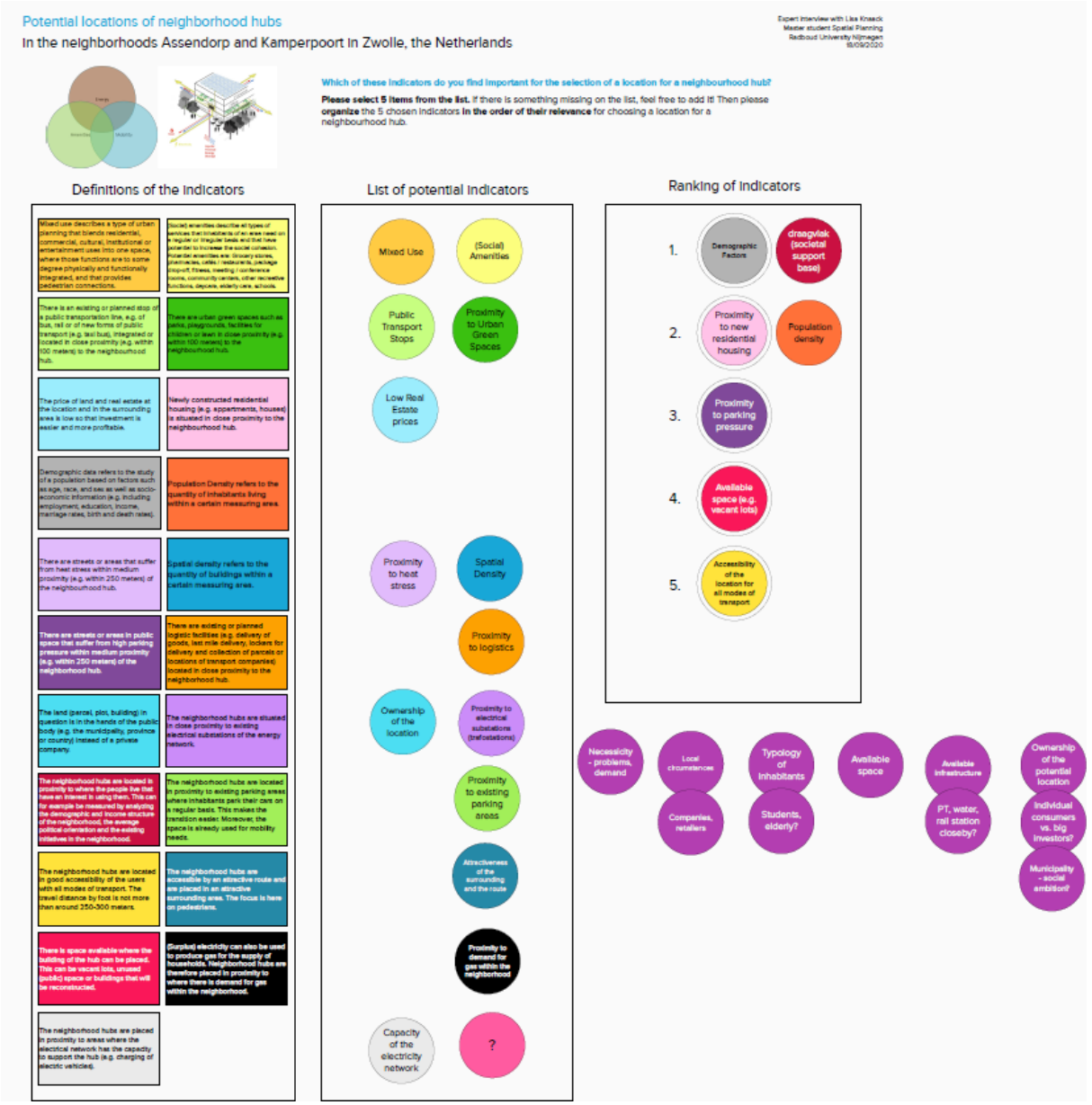
I: Yes. Okay, have a nice day.

E: For you the same, bye.

I: Bye, bye.

Appendix 35: Expert Interview MURAL board Expert 12





Appendix 36: Expert Interview Adjustment Log

22.07.2020:

- Interview with expert 1 (Else Veldman)
- No additional indicators added

14.08.2020:

- Interview with expert 2 (Syb Tjepkema)
- Additional indicators: proximity to parking pressure, proximity to logistics
- Addition to definition of public transport stops and proximity to UGS

18.08.2020:

I have now decided to apply two changes in the second part of the interviews:

1. The experts are shown the list of potential indicators, derived from the literature review as planned, and those additional indicators that previous experts have added.
2. The experts are asked which aspects they would find important for selecting a location before any indicators derived from literature are shown to them. This is done by adding a second, blank page to the MURAL board and writing down those indicators listed by the expert for this question. Afterwards, these indicators are moved to the second page of the board, where the expert is asked to look at the other indicators offered to him/her, decide which ones of all indicators are the 5 most important ones and to rank them in the order of their relevance.

The benefits of both additions are:

1. Thereby, a fuller picture of indicators can be achieved. Experts are confronted with indicators they didn't think about themselves and can evaluate whether they think these are important.
2. It should reduce the bias from the opinion of other experts. Thereby, the opinion of the expert in question is derived before any other influence has happened from the side of the interview.

Issues, because I changed the methodology although 2 expert interviews have been conducted already:

1. Should be no problem, as the first expert only selected indicators from the existing list. The second one added indicators, and the third one, which will be interviewed soon, can then be shown the additional indicators added by expert 2.
2. It is a little bit of a bias, that I changed the method, as I did not ask expert 1 and 2 the question. However, it should not be such a problem, as both experts saw the same list of indicators, which was derived from literature. This list was unbiased still from opinions of other experts. The only bias happening here is then that the first two experts might have been biased by the list of indicators shown to them and their "pure" opinion was not asked before. However, as long as I don't conduct inductive research in its pure form, there is always something forming the bottom line from where I start. And, the list of indicators is based on the literature review, which means that the first two experts are at least biased by scientifically proven aspects.

Adding other parts of the Delphi method would not have added value:

- It is not aimed for consensus in the typical sense of Delphi, but for different opinions of which the mean value will be the decisive factor for further analyses. The chronological order of the interviews makes it difficult to confront the experts with the rankings of the other experts after their own ranking has been established (which would have been the easiest way of applying Delphi here). Moreover, as two expert interviews have been conducted already, a major change is not good, as it would cause more bias. This is, besides the chronology argument, the most important argument against confronting the experts with the ranking of the other experts after they have established their own ranking.
- This could only take place as a second round (in whatever form) after all expert interviews have been completed. However, the time required for this is too much compared to the relatively small added value of reaching consensus, which will be substituted by determining the median of the rankings.

19.08.2020:

- Interview with expert 3 (Jeroen van Doorne)
- In the first task, where the expert is supposed to name indicators without seeing those proposed by literature and other experts, the expert named the following ones: accessibility by all modes, accessibility from the main roads (important for the car), situated outside of the neigborhood, close to electricity network
- However, the expert did not use these indicators for the ranking; therefore, they are not included in the ranking for the upcoming experts.

20.08.2020:

- Interview with expert 4 (Arjan Broer)
- In the first task, the expert named the following indicators: Owner of the land (municipality preferred), Accessibility for all modes of transport (connected to this are: Routes that go there, Attractiveness of the route (e.g. green, no heatstress), Lighting in the evening, Safety (feeling safe)), Huidige infrastructuur (connected to this are: Electricity line should be there), Amenities close to it.
- In the second task, the expert added some additional aspects: Consciousness of necessity (of the hubs), Attractiveness of the hub itself, Quality of pavement
- The two aspects consciousness of necessity and attractiveness of the hub itself refer to the qualities of the hub and not to the quality of the surrounding; therefore, these will not be added to the list of potential indicators for the following experts. A way of processing them for the index will be developed.

21.08.2020:

- Interview with expert 5 (Tim Idema)
- In the first task, the expert named the following indicators: (close to) locations where you would create new trafo stations, easily accessible and normal to pass by (connected to this is: part of a route), don’t replace an attractive part in the neighborhood (connected to this are: avoid making the development in the green areas of the neighborhood, don’t use a spot where there is wateroverlast (or use it as a chance)), search for old buildings (to replace).
- In the second task, the expert added the following additional aspects: to ownership of the location, financing was added, also existence of electricity network / link with Enexis network. The expert did not use aspects from the first task in the second one.

- The aspect financing is integrated in the aspect of ownership of the location, and will thus not be added to the indicators or the explanation of the indicator. The aspect existence of the electricity network is one of the conditions for the spot, that was anyway planned to be analyzed. It will nevertheless be added to the indicators, as a recurring selection as an indicator would also show the importance of it.

21.08.2020:

- Interview with expert 6 (Marieke van Brussel)
- In the first task, the expert named the following indicators: draagvlak, connection to the mobility networks, attractiveness for pedestrians (and cyclists), social safety, costs for investment (connected to this is: changes to be implemented in the streets), proximity to new residential housing.
- In the second task, the expert used one of the indicators from the first task, draagvlak. This could possibly be analyzed by analyzing the demography of the area. Moreover, the expert connected several of her own indicators from the first task to indicators from the list, e.g. social safety with (social) amenities, or connection to the mobility networks with proximity to logistics.
- The additional aspect draagvlak is added to the list of potential indicators and a definition is added in line with the description of the expert.

24.08.2020:

- Interview with expert 7 (Wim Dijkstra)
- In the first task, the expert named the following indicators: travel distance / accessibility (connected to this is: attractive route), interest of mobility companies (connected to this is: Is it a business case?), Combination with parking lots from today (connected to this is: Where do people park their cars today?), proximity to the energy network, proximity to the logistics network (connected to this is: interests of package companies), proximity to existing amenities (e.g. coffee shop). The expert explicitly stated that these aspects are organized in hierarchical order already; this means that the most important aspects according to him is travel distance / accessibility, followed by the other aspects.
- In the second task, the expert used several of the aspects he named in the first part. He took travel distance / accessibility (connected to this is: Attractive route) as the highest ranking indicator and interest of the mobility companies (connected to this is: Is it a business case?) as the second highest ranking indicator. He combined with this the existing indicator Public Transport Stops. As fifth place, the expert was reluctant to decide upon one indicator and selected a mixture of existing and his own indicators: proximity to parking pressure, proximity to parking areas, proximity to the energy network, proximity to logistics, proximity to existing amenities.
- The additional aspect proximity to existing parking areas is added to the list of potential indicators and a definition is added in line with the description of the expert.
- The definition of the proximity to logistics indicator is adjusted, adding the locations of transport companies.
- The interests of logistics companies indicator is taken into account by adding existing or planned to the definition of proximity to logistics.
- The additional aspect travel distance / accessibility is added as Accessibility of the location by all modes of transport and a definition is added in line with the opinion of the expert.
- The additional aspect attractive route is added as Attractiveness of the surrounding and the route and a definition is added in line with the opinion of the expert.

- The interests of mobility companies indicator is taken into account by adding existing or planned to the definition of Public transport stops.

28.08.2020:

- Interview with expert 8 (Christian Voortman)
- In the first task, the expert named the following indicators: Loopafstand tot deze plek, beschikbare ruimte, Meerdere modaliteiten, Aansluting aan de omgeving, Voorzieningen in de buurt (connected to this is: Winkels), Netkapaciteit, Welke warmtebronnen liggen in de buurt? (connected to this is: Aansluting van het gebouw zelf), Is er al iets? (connected to this is: Eraan ansluiten).
- In the second task, the expert used partly the same themes named in the first task, although he chose only existing indicators. However, the indicator amenities is very close to the voorzieningen the expert named, and the accessibility for all modes of transport is close to the loopafstand tot deze plek. Beyond that, the expert did not select any of his own indicators.
- The expert added beschikbare ruimte. This is added as the indicator Available space (e.g. vacant lots). The expert added Netkapaciteit. This is added as the indicator Capacity of the electricity network. For both indicators, a definition is included in line with the opinion of the expert.

02.09.2020:

- Interview with expert 9 (Wouter Gerarts)
- In the first task, the expert named the following indicators: the interest of people in using it (connected to this is: Who wants to have an electric vehicle?), Use energy hubs to transform energy e.g. into gas (connected to this is: Where in the city do we need gas?), Involvement of people / Interest of people (connected to this is: type of the neighborhood, demographics, income of the people living there, political orientation of people, what kind of initiatives are there already?), capacity of the electricity network, space in the neighborhood, changing habits.
- In the second task, the expert did not use any of his own indicators, but he chose proximity to electrical substations (trafostations) on ranking place 5. Two of the indicators named by the expert can be collected under the existing indicator draagvlak, with adding new layers and measurement methods to it. Therefore, the definition of draagvlak is adjusted / the aspects named by the expert are added. Space in the neighborhood is already there as the indicator vacancy, capacity of the electricity network is also already there. Changing habits can be somewhat collected within draagvlak.
- The indicator Use energy hubs to transform energy e.g. into gas is included in the potential list of indicators as Proximity to demand for gas within the neighborhood and a definition is included in line with the opinion of the expert.

07.09.2020:

- Interview with expert 10 (Jenine Timmerman)
- In the first task, the expert named the following indicators: “bereikbaarheid” by all modes of transport, proximity to residential housing (connected to this is: 250-300 meters), facilities at the hubs (connected to this is: different facilities to bring people together, combination – different people meet, the busses are disappearing, also for all age groups).

- In the second task, the expert did not use any of her own indicators, but she chose mixed use, (social) amenities and accessibility of the location for all modes of transport. These can be seen as very close to the aspects the expert named herself. No additional aspects are added to the list of potential indicators and no adjustments are made at the definitions, as the expert only named aspects that are already on the list.

09.09.2020:

- Interview with expert 11 (Dirk Pieter Halbesma)
- Something went wrong, which is why there is no recording of the meeting. However, I was able to gather most of the aspects that were discussed right away after the meeting had ended from what I recalled.
- In the first task the expert named the following indicators: Aantal mensen in dat gebied (connected to this is: Minimaal aantal mensen?), Voldoende draagvlak, Bereikbaarheid van de hub (connected to this is: in de buurt van hoofdroutes), Afstand tussen de plekken (connected to this is: voldoende spreiding), Wat functies zijn er al? (connected to this is: Welke functies ontbreken nog?, Wijkonderzoek), Leeftijdopbouw in de wijk (connected to this is: Welke functies hebben de mensen nodig?), Veiligheid (connected to this is: hoe prettig is het om te lopen? Verlichting), Eigendom van de locatie.
- In the second task, the expert did not use any of his own indicators, but some of the chosen indicators from the list reflected the indicators the expert had named. No additional aspects are added to the list of potential indicators and no adjustments are made at the definitions, as the expert only named aspects that are already on the list.

18.09.2020:

- Interview with expert 12 (Wouter Beelen)
- In the first task, the expert named the following indicators: Necessity – problems, demand, local circumstances (connected to this is: Companies, retailers), Typology of inhabitants (students, elderly?), Available space, Available infrastructure (connected to this is: Public Transport, water, rail station closeby?), Ownership of the potential location (connected to this is: individual consumers vs. big investors?, Municipality – social ambition?).
- In the second task, the expert did not use any of his own indicators, but some of the indicators on his list can also be found in the list of indicators derived from literature and from the other expert talks. As he did not change the meaning of the indicators he chose, no adjustments are made on the list or on the definitions.

03.11.2020:

- Ranking of the indicators: After all interviews have been conducted, a ranking of the indicators has to be done. For this, the indicators are put in the rows into an Excel sheet and the rank assigned to the indicators by the experts is put in the columns. Then, the mean value is taken from these ranks to result in the final rank of the respective indicator. From this, a ranking can be deducted.
- In the following, decisions are noted down that were taken in the course of adding the ranking of the indicators by the experts into the Excel sheet. Because of some experts choosing more than one indicator for a rank, or describing the indicators in more detail, it is hoped to show with more clarity to the reader how it was decided about the respective rank of the indicator.

- **Expert 2:** Although expert 2 chose two indicators for the ranks 2 and 6, these are not taken into account. Rank 6 is relatively unimportant, as it will not be part of the indicators measured. The second "indicator" named by expert 2 for rank 2 is only an addition and does not stand as an indicator by itself.
- **Expert 4:** all of the indicators in the ranking are now listed in the Excel table. It has been discussed on the 20th of August that the first and the third indicator describe the hub itself and not the aspects of the surrounding, which is why they do not apply currently to the task. In the meeting with the expert, the expert said that a major part of the attractiveness of the hub are the connection to the energy network and whether there are amenities close to it. Because the expert named the connection to the energy network first, it is chosen to as well put the rank 3 to this indicator for this expert. The same has been done with the rank 4 for expert 4. The expert named proximity to heat stress and proximity to UGS for the rank 4. However, these adjustments are marked in the table as "double" indicators and will be checked in the end – if they do distort the ranking, they will be taken out.
- **Expert 5:** Expert 5 has named an addition to his / her second indicator. This cannot stand as a single indicator and is therefore neglected.
- **Expert 6:** Expert 6 named another indicator for each of the 5 ranked ones. These are, as the ones before, taken into the Excel sheet and will be checked in the end. The indicator social safety was named by the expert twice; first for the second and then as well for the fourth indicator. It is only taken into account on rank 2. Moreover, for the fifth rank, the expert made an addition to the rank, which is not taken into account for the ranking, because it is more of an explanation.
- **Expert 7:** The additional indicators the expert named are taken into the ranking for now, as has been done with the others before. Especially for the indicators on the fifth rank, this is important, because the expert did choose a list of indicators which would for him currently rank all on rank five. He did not have any preference there. If these were not taken into account, then they would fall out of the ranking, although the expert found them important enough to put them on rank 5. And if the researcher chose one from the indicators the expert put on rank 5, this would bias the research.
- **Expert 11:** The expert chose two extra indicators for the ranks one and three. These were taken into account for now as well.
- Expert 12: The expert chose two additional indicators for the rank one and two. These were taken into account for now as well.

Appendix 37: Expert Interview Coding Scheme

Main question: Which of the indicators can be selected as relevant for selecting suitable locations for neighborhood hubs?

Code	Description
Space needed	The space needed for the placement of a neighborhood hub.
Vacancy	Information on the vacancy of lots for placing a neighborhood hub.
Energy connection - Energy network structure - Energy network investments - Batteries	Information about how to connect the hub to the energy network. - Information about how the energy network in the Netherlands and in Zwolle especially is structured. - Information about investments necessary for improving the energy network. - Information about using batteries for storing energy in the energy system.
Accessibility of hubs	Information about the accessibility aspects of hubs as well as the access distance suitable for neighborhood hubs.
Location hub	Information about other prerequisites for selecting the location of a neighborhood hub.
Mobility function central, others secondary	Information about the statement that the mobility function is central to the concept of the hub, while the other functions are secondary.
Combination three topics	Information about the combination of the three topics mobility, energy and society in neighborhood hubs.
Grow concept	Information about ideas of grow concepts for the neighborhood hubs.
Hub no goal itself	Information about why the experts think that neighborhood hubs or hubs in general are no goal by themselves.
All indicators somehow important	Information about how and in how far all indicators might be somehow important for the selection of a location for a neighborhood hub.
Society amenities pot prob	Information about the potentials and problems of including societal functions into a neighborhood hub.
Society vital place	Infmroation about what has to be done in order to make a vital place out of a neighborhood hub.
Society com feel	Information about how to create a community feeling with the use of a neighborhood hub.
Energy network adapt	Information about how the energy network has to be adapted in order for neighborhood hubs to function.
Energy network trafos	Information about how and in how far transformation stations of the energy network can be adapted in order to function as the starting point of neighborhood hubs.
Energy V2G	Information about the concept vehicle to grid and its' implementation in neighborhood hubs.

Energy EV charging	Information about the charging of electric vehicles at neighborhood hub.
Energy PV	Information about the integration of photovoltaic panels on the roofs of the neighborhood hubs.
Mobility vehicle sharing	Information about the potentials and problems of vehicles sharing in general and for the case study areas.
Mobility EV	Information about the potentials and problems of electric vehicles in general and for the case study areas.
Mobility pot prob	Information about the potentials and problems that neighborhood hubs add to the mobility system.
Future neigh hub	Information about the expected future of the concept and the implementation of neighborhood hubs.
Amenities - What - Why - Useful - How important - Which - Amenities at hub	Information about the potential indicator (social) amenities in the different categories: - What does it mean? - Why is it important for a hub? - In what way can it be useful to a hub? - How important is it for a hub? - Which amenities should be analyzed? - Information about amenities situated at the neighborhood hub.
Mixed use - What - Why - Useful How important	Information about the potential indicator mixed use in the different categories: - What does it mean? - Why is it important for a hub? - In what way can it be useful to a hub? - How important is it for a hub?
Spatial density - What - Why - Useful - How important	Information about the potential indicator spatial density in the different categories as discussed above.
Demographic factors - What - Why - Useful - How important - Which	Information about the potential indicator demographic factors in the different categories as discussed above. - Which demographic factors should be analyzed?
Population density - What - Why - Useful - How important	Information about the potential indicator population density in the different categories as discussed above.
Public transport stop - What - Why - Useful - How important	Information about the potential indicator public transport stop in the different categories as discussed above.
Real estate prices - What - Why	Information about the potential indicator real estate prices in the different categories as discussed above.

- Useful - How important	
New res area hubs - What - Why - Useful - How important	Information about the potential indicator proximity to new residential housing in the different categories as discussed above.
Prox to heat stress - What - Why - Useful - How important	Information about the potential indicator proximity to heat stress in the different categories as discussed above.
Prox to UGS - What - Why - Useful - How important	Information about the potential indicator proximity to urban green spaces in the different categories as discussed above.
Heat production	Information about the integration of geothermal heat production within the neighborhood hubs.
Safety	Information about the topic of safety on the topic of neighborhood hubs.
Draagvlak	Information about the societal support base for neighborhood hubs.
Prox to parking pressure	Information about the proximity to parking pressure in the case neighborhoods.
Proximity to logistics	Information about the proximity to logistics as an indicator for choosing a location for a neighborhood hub.
Accessibility of hubs*	Information about the accessibility of the neighborhood hubs by all modes of transport as an indicator for the selection of a location for a neighborhood hub.
Prox to electrical substations	Information about the proximity to electrical substations as an indicator for the selection of a location for a neighborhood hub.
Ownership location	Information about the ownership of the potential location as an indicator for the selection of a location for a neighborhood hub.
Organization of hubs	Information about the organization of neighborhood hubs and how to implement them in a municipality.
Stakeholders	Information about the involvement of stakeholders in the process of deciding for a location and supply of a neighborhood hub.
Existing infrastructure	Information about the already existing infrastructure at potential location of a neighborhood hood.
Attractiveness of hub	Information about the attractiveness of a neighbohrood hub and how it is influenced.
Consciousness of necessity	Information about the consciousness of the necessity of providing a neighborhood hub of the local residents.
Wateroverlast	Information about integrating the protection against flood risk due to heavy rainfall within neighborhood hubs.

Inclusivity	Information about including all groups of residents in the process of finding a place for a hub as well as deciding about the supply of amenities.
Projects / developments in Zwolle	Information about the current and planned developments in the two case areas and adjacent areas.
Comments on indicators	Information about comments of the experts on the list of potential indicators.
Experts background	Information about the background of the experts.

The codes that were selected based on the literature review are marked in white.

The codes that were derived inductively in the course of the coding process are marked in yellow.

*The code Accessibility of hubs was derived inductively in the course of the coding process and then it was joint with the pre-selected code access distance. Therefore, the code access distance is not part of the coding scheme anymore.

Appendix 38: Final list of indicators after expert interviews

Indicator	Description
Amenities	Social amenities describe all types of services that inhabitants of an area need on a regular or irregular basis and that have potential to increase the social cohesion. Potential amenities are: Grocery stores, pharmacies, cafés / restaurants, package drop-off, fitness, meeting / conference rooms, community centers, other recreative functions, daycare, elderly care, schools.
Mixed use development	Mixed use describes a type of urban planning that blends residential, commercial, cultural, institutional or entertainment uses into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian connections.
Spatial density	Spatial density refers to the quantity of buildings within a certain measuring area.
Demographic factors	Demographic data refers to the study of a population based on the factors such as age, race, and sex as well as socio-economic information (e.g. including employment, education, income, marriage rates, birth and death rates).
Population density	Population density refers to the quantity of inhabitants living within a certain measuring area.
Public transport stops	There is a stop of a public transport line, e.g. of bus or rail, integrated or located in close proximity (e.g. within 100 meters) to the neighborhood hub.
Real estate prices	The price of land and real estate at the location and in the surrounding area is low so that investment is easier and more profitable.
Proximity to new residential housing	Newly constructed residential housing (e.g. apartments, houses) is situated in close proximity to the neighborhood hub.
Proximity to heat stress	There are streets or areas that suffer from heat stress within medium proximity (e.g. within 250 meters) of the neighborhood hub.
Proximity to Urban Green Spaces	There are urban green spaces such as parks, playgrounds or lawn in close proximity (e.g. within 100 meters) to the neighborhood hub.
Proximity to parking pressure	There are streets or areas in public space that suffer from high parking pressure within medium proximity (e.g. within 250 meters) of the neighborhood hub.
Proximity to logistics	There are existing or planned logistic facilities (e.g. delivery of goods, last mile delivery, lockers for delivery and collection of parcels of locations of transport companies) located in close proximity to the neighborhood hub.
Ownership of the location	The land (parcel, plot, building) in question is in the hands of the public body (e.g. the municipality, province or country) instead of a private company.
Proximity to electrical substations (trafostations)	The neighborhood hubs are situated in close proximity to existing electrical substations of the energy network.
Draagvlak (societal support base)	The neighborhood hubs are located in proximity to where the people live that have an interest in using them. This can for example be measured by analyzing the demographic and income structure of the neighborhood, the average political orientation and the existing initiatives in the neighborhood.
Proximity to existing parking areas	The neighborhood hubs are located in proximity to existing parking areas where inhabitants park their cars on a regular basis. This makes the transition easier. Moreover, the space is already used for mobility needs.
Accessibility of the location for all modes of transport	The neighborhood hubs are located in good accessibility of the users with all modes of transport. The travel distance by foot is not more than around 250-300 meters.

Attractiveness of the surrounding and the route	The neighborhood hubs are accessible by an attractive route and are laced in an attractive surrounding area. The focus is here on pedestrians.
Available space (e.g. vacant lots)	There is space available where the building of the hub can be placed. This can be vacant lots, unused (public) space or buildings that will be reconstructed.
Proximity to demand for gas within the neighborhood	(Surplus) electricity can also be used to produce gas for the supply of households. Neighborhood hubs are therefore placed in proximity to where there is demand for gas within the neighborhood.
Capacity of the electricity network	The neighborhood hubs are placed in proximity to areas where the electrical network has the capacity to support the hub (e.g. charging the electric vehicles).

Appendix 39: Results on the open questions of the expert interviews: the three functions of a neighborhood hub

As described in chapter 3.4., the expert interviews were conducted in two major parts, the open-ended questions and the ranking. In this Appendix, the results of the open-ended questions are discussed along the lines of the three functions of a neighborhood hub.

Mobility function

For the mobility function, the main focus of the questions was on the application and the potentials and problems of vehicle sharing and electric vehicles in the two case neighborhoods and the general opinion of the experts on the concept of neighborhood hubs.

Vehicle sharing

The general opinion of the experts on vehicle sharing is positive, because it offers the possibility to reduce the amount of cars that take up space in the neighborhoods. The personal experience with vehicle sharing is limited, but also positive (Expert 1, 2020, p. 5). The experts discussed that the financial incentives in sharing vehicles will invite more people to make use of the services in the future, because people often oversee the actual costs of having a private car (Expert 3, 2020, p. 10; Expert 4, 2020, p. 6). Moreover, the trend of sharing instead of owning is becoming more important, especially among younger people (Expert 3, 2020, pp. 11–12). It was discussed by the experts that it seems to be very inefficient that most cars stand around most time of the day and block a lot of space in the small streets of the neighborhoods, which could be used for other things (Expert 9, 2020, p. 20). Another aspect is that most people that own a second car do not use it very much (Expert 3, 2020, pp. 10–11). The experts also see potential for including bicycle sharing, especially for areas where the space is very scare and people cannot park personal bicycles (Expert 11, 2020, pp. 5–6). Moreover, it is expected by the experts that based on the current policies, in the near future it might not be able to have two or even one car in neighborhoods such as Assendorp and Kamperpoort and that the residents will need to adapt to this (Expert 3, 2020, pp. 10–11). Also, the experts have high expectations for the alternative uses for the new free space; it is expected that with more sharing, more green, more water and more playing facilities for children can be included in the neighborhoods (Expert 2, 2020, p. 10; Expert 8, 2020, pp. 6–7). Also, a reduction of the impact of the mobility sector on climate change is expected from sharing vehicles (Expert 8, 2020, p. 7).

Moreover, it has been argued by the experts that the existence of shared bicycles in close proximity to the residents of a neighborhood has a significant influence on the bicycles being used, in comparison to if they were stationed far away from the residents' home (Expert 11, 2020, p. 5; Expert 6, 2020, p. 8). This is supported by scientific findings: Bachand-Marleau et al. (2012, p. 66) found out that the factor having the greatest effect on the likelihood for use of a shared bicycle system was the proximity of home to docking stations. The inclusion of bicycles in the hubs thus can have important influence on the sustainability of the mobility of the residents.

However, the experts also see different problems with sharing vehicles: First, a problem is that there is a certain threshold that makes shared vehicles more difficult to use than a private car (e.g. ticketing systems, reservations) (Expert 1, 2020, p. 6; Expert 2, 2020, p. 8). Second, a fear exists that, depending on the service, the vehicles are not always available when the residents need them (Expert 1, 2020, p. 6; Expert 10, 2020, pp. 6–7; Expert 11, 2020, p. 4; Expert 3, 2020, p. 11). This was discussed in several interviews, and often the notion was that the residents need to trust that the vehicles are available when they need them, otherwise they would not make use of them in the long run. Moreover, the placement of more shared vehicles at hubs instead of using a free-floating system was seen as positive, because it makes the vehicles more accessible and easier to reach (Expert 7, 2020, p. 8). However, it was discussed by another expert, that the choice of system (e.g. station-based, free floating) should be made on the

basis of the location and the target group (Expert 12, 2020, p. 7). Moreover, according to the experts, the concept of sharing is becoming more widespread and more and more people are willing to also share vehicles, but it will still take some years until the general public is willing to give up the personal car, as most people are not yet ready for it (Expert 11, 2020, p. 4; Expert 12, 2020, p. 8; Expert 3, 2020, p. 11; Expert 4, 2020, pp. 5–6). By making use of sharing services for vehicles, often the second car is abandoned, but the first car is still kept out of the fear that one might need it at some point. It was made clear by different experts, that a differentiation must be made for the willingness to make use of shared vehicles in Zwolle; while in neighborhoods such as Assendorp and Kamperpoort the willingness to adapt is high, in neighborhoods such as Stadshagen, which is inhabited by a lot of families, it is not expected that the inhabitants are interested in sharing vehicles (Expert 10, 2020, pp. 9–10; Expert 11, 2020, p. 4; Expert 3, 2020, 11, 14; Expert 6, 2020, p. 7).

Electric vehicles

On the placement of EVs, there were very different opinions among the experts. First, the experts generally agree that EVs could be a sustainable alternative, which could be used for shared transportation in the two neighborhoods (Expert 4, 2020, p. 6; Expert 7, 2020, pp. 8–9). However, some experts were very positive on the application, while others were more skeptical and did not see the necessity for including them. Moreover, there is some insecurity about the development of EV and hydrogen cars in the future (Expert 8, 2020, p. 7). Currently, in Zwolle there are no shared electric cars available that are provided by a company, only by peer-to-peer-sharing (Expert 2, 2020, p. 8).

An expert argued that the combination of electric and shared vehicles has high potentials for neighborhoods such as Assendorp and Kamperpoort (Expert 7, 2020, pp. 8–9). Both the energy and the mobility transition could be done faster with this combination. Moreover, the providers should be involved to organize it and there are possibilities to support it, e.g. by subsidies or regulation (Expert 7, 2020, pp. 8–9).

On the other hand, it was argued by some of the experts that it is questionable if people would invest in an electric cars if the policy developed is aiming at reducing car travel and increasing travelling by other modes of transport (Expert 10, 2020, p. 11). Moreover, it costs more time to travel by car within Zwolle than using the bike (Expert 10, 2020, p. 11). Also, it was discussed that the electric cars in Assendorp and Kamperpoort today belong to either people with enough money, or to people who were provided these cars for their jobs, and are often second cars (Expert 10, 2020, p. 11). Moreover, the necessity of electric bicycles was questioned, with the explanation that the distances within Zwolle would not be far and that electric bicycles would therefore not be needed (Expert 11, 2020, p. 4).

A problem of EVs discussed by the experts is that they are still a very new development and therefore are expensive, and there are not always charging stations available, which can reduce the willingness of people to make use of them (Cooper et al., 2019, p. 37; Expert 1, 2020, p. 6). However, it was discussed that if electric cars were available at a neighborhood hub, people would rather use them instead of the normal cars (Expert 10, 2020, p. 11). Moreover, a problem discussed was that residents resist the placement of charging stations in the streets, because they "are very fossil-minded" (Expert 4, 2020, p. 6) or because the charging stations take up a lot of space (Expert 6, 2020, pp. 7–8).

Neighborhood hubs

In general, the experts were very positive on the topic of neighborhood hubs in general and for the two case neighborhoods (Expert 2, 2020, p. 9). The neighborhood hub is seen as "essential for transforming" (Expert 6, 2020, p. 5) the city to be more pedestrian-friendly. They discussed the many benefits the hub could bring for the neighborhoods, such as more space, more green, an efficient transportation system and more amenities (Expert 2, 2020, 5, 10-11; Expert 4, 2020, 5, 17; Expert 5, 2020, 5, 13; Expert 6,

2020, 8, 12; Expert 8, 2020, 6, 12). However, the experts also discussed several problems in the placement of neighborhood hubs. First, it was discussed that the hubs might cause problems with the surrounding residents, because they could become places of more nuisance (Expert 3, 2020, p. 7; Expert 6, 2020, p. 8). Moreover, an important aspect was that the experts agreed that it could be difficult to find a place to locate a neighborhood hub as conceptualized in this research (Expert 10, 2020, p. 6; Expert 5, 2020, p. 8). It was suggested that bigger hubs could be placed at the edges of the neighborhoods, where more space is available, and very small hubs could be placed within the neighborhoods (Expert 11, 2020, p. 5; Expert 3, 2020, p. 7; Expert 6, 2020, p. 8). This was also discussed as good for the neighborhood because then the cars would not drive through it to reach the hubs (Expert 3, 2020, p. 13). The bigger hubs should then include shared cars, while the smaller ones should only include bicycles or scooters, which would also invite people to walk or cycle, instead of drive (Expert 6, 2020, p. 8). Moreover, it was discussed that the inclusion of multiple functions at a hub is very difficult and does not fit into the typical work structure of the municipality (Expert 10, 2020, pp. 12–13; Expert 5, 2020, p. 12). Another point was that the first ideas for the placement of neighborhood hubs would typically be existing parking lots, empty buildings, office buildings or other available space, but that this might be difficult because these places are not optimally located in terms of the societal and energy function. Therefore, a balance should be established between all the different influence factors (Expert 7, 2020, p. 5). However, still it could be very difficult to find enough space in the suitable areas, because there are many other uses present; it might therefore become necessary to create the space by substituting other uses (Expert 10, 2020, p. 6; Expert 7, 2020, p. 9; Expert 9, 2020, pp. 19–20). Moreover, it was discussed that the size of the hubs needs to be thought about because it might not be rentable or necessary to place several hubs as conceptualized in this research in each of the case neighborhoods (Expert 7, 2020, p. 7). According to the experts, there need to be enough people making use of each of the provided amenities in order for the hub to function (Expert 11, 2020, p. 5). A starter problem discussed was that there seems to be much resistance against parking the personal cars at a neighborhood hub, because the people like to have the possibility to see their car from their windows and always have the possibility to use it whenever they want to (Expert 4, 2020, p. 7).

Societal function

In general, the experts were very positive about integrating societal functions into the neighborhood hub (Expert 1, 2020, p. 14; Expert 12, 2020, p. 9; Expert 4, 2020, pp. 7–8; Expert 7, 2020, pp. 6–7). The main reasons for this are the increased convenience of usage, as well as the potentials for social cohesion (Expert 1, 2020, p. 7). The hub concept is still mainly seen and interpreted as a mobility concept at first, but the idea of combining different societal functions with the hub is generally accepted very positively. Moreover, a general notion was that the amenities that would be placed at the hub should directly support the neighborhood, and that they should be adjusted to what is needed in the neighborhood (Expert 11, 2020, p. 7; Expert 2, 2020, p. 5; Expert 3, 2020, pp. 5–6; Expert 4, 2020, p. 8). The residents should directly see what they get in exchange for not parking their cars in the streets anymore (Expert 6, 2020, p. 8). Moreover, the provided amenities should be adjusted to the age structure of the respective neighborhood (Expert 11, 2020, p. 5). Also, with the hubs, functions could be brought back to the neighborhood or be kept in the neighborhood that are normally not there anymore or could not stay there due to financial reasons (Expert 3, 2020, pp. 5–6). Moreover, the idea of combining the hubs with package lockers for the packages of the residents was named several times (Expert 4, 2020, p. 5; Expert 7, 2020, p. 5).

The potentials for social cohesion of neighborhood hubs are seen in the coming together of different societal and age groups (e.g. children and the elderly) (Expert 1, 2020, p. 7; Expert 10, 2020, p. 7). Neighborhood hubs are seen as meeting places, which could increase the contact among the local residents and could provide them with a place for joint activities (Expert 1, 2020, p. 7; Expert 10, 2020, pp. 13–14; Expert 3, 2020, p. 6). Today, often the residents only visit the places they need to, while they

are only getting in contact to the people they meet there, e.g. at the daycare. However, with this, there is no contact among the different age groups (Expert 10, 2020, pp. 7–8). It was also discussed that it is easier to start with the meeting function of the hub if there is already a community feeling in a neighborhood, which seems to be the case in the two case neighborhoods (Expert 10, 2020, p. 8; Expert 11, 2020, p. 6; Expert 12, 2020, p. 9). Moreover, in their function of providing the people place to come together they could increase the acceptance of solutions such as the shared vehicles (Expert 10, 2020, p. 7). A problem discussed was that by providing these meeting places, the residents around it could suffer from the noise for example made by younger people (Expert 3, 2020, pp. 6–7).

A point that was often discussed was that in order to make vital places from the neighborhood hubs that are visited by many of the residents, it is necessary to make the hubs very attractive in terms of amenities and design (Expert 2, 2020, pp. 5–6). Influence factors for this are for example safety, protection against the weather, design aspects, green, (Expert 10, 2020, p. 14; Expert 2, 2020, pp. 5–6; Expert 3, 2020, pp. 7–8).

Energy function

For the energy function, the results of the interviews were slightly different than for the other two functions, mainly because there were a lot of fundamental aspects that needed to be organized before answering the research questions. This chapter is structured according to the following questions and aspects that were answered in the course of the interviews:

- How does the energy network work?
- What are the costs of extending the energy network?
- Which charging rates for EVs are needed?
- How does the energy network need to be adapted to deal with the neighborhood hubs?
- The implementation of EVs at hubs
- What are the potentials and problems of using V2G to balance the network?
- Preference of the energy operator: one big station, one big cable
- Can the electrical substations be used as a starting point for the development of hubs?

How does the energy network work?

The energy network in the Netherlands consists of high voltage cables transporting the energy from the place of production to the cities. Within the cities, there are three levels of transformation stations: the big, the middle and the small stations (compare to figure 2) (Expert 9, 2020, pp. 5–6). A transformer station is a location where electrical energy from the higher voltage network is transformed to lower voltages in order to supply households with electricity. These stations have different energy capacities they can handle. The energy is transformed from the higher stations from high voltages to the middle and small stations to lower voltages. Different users of energy get different voltages from the grid, for example the industry is connected with the biggest stations, while the domestic users are connected with the small stations (Expert 9, 2020, p. 11). There are few big stations and a lot of small stations, which are evenly distributed throughout the city and provide the households with energy (compare to Appendix 52) (Expert 9, 2020, p. 6). On a general note, if the facility one wants to connect with the energy network demands a lot of energy, then it will need to be connected with one of the three high voltage stations in Zwolle, while if the demand is very low, the connection to a small station is sufficient (Expert 9, 2020, p. 6). If one wants to put between 5,000 and 10,000 PV panels somewhere, which equals to around 2 hectares, then a connection to the middle voltage station is needed, as the lower voltage stations cannot handle the high amounts of energy (Expert 9, 2020, 6, 7). Two hectares of PV panels equals two MVA in energy production (Expert 9, 2020, p. 7).

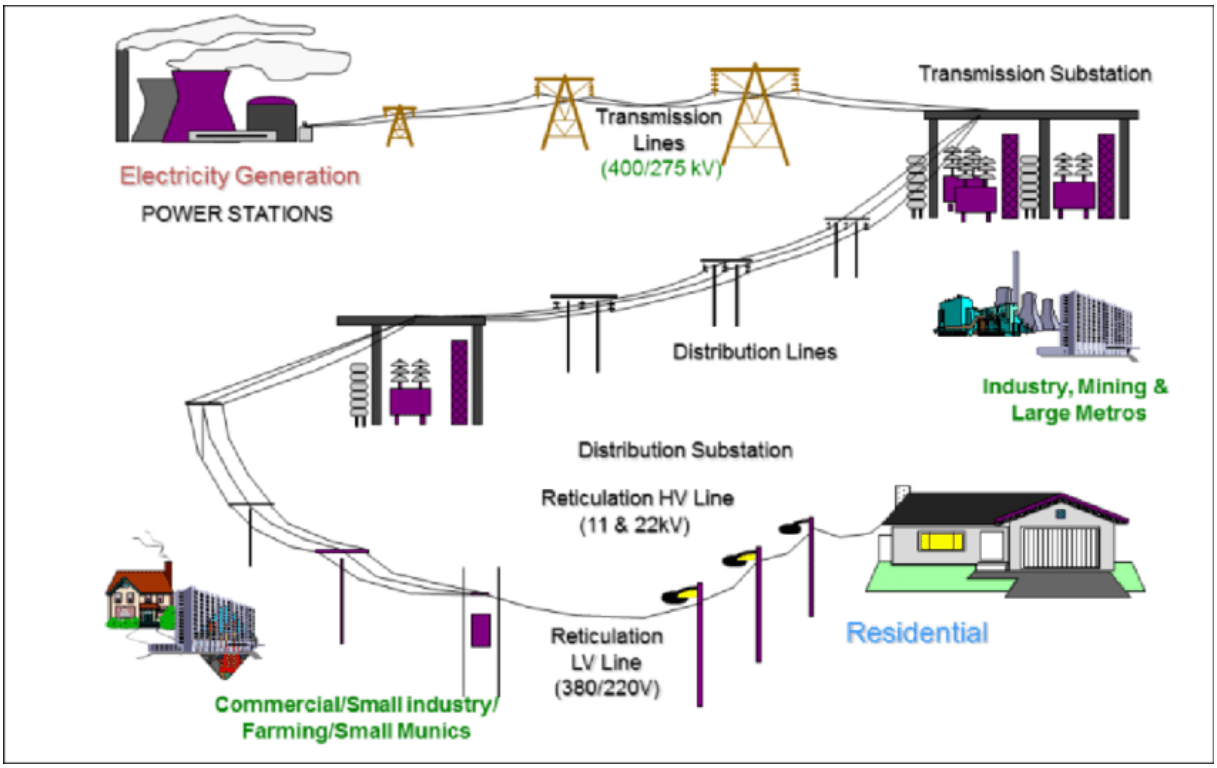


Figure 2: Visualization of the energy network (Das Nair et al., 2014, p. 15).

On the network in the city of Zwolle, it was said that especially in the older neighborhoods such as the city center or Kamperpoort and Assendorp, the network is very old, has very thin cables and is difficult to extend due to the high building density (Expert 9, 2020, p. 11). However, extensions are needed in the coming years with the energy transition, having more people heating and cooking electrical, the use of EVs and PV panels on the roofs (Expert 9, 2020, p. 11). A small station can on average supply about 400 to 500 houses and has a size of around 25 square meters (compare to table 5 for the voltage levels) (Expert 9, 2020, pp. 11–12). If the demand of energy of the households doubles, then one small transformation station can only supply 200 houses, if the demand is four times as high as today, only 100 houses, resulting in more small stations needed which need more space (Expert 9, 2020, p. 12). The wish of the energy operator and from the urban design side is not to increase the network insofar as that there are way more transformation stations in the neighborhoods (Expert 5, 2020, p. 5; Expert 9, 2020, pp. 11–12). It is also difficult to estimate the amounts of energy needed, as they heavily depend on how the key technologies will develop (Expert 5, 2020, pp. 6–7).

Table 5: Energy levels of the three stations

Level of station	Voltage levels	Source
High voltage station (3)	> 6,000 kVA 6 to 90 MVA	(Expert 9, 2020, 6, 7)
Middle voltage station (6)	< 6,000 kVA 1.75 to 6 MVA	Expert 9 (2020, p. 6) Expert 9 (2020, p. 7)
Low voltage station (- 1000)	< 500 kWh 1.75 MVA = 1750 kVA	Expert 9 (2020, p. 6) Expert 9 (2020, p. 7)

Note: Based on the discussion with Expert 9 (2020, pp. 6–7). 1 W equals 1 VA; 1 MVA equals 1000 kVA equals 1000000 VA, which equals 1000000 W. A small station is able to accept a maximum of 1.75 MVA; however, it is only able to deliver / provide an energy turnover of maximum 500 kWh, because of technical reasons.

What are the costs of extending the energy network?

Besides the connection to the respective voltage level, the distance to these transformation stations is very important, as cables need to be installed for the connection which are very expensive (Expert 9, 2020, pp. 7–8). A cable costs on average 150 euros per meter and is able to transmit a maximum of 10 MVA (Expert 9, 2020, p. 8). If more energy needs to be transported, the price doubles for two cables. A battery on the other hand costs on average 100 euros per kW, making the option more expensive than a cable (Expert 9, 2020, p. 9). Moreover, due to the charging and discharging of the battery, it has a significantly shorter lifetime than a cable (up to 50 years for the cable, up to five years for the battery) (Expert 9, 2020, p. 9). Therefore, today, it is not economically useful to install batteries without having a good business case (Expert 9, 2020, p. 9). This is important for the placement of a neighborhood hub, because the places where a neighborhood hub can easily be connected to the grid depend on the demand of energy and the production of energy by the PV panels (Expert 9, 2020, p. 6).

Which charging rates for EVs are needed?

The focus within this research is on the implementation of battery electric vehicles, meaning fully electric cars that are directly charged from the electricity grid or another battery situated at a charging spot (Bünger & Michalski, 2018, p. 113). These are in contrast for example to fuel-cell electric vehicle, which use the fuel on board to produce the electricity, and hybrid electric vehicles, which are partly electric and partly gas-dependent (Bünger & Michalski, 2018, p. 113; Falvo et al., 2011, p. 2135). Figure 3 displays the possible charging rates for charging electric vehicles. Of course, the higher the charging rate is, the faster the car is fully charged, leading to stops of only ten to 30 minutes needed for the recharging process if the charging rates climb up to 350 kW (Bünger & Michalski, 2018, p. 116). With the lowest charging rate, the EV is currently fully charged after around 20 hours (Mwasilu et al., 2014, p. 504). The high charging rates are therefore planned for public areas, while the slower charging rates are meant for the use at home and at the office (Bünger & Michalski, 2018, p. 116; Mwasilu et al., 2014, p. 504). Moreover, the lower charging rates are expected to be adapted first, while the higher charging rates are expected to emerge at a later stage at public spaces and for example shopping centers (Luca de Tena & Pregger, 2018, p. 2676).

Power Level Types	Charger Location	Typical Use	Energy Supply Interface	Expected Power Level	Charging Time	Vehicle Technology
Level 1 (Opportunity) 120 Vac (US) 230 Vac (EU)	On-board 1-phase	Charging at home or office	Convenience outlet	1.4kW (12A) 1.9kW (20A)	4–11 hours 11–36 hours	PHEVs (5-15kWh) EVs (16-50kWh)
Level 2 (Primary) 240 Vac (US) 400 Vac (EU)	On-board 1- or 3-phase	Charging at private or public outlets	Dedicated EVSE	4kW (17A) 8kW (32 A) 19.2kW (80A)	1–4 hours 2–6 hours 2–3 hours	PHEVs (5-15 kWh) EVs (16-30kWh) EVs (3-50kWh)
Level 3 (Fast) (208-600 Vac or Vdc)	Off-board 3-phase	Commercial, analogous to a filling station	Dedicated EVSE	50kW 100kW	0.4–1 hour 0.2–0.5 hour	EVs (20-50kWh)

Figure 3: Charging power levels (Yilmaz & Krein, 2013, p. 2152).

Mwasilu et al. (2014, p. 504) explains, that chargers were developed that allow different charging rates. This might be important because it might mean that a city does not need to supply several types of chargers, but that they can provide the multi-usage chargers, if applicable. It of course depends on the business case of the shared vehicle operator and the needs of the location residents, which charging options will be available at the neighborhood hubs. One of the experts, who has experience in providing charging options for EVs, argued that in his opinion, it might be more useful to put fast chargers at specific centralized spots, like todays' fuel charging stations, and make people go there if they need to fast charge their EVs (Expert 12, 2020, p. 10). However, he also confirmed the potentials of the low charging rates and the possibility to use the batteries of the EVs as a buffer for the energy grid (Expert

12, 2020, p. 11). Moreover, it was argued by Expert 7, that if the low charging rates are adapted, the cars need a significantly longer time at the station and therefore the utility of the cars is reduced and they take up more space (Bünger & Michalski, 2018, p. 116). On the other hand, the low charging rates can be important for not asking too much energy from the grid at the same time.

Based on these findings and the opinions of the experts, it is suggested to provide mainly the level 2 middle charging rate chargers at the neighborhood hubs and leaving the provision of high charging rates to bigger hubs.

How does the energy network need to be adapted to deal with the neighborhood hubs?

What is currently happening when someone wants to charge their EV, is that they can request the energy operator to provide a charging station in the street, connected to the small station in the street. However, this can have significantly negative effects on the energy network. There are 500 kWh available at any moment for each small transformation station, thus approximately for each street (compare to table 5). Each small station supplies on average 400 to 500 houses with energy, meaning that there is at any given moment 1 kW available for each house (Expert 9, 2020, p. 13). According to the expert, the lowest charging rate for an EV is 3.6 kW[3] (Expert 9, 2020, p. 14). If there is one EV charging, then the remaining 497 kW supply the remaining 499 houses. Even with 10 EVs charging, this scheme is working out. However, if the number of EVs is increased to e.g. 100, there are at some point not enough kW available anymore for the remaining houses (Expert 9, 2020, p. 14). Furthermore, at higher charging rates, the problems start at a lower amount of EVs (Expert 9, 2020, p. 14). Therefore, if the number of EVs in private use increase, the network has to be extended, which costs a lot of money paid by the tax (Expert 9, 2020, p. 14).

The implementation of EVs at hubs

If one wants to put more EVs, for example 10, to a charging place or a hub, then this place will not be connected to the small stations in the surrounding, but will have to be connected to a middle station (Expert 9, 2020, p. 12). However, this will increase the costs for the requester, depending on the distance to that station (Expert 9, 2020, p. 13). Moreover, the more energy a solution asks from the grid, the more space is needed for it, which is often not available in the dense neighborhoods (Expert 9, 2020, p. 15).

The energy network expert was also asked, which of the following two options would cost less in total: Either to place two charging spots in every street, and extend the grid with more small stations, or to place 10 to 20 charging spots into bigger neighborhood hubs every 600 to 700 meters, which would then be connected to the middle stations. The expert answered that he could only answer this question based on feelings, as it is not their job as the grid operator to calculate this:

"But we know in fact, the solutions for us, as net operators - but we cannot tell the market - is in fact the bigger stations, with 10 or 20 chargers in one place. With one cable, that they need to pay for. That is for us the most effective way. But we cannot say that, because we are government, and everyone has the right to ask for connection to the grid. So, if they do, we need to do it. So, we cannot suggest something, because that is not our job" (Expert 9, 2020, p. 15).

[3] This low charging rate is used as a baseline in this research, but as it is visible from table 5, there are even lower charging rates. However, based on the time needed for fully charging the vehicles with the lower rates, it is expected that these might not be suitable for shared vehicles at neighborhood hubs.

What are the potentials and problems of using V2G to balance the network?

Generally, the private company requesting a connection for something like a neighborhood hub to the energy network has to pay the connection over the distance to the next transformation station, and if it is a middle station, it can get expensive (Expert 9, 2020, p. 7). However, there are possibilities to reduce the costs of this, by making use of batteries to store a part of the excess energy: if a private company had to pay the connection to a middle station, because it produced 2 MVA, it could put a battery in place and have it store 0.3 MVA at peak times. Then, a connection could be made to a small station for the remaining 1.7 MVA, presumably reducing the costs of making the connection (Expert 9, 2020, p. 8).

However, it is noted that a battery is also very expensive. Therefore, it might only be interesting for the private company, if it is possible for them to earn money with the system, using the battery (Expert 9, 2020, p. 8). This is where the charging of shared EV could play a role, as well as V2G or smart charging schemes (Expert 9, 2020, p. 8). However, until now there are not so many cases of this, because it is still relatively expensive (Expert 9, 2020, p. 8).

An advantage of the scheme using the EVs of the people in the neighborhood could be that these cars have been paid for already by the residents, and the costs for a private company would be reduced. The company would not have to invest in a battery, but could use the batteries in the cars to store the excess energy (Expert 9, 2020, p. 10). On the other hand, a scheme like this could also work with shared EVs, that the private company would supply. However, a big problem of this scheme is that the cars need to be at the hub at the time when the PV panels generate the high amounts of energy to store it, which is expected to be during noon (Expert 9, 2020, p. 10). As the energy network has to be built in a way that it can always accept all the produced energy, even if the private company's system is not functioning, this might cause severe problems for the grid if the cars are not there (Expert 9, 2020, p. 10). Therefore, it is questionable how flexible the EVs can be used, or on the other hand, how much the network operators are able to trust the solutions used by the private companies.

Connected to the discussion above is also the concept of V2G, vehicle to grid. This concept entails feeding the energy stored in the batteries of the EVs back into the grid at a time when it is either helping to balance the grid, or when it is economically interesting (Expert 9, 2020, p. 10; Luca de Tena & Pregger, 2018, p. 2671). In order to balance the grid, a part of the energy that has been generated at the peak time can be stored in the batteries and fed into the grid when there is a shortage of energy due to little generation, for example at night. This has also something to do with the economic interest, as the energy price is determined according to supply and demand (Expert 12, 2020, pp. 12–13; Nieuwestroom, 2020). If a private company stores the generated energy of the PV panels at a time when the prices are low and feeds it back into the grid at a time when the prices are high, they can earn money with it and for example also finance the battery (Expert 9, 2020, p. 10). Therefore, it is also a possibility to include an extra battery at the neighborhood hub, which can store the excess PV energy (Bünger & Michalski, 2018, p. 116; Expert 9, 2020, p. 10). One would circumvent the problem of the EVs not being there when they need to be and there is even a paying scheme available for the battery (Expert 9, 2020, p. 11).

Preference of the energy operator: one big station, one big cable

The best solution for the energy operator, if they have to implement it themselves, would be to implement one big charging stations for all EVs somewhere and to connect it to a high voltage station (Expert 9, 2020, p. 16). However, this might not be in the interest of the company paying for it.

In terms of the PV panels, it would be the best solution for the grid operator if they could provide connections to the middle stations for the PV panels, instead of having to build way more small stations (Expert 9, 2020, p. 12). If then also a private company would find a solution for peak shaving, so that they would not have to connect the PV panels with the middle but with the small stations, then the company does not have to spend so much money on the provision of the connection (Expert 9, 2020,

p. 12). A big problem for the grid operator is that they cannot suggest solutions themselves, as they are a government organization (Expert 9, 2020, p. 12).

The best solution for the Dutch citizens, according to Expert 9, would be if private companies would find a business case in providing charging stations with for example 10 chargers, connecting them either with the middle stations or applying a peak shaving scheme with batteries and connecting them with the small stations (Expert 9, 2020, p. 14). This would mean that the energy network does not have to be extended so heavily in the streets, and that the tax payers money is not invested in this extension (Expert 9, 2020, p. 14).

Can the electrical substations be used as a starting point for the development of hubs?

Based on the interviews with the energy experts, it can be concluded that there are only two ways of connecting the neighborhood hubs to the energy network: They can be either connected to the small transformation stations or to the middle transformation stations. Depending on which of these options is chosen, the implication is different. If it is chosen for connecting the hubs to the small stations, then only a very little number of EVs can be charged and PV panels can be installed, because the stations are not able to transfer the higher amounts of energy that would be needed. There is also a difference between connecting hubs to existing small stations and building new small stations. A connection with the existing ones is not recommended, because these provide energy for the households and are therefore not capable of providing a lot of energy to a hub (Expert 1, 2020, p. 9). In these cases, it might be easier and even less expensive to extend the grid by building new small stations and putting more cables into the ground (Expert 1, 2020, p. 9). If a connection is made to a new small station, this station could be used to provide only the hub and its uses with energy; therefore, more vehicles could be charged, and more PV panels could be planned than with an existing hub. However, the capacity would still be very limited. If a hub is connected to the middle transformation stations, the capacity possibilities are way bigger, however, then the distance to the station is bigger and the connection costs more money.

Therefore, the small stations cannot actually be used as the starting point for neighborhood hubs, at least not for the scale of neighborhood hubs used in this conceptualization. Therefore, it is not necessary to start at the small stations and try to find suitable locations in the surrounding. However, for smaller neighborhood hubs, proximity to the small stations could be useful if peak shaving solutions are applied and the hub can be connected to the small stations. On the basis of the discussion above, after the GIS analysis has been applied, the distances to the middle stations are displayed and discussed for the areas with high potential for placing a neighborhood hub.

Appendix 40: Results of the ranking on the other indicators

The remaining indicators cannot be discussed in detail in this research, but a summary of the most important aspects is displayed in this Appendix. The remaining indicators can be categorized into two groups: the medium important indicators (draagvlak, demographic factors, ownership of the location, public transport stops, proximity to new residential housing, spatial density, proximity to urban green spaces, available space (vacancy)) and the less important indicators (proximity to logistics, interest of mobility companies, attractiveness of the hub itself, attractiveness of surrounding and route, proximity to heat stress, safety, real estate prices). The distinction between the two categories is made based on the score the received in the Excel table (table 3 in the main document). The indicators in the less important category received a score of maximum five, which means that either only one person has chosen for it, or several people have selected it for a lower rank. Two indicators, the safety and real estate prices, were not selected for the ranking (cleared version).

In general, it can be said that some of the indicators in the two lower categories were discussed way more in the open part of the expert interviews than they were selected afterwards in the ranking. Partly, this is thought to be the case because indicators such as the attractiveness of the hub itself are not actually aspects that have an influence on the selection of a location but are more important for the design process at a later stage.

The aspect attractiveness of the hub has a lot of connections with other indicators. It can be said that a lot of indicators were chosen with the aim in mind to improve the attractiveness of the hub. The attractiveness of the surrounding and the route is influenced by different factors, such as the accessibility for all modes of transport, the proximity to heat stress and to urban green spaces and also the social safety (Expert 4, 2020, 11-12, 13-14; Expert 6, 2020, 6, 9-10; Expert 7, 2020, pp. 7–8). Connected to this is the idea, that the attractiveness of the hub will increase the “draagvlak”, the societal support base for the hub and therefore increase the usage of the hub (Expert 6, 2020, 6, 9-10). The “draagvlak” of the residents as well as businesses and the mobility companies was named as an important success factor for a neighborhood hub (Expert 7, 2020, p. 13). The “draagvlak” is again influenced by a lot of the indicators: the residents need to see the hub as a necessity for their neighborhood, which can for example be the case if there is a high parking pressure (Expert 4, 2020, p. 12). Other aspects, such as heat stress due to a lot of hardened surfaces, the population density, the demographic factors have an influence on the “draagvlak” of the residents (Expert 6, 2020, pp. 11–12).

The indicator demographic factors was named relatively much in the course of the interviews, but it was often not chosen for one of the highest ranks. Both the indicators “draagvlak” and demographic factors were rather chosen in combination with another indicator, than alone, which reduced the score of the two indicators (compare to table 2 in the main document). One expert discussed that depending on the population and their needs, a neighborhood hub might not be the best solution to solve their problems, but for example better public transport might be the way to go (Expert 12, 2020, p. 16). The combination of the indicators “draagvlak” and demographic factors was further displayed by Expert 9, who discussed the idea of including the interest in a specific side of politics for the analysis (Expert 9, 2020, p. 19). He explained that Assendorp and Kamperpoort are politically very green-left neighborhoods and that this is typically associated with more interest in the climate change (adaptation), the future of the city and neighborhoods and the role of the municipality. Another expert explained that in neighborhoods like Stadshagen, questions of climate change and mobility regulation form no parts of the interests and the daily lives of the residents and it would therefore expected to have less “draagvlak” in this part of the city (Expert 10, 2020, pp. 9–10).

The indicators ownership of the location and proximity to new residential housing were both discussed as influence factors for the placement of a neighborhood hub, that could make the placement easier. If there is new construction going on in the coming years in a neighborhood, it is more easy to include the development of a neighborhood hub, than if this has to happen where everything is fully built and no restructuring is happening (Expert 2, 2020, p. 11; Expert 5, 2020, p. 15; Expert 7, 2020, p. 15).

Moreover, it was discussed that it might be an advantage if the land for the hub is in the hands of the municipality, but that solutions could also be found with other parties to organize the hub (Expert 11, 2020, p. 6; Expert 12, 2020, pp. 13–14; Expert 4, 2020, p. 15). The indicator real estate prices was not chosen by the experts for the ranking, but it was shortly discussed in relation to the ownership of the location. The experts agreed that the indicator is not relevant for the search for a location but that it is rather one of the influence factors the municipality has to deal with in the implementation phase (Expert 1, 2020, p. 15; Expert 5, 2020, p. 15; Expert 6, 2020, p. 10). Also, a relationship was discussed by Expert 1 (2020, p. 15) between the proximity to new residential housing and to urban green spaces. The expert argued, that if the hub was started in proximity to new residential housing, then there might be more space for including green spaces in the plans.

The indicator public transport stops was chosen more often than it was discussed about it. Some of the experts perceived them as a prerequisite for a neighborhood hub, while most of the experts did not choose them as one of the indicators (Expert 10, 2020, p. 13; Expert 7, 2020, p. 13; Expert 9, 2020, p. 22). This implies that most of the experts rather agreed that neighborhood hubs do not necessarily need to be combined with public transport stops, but that they could also function as stand-alone mobility providers. However, accessibility of the hubs by public transport was said to be important (compare to indicator accessibility).

The indicator spatial density was only chosen by two experts, and it was not discussed very much in the course of the interviews. However, it was often named as being connected to or partly used as a synonym of population density and mixed use (Expert 2, 2020, p. 12; Expert 3, 2020, pp. 14–15; Expert 7, 2020, p. 13). One of the reasons might be what was also discussed by some of the experts; the two case neighborhoods are very dense and it was therefore explained that no further focus was necessary on the density of the areas (Expert 6, 2020, p. 6). Rather, the experts selected the population density, which seemed to make a difference to them even in the very dense neighborhoods.

The proximity to UGS was as well only selected by two of the experts, however by both for the second rank (Expert 2, 2020, p. 11; Expert 9, 2020, p. 22). The indicator was often discussed more general, saying that it would be necessary to improve the surrounding of the hub and the neighborhoods in general with more green (Expert 10, 2020, pp. 13–14; Expert 2, 2020, p. 11; Expert 4, 2020, p. 14). The close connection of the indicator with heat stress was also discussed (Expert 2, 2020, p. 11). Proximity to heat stress could also increase the draagvlak (Expert 6, 2020, p. 12). Moreover, it was discussed that it would be a very negative signal for the residents if green spaces would be removed for placing a hub there (Expert 9, 2020, p. 22). There were moreover arguments given for both placing hubs in proximity to existing green spaces and for placing them where there is little green space, depending on the structure of the neighborhoods (Expert 1, 2020, p. 15; Expert 4, 2020, pp. 12–13; Expert 9, 2020, p. 22).

The indicator available space was only chosen twice, but the issue was discussed more often. It was agreed by all experts who discussed it, that without enough space for the placement of the hub, such a project could not be realized (Expert 1, 2020, 6-7, 9; Expert 12, 2020, p. 16; Expert 2, 2020, p. 10; Expert 3, 2020, p. 6; Expert 4, 2020, p. 10). However, the experts differed in their opinion on where one could expect to find vacant space for hubs in the neighborhoods; some experts suggested to look for old houses that need to be rebuild, and instead building a hub there (Expert 5, 2020, p. 7), others argued that neighborhood hubs as conceptualized in chapter 1.2. could only find space on the edges of the neighborhoods (Expert 11, 2020, p. 5). These hubs at the edges should then be supplemented by very small “street” hubs, which would only include bicycle parking facilities (Expert 11, 2020, p. 5). If there is no space available at a location, it is not possible to place a hub there. This has a connection with the ownership of the location; the possibilities depend a lot on whether the area in question is in the hands of a private person, a developer or the municipality. Based on the conceptualization of a neighborhood hub, it can be concluded that one important aspect of the concept is the amount of space all the functions need at a hub and where this space is available within the neighborhood. It must be established, what should be present at the neighborhood hub so that it functions and how much space is required for these

functions. The question here moreover is whether there is an average size that can be used, or whether neighborhood hubs depend so much on their surroundings and differ between the cases, that an average size is not possible to derive. The second aspect of this, the existence of vacant plots to build a hub upon, is the next step. These plots would need to at least provide the space of the size of the average neighborhood hub then. Moreover, the question here is whether only areas should be taken into account which are currently vacant, or as well areas that are to be rebuild in the near or distant future (e.g. due to old buildings and infrastructure).

The indicator proximity to logistics was chosen by two experts, who discussed that it might be useful if the hub would be connected to the logistics network within the city (Expert 2, 2020, pp. 12–13; Expert 5, 2020, pp. 15–16; Expert 6, 2020, p. 12; Expert 7, 2020, p. 11). As the hubs are also supposed to house package lockers, this could have significant benefits for the functioning of the hub.

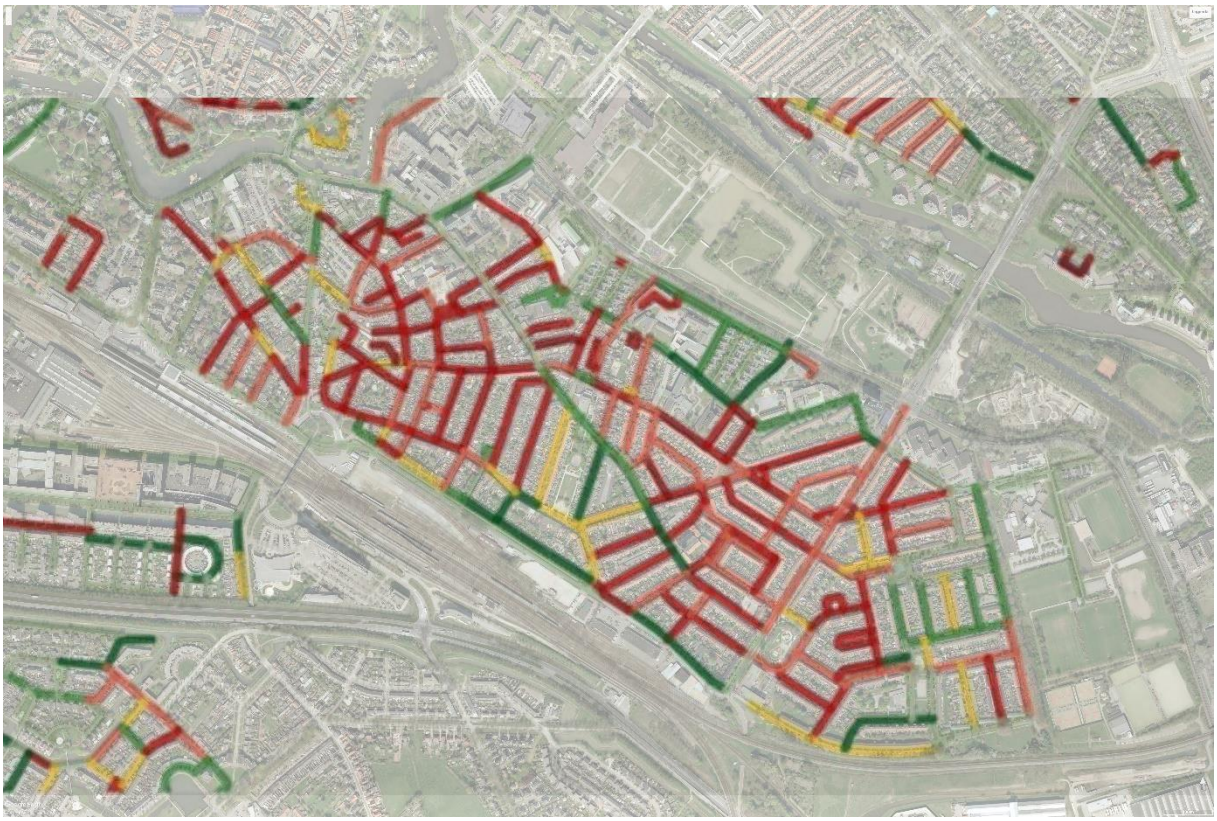
The indicator proximity to electrical substations was only chosen by three experts, but it was discussed in more detail with these experts. The reason that this indicator is not ranked higher is expected to be that two thirds of the experts were no experts for the energy side and therefore did not see this as a priority. Some of these experts however discussed that the availability of the energy network for charging is important (Expert 4, 2020, p. 14). The second reason is that even the experts for the energy side often chose not to rank the indicators very high (Expert 4, 2020, 13, 15-16; Expert 8, 2020, p. 15). Expert 9 explained on this, that it is very important to start with the spatial and population side first and then take the network into account (Expert 9, 2020, p. 17). The expert explained it like this:

„I think you need to start from your point of view first without the grid. Find the places. But then I think you find a lot of possibilities. And then after you can put the grid next to it. And then you can see if there is a connection or not. And if there are connections, then you can tell that are the, wij noemen het, we call it, laaghangend fruit. The easy collectable parts. You know, places? And more difficult. And you can work with colors. Related to the grid and this three station places are easy going and fast to build or to set up, this kind of places are more far away from the grid, more expensive and less interesting, you can, and then you can give an advise to the, to Zwolle. I think that is the best way for you" (Expert 9, 2020, p. 17).

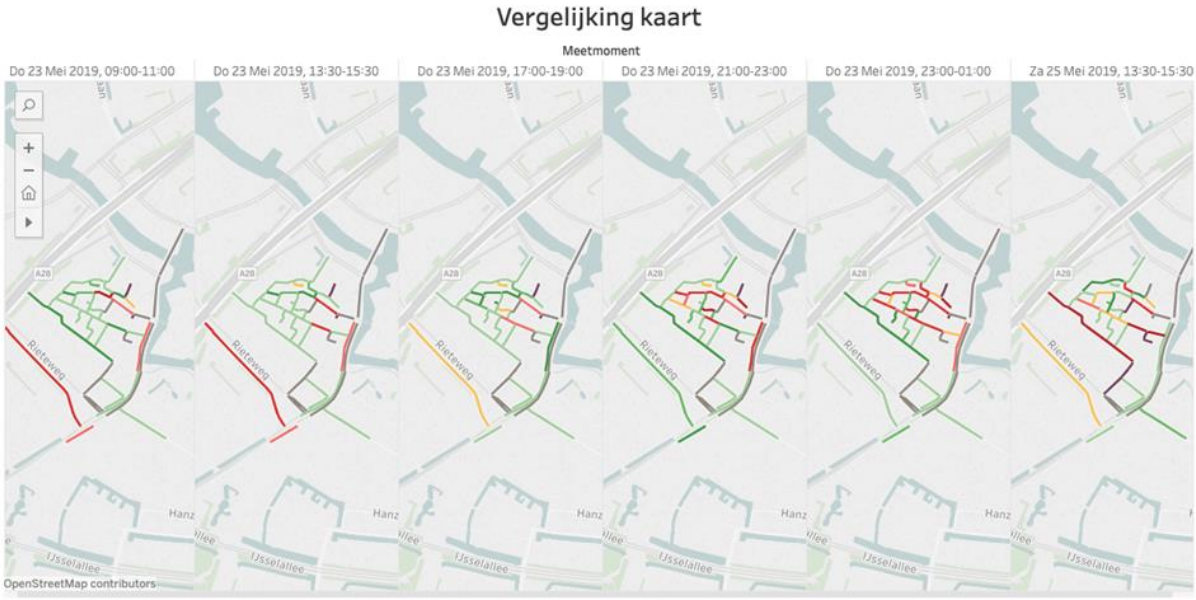
The indicator interest of mobility companies was chosen by only one expert on rank four. This expert said that it is important for searching for a location to ask mobility companies where they see a business case for their products (Expert 7, 2020, p. 13).

The indicator safety was not chosen by the experts, which is surprising because it was discussed a lot in the course of the interviews. Most experts discussed that it is part of the attractiveness of the hub, that the place itself but also the routes to it are safe, well-lit, that there is a guard at the hub and that every age and gender group should be willing to visit it (Expert 11, 2020, p. 7; Expert 2, 2020, pp. 5–8; Expert 6, 2020, pp. 13–14).

Appendix 41: Parking pressure in Assendorp and Kamperpoort – Data from the municipality



Note: Parking pressure in the neighborhood Assendorp. Map made by &morgen on the basis of data of the municipality of Zwolle.



Note: Parking pressure in the neighborhood Kamperpoort at different times of two different days. Map received from the municipality of Zwolle.

Note: Legend for both maps from the municipality of Zwolle. Occupancy level of the parking places in different categories.

Appendix 42: Indicator (social) amenities: The meaning of the functions from the BAG

Waarden	Omschrijving
woonfunctie	Gebruiksfunctie voor het wonen
bijeenkomstfunctie	Gebruiksfunctie voor het samenkomen van personen voor kunst, cultuur, godsdienst, communicatie, kinderopvang, het verstrekken van consumpties voor het gebruik ter plaatse of het aanschouwen van sport
celfunctie	Gebruiksfunctie voor dwangverblijf van personen
gezondheidszorgfunctie	Gebruiksfunctie voor medisch onderzoek, verpleging, verzorging of behandeling
industriefunctie	Gebruiksfunctie voor het bedrijfsmatig bewerken of opslaan van materialen en goederen, of voor agrarische doeleinden
kantoorfunctie	Gebruiksfunctie voor administratie
logiesfunctie	Gebruiksfunctie voor het bieden van recreatief verblijf of tijdelijk onderdak aan personen
onderwijsfunctie	Gebruiksfunctie voor het geven van onderwijs
sportfunctie	Gebruiksfunctie voor het beoefenen van sport
winkelfunctie	Gebruiksfunctie voor het verhandelen van materialen, goederen of diensten
overige gebruiksfunctie	Niet in dit lid benoemde gebruiksfunctie voor activiteiten waarbij het verblijven van personen een ondergeschikte rol speelt.

Note: The current values of the Domain Usage Purpose (Ministerie van Binnenlandse Zaken en Koninkrijksrelaties, 2018)

Appendix 43: Indicator (social) amenities: Discussion about the inclusion of the functions from the BAG

The following discussion of the functions included in the BAG is based on the meaning of the functions displayed in the explanation about the BAG and article 1.1 section 2 of the Bouwbesluit from 2012 (Bouwbesluit, 2012; Ministerie van Infrastructuur en Milieu, 2020, p. 126). Moreover, if it was not clear whether the category should be included or not, the functions of the buildings were checked in Google Maps and thereafter evaluated on the basis of their value for social interaction.

In order to decide whether a function should be included in the analysis of the social amenities or not, the following three questions were asked:

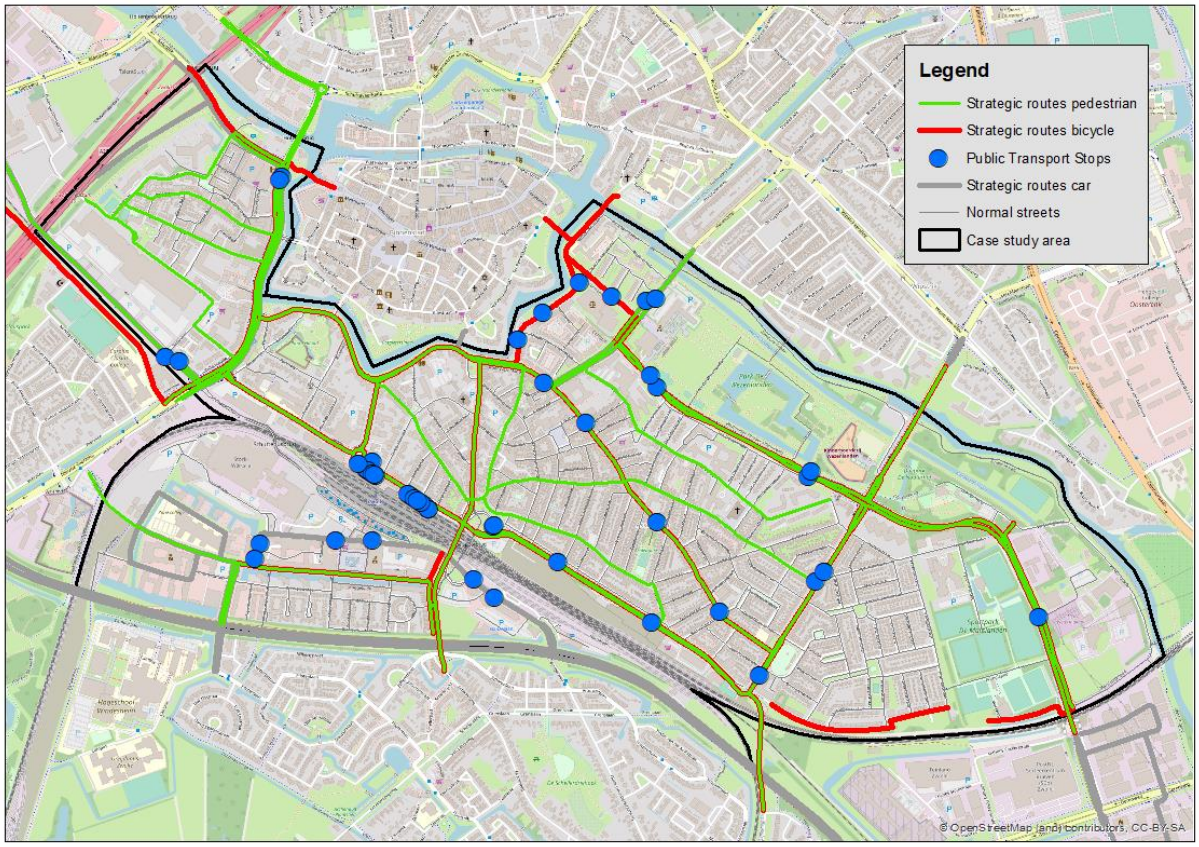
1. Is the function in line with the definition of the (social) amenities used in this research?
2. Does the function provide room for social interaction?
3. Does the function invite people to stay in the area?
4. Does the function increase the attractiveness of the hub?

- The **living function ("woonfunctie")** was not included for the analysis of the amenities as it includes buildings with the function of living. Although it might be possible to include some of the functions listed in Gemeente Amsterdam (no year), the majority of the buildings does not fulfil the requirements of the definition of social amenities used in this research.
- The **meeting function ("bijeenkomstfunctie")** was included for the analysis of the amenities as it includes all kinds of buildings which have as a main function to bring people together during different activities. Included are things like cultural, recreational or other functions that provide space for meeting among people (Gemeente Amsterdam, no year). Therefore, this function is the main function discussed in the chapter 2.3 and in the expert interviews. These functions are expected to have the highest value for the connection among residents, as they provide possibilities for spending time together.
- The **cell function ("celfunctie")** was not included for the analysis of the amenities, as it does not provide possibilities for social interaction for the residents of the neighborhoods in a typical way. Additionally, the function is not expected to increase the attractiveness of the hub. Moreover, there are no objects with this function present in the two case neighborhoods, which is why the function can be neglected.
- The **healthcare function ("gezondheidszorgfunctie")** was included for the analysis of the amenities, as it can provide the ground for social interaction among the residents of a neighborhood. The user groups of these functions might be limited in comparison to the meeting or shopping function, but some user groups might still be invited to stay in the surrounding area of the function and to these user groups the attractiveness of the surrounding area of the hub could be increased.
- The **industry function ("industriefunctie")** was not included for the analysis of the amenities, as it does not match the definition of social amenities used in this research. It is thereafter also not expected to provide room for social interaction for all residents of the neighborhood.
- The **office function ("kantoorfunctie")** was not included for the analysis of the amenities, as it was not part of the definition of the amenities used in this research. Moreover, it is not expected that offices, fire stations or police stations enhance the potential for social interaction. The town hall is included in this category as well, which might be a reason to include the category, as all kinds of people make use of the town hall and it would thereby provide room for social interaction. However, it was checked for the two case neighborhoods, and the town hall of Zwolle is part of the other usage function. Therefore, this function could be neglected.
- The **accommodation function ("logiesfunctie")** was not included for the analysis of the amenities. It is not part of the definition, but functions like a hotel or a holiday house would

have the potential to provide social interaction. However, this interaction would then normally not take place between the local residents, but between providers of the hotel and visitors. Therefore, the accommodation function does not actually have potential to increase the social interaction in a neighborhood. Moreover, there is only one building with this function in the two neighborhoods, which is why the function is relatively unimportant.

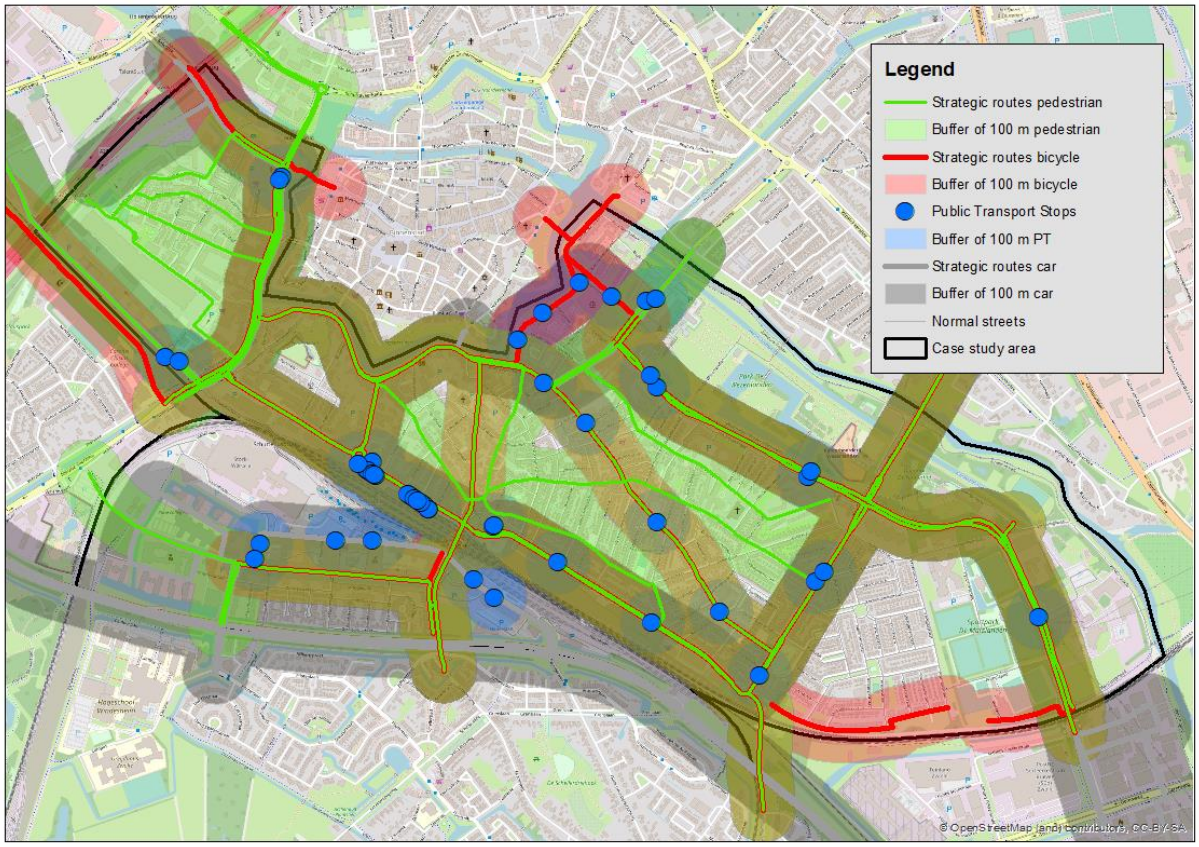
- The **educational function ("onderwijsfunctie")** was included for the analysis of the amenities. It was part of the definition of social amenities and it is expected to provide room for the social interaction of the residents. The combination with a neighborhood hub would have the benefit that more societal groups might get into closer contact with each other.
- The **sport function ("sportfunctie")** was included for the analysis of the amenities, as it matches the definition used in this research and it is expected to provide room for social interaction, invite people to stay in the surrounding area and to increase the attractiveness of the hub. At sport amenities people come together and stay for an extended period, sometimes in comparison to the shopping function.
- The **shopping function ("winkelfunctie")** was included for the analysis for the amenities, as it matches the definition of amenities. This function, together with the meeting function, are the two most important categories from the BAG for this analysis. Shopping areas provide the possibilities of meeting other people from the neighborhood and for casual social interaction on the streets. Moreover, the existence of shops has an important influence on the attractiveness of a neighborhood hub. However, also this function has to be used with caution, as it also includes not only clothes and food shops, but for example can also include prostitution, sex establishments and showrooms (Gemeente Amsterdam, no year).
- The **other usage function ("overige gebruiksfunctie")** was not included for the analysis for the amenities, as it is not actually part of the definition. Moreover, it is a sort of rest" category, which cannot just be taken into the analysis without further discussion. Several of the places with this function were checked in Google Maps and either had no described function, which makes it difficult to decide about their social interaction value, or had functions that are not expected to have a high social interaction value, such as a publishing company or backyard houses.

Appendix 44: Strategic routes (and public transport stops) for all modes of transportation in the two case neighborhoods



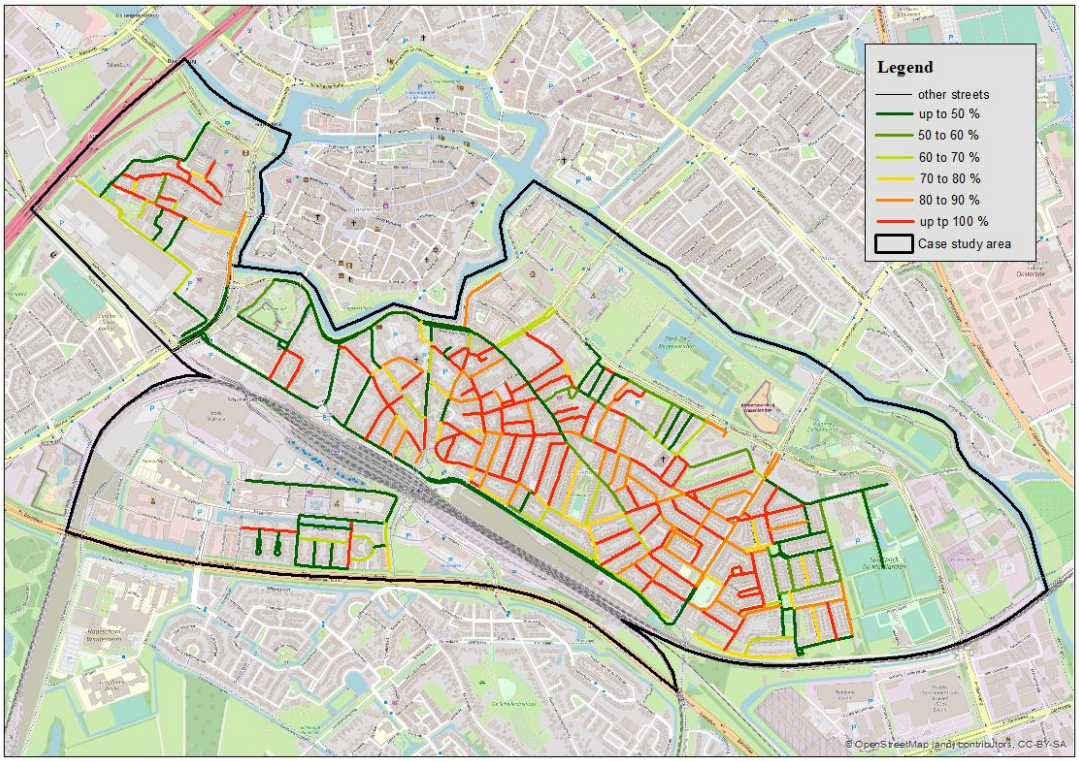
Note: Own presentation based on BISON (2018), Gemeente Zwolle (2017, 97, 99), Gemeente Zwolle (2020k, 73, 77) and PDOK Viewer (no year).

Appendix 45: Buffer areas around the strategic routes for the single modes of transportation



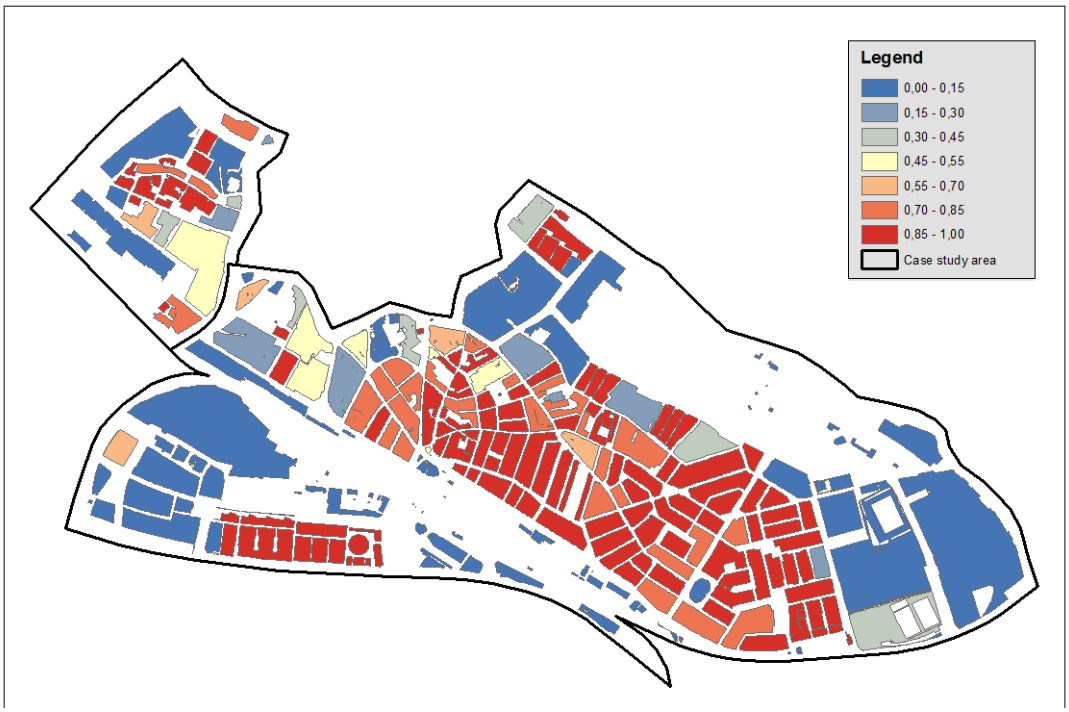
Note: Own presentation.

Appendix 46: Amount of parking pressure in the two case neighborhoods



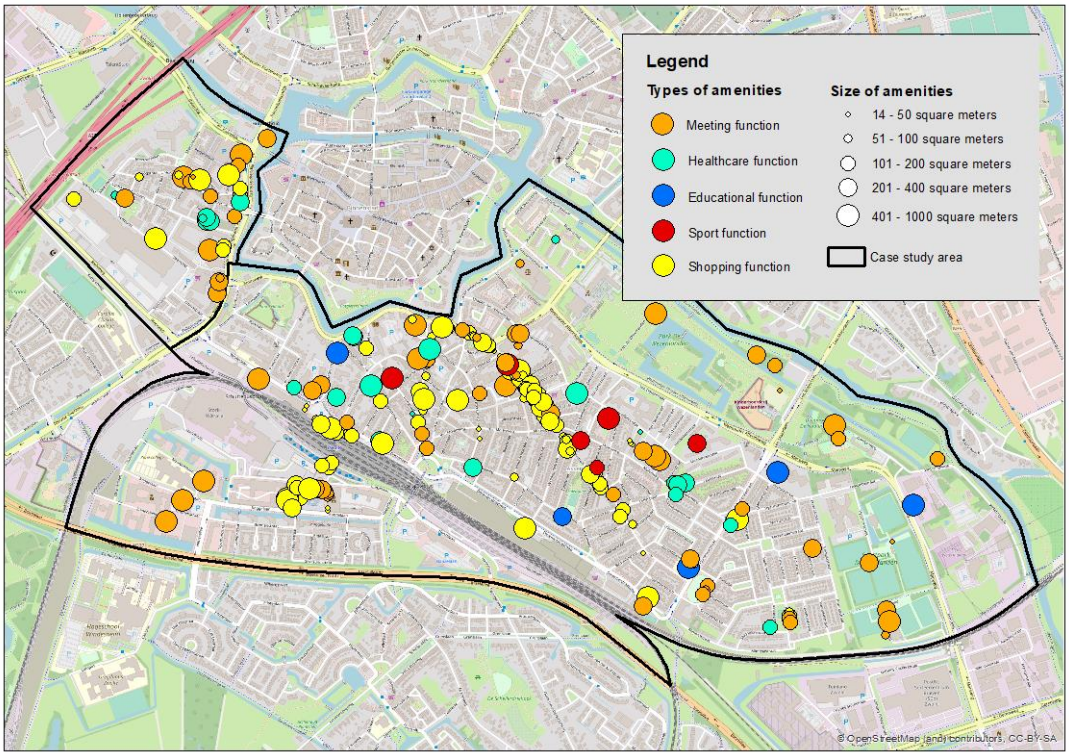
Note: Own presentation based on information provided by the municipality of Zwolle (compare to Appendix 41). The percentages represent the occupation of the parking spaces in the respective street.

Appendix 47: Mixed use index in the two case neighborhoods



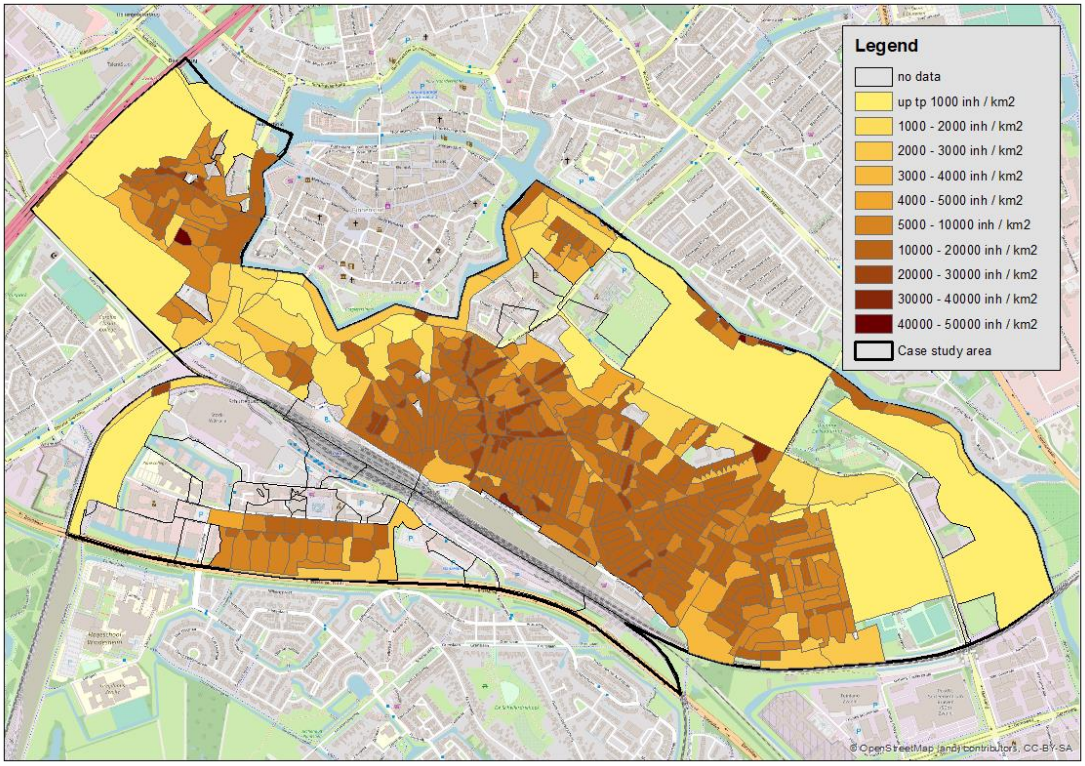
Note: Own presentation based on van den Hoek (2008) and PBL Planbureau voor de Leefomgeving (2019, p. 13)-

Appendix 48: Different types and sizes of amenities in the case neighborhoods



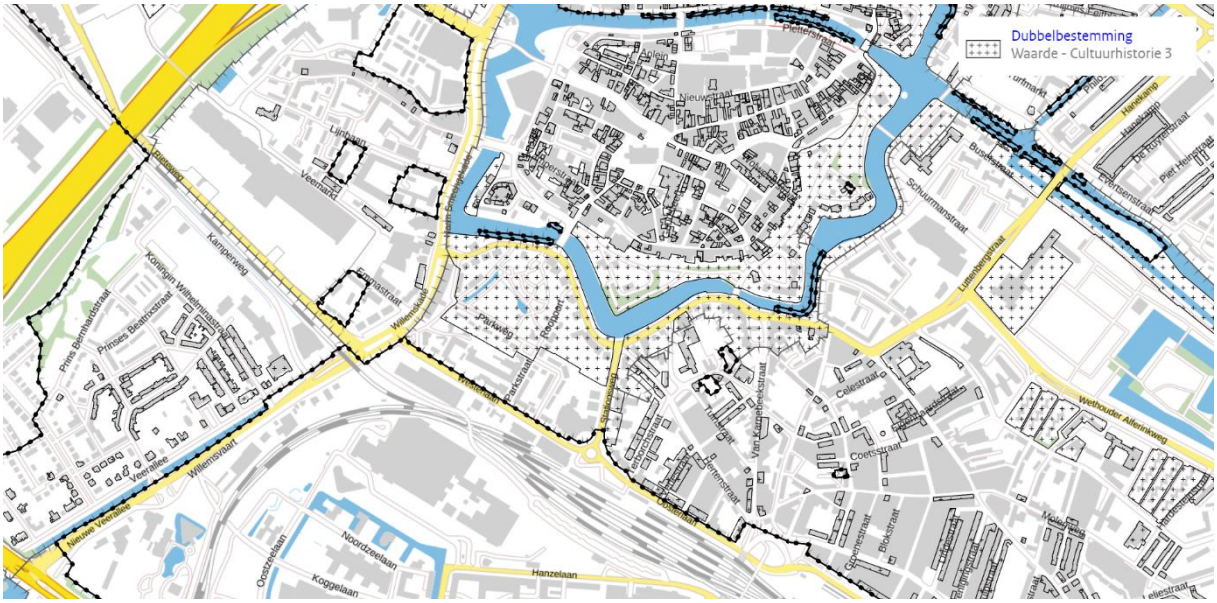
Note: Own presentation based on Ministerie van Binnenlandse Zaken en Koninkrijksrelaties (2018, p. 126), Bouwbesluit, 2012 and Kadaster (2020).

Appendix 49: Population density (inhabitants per square kilometer) in the two case neighborhoods



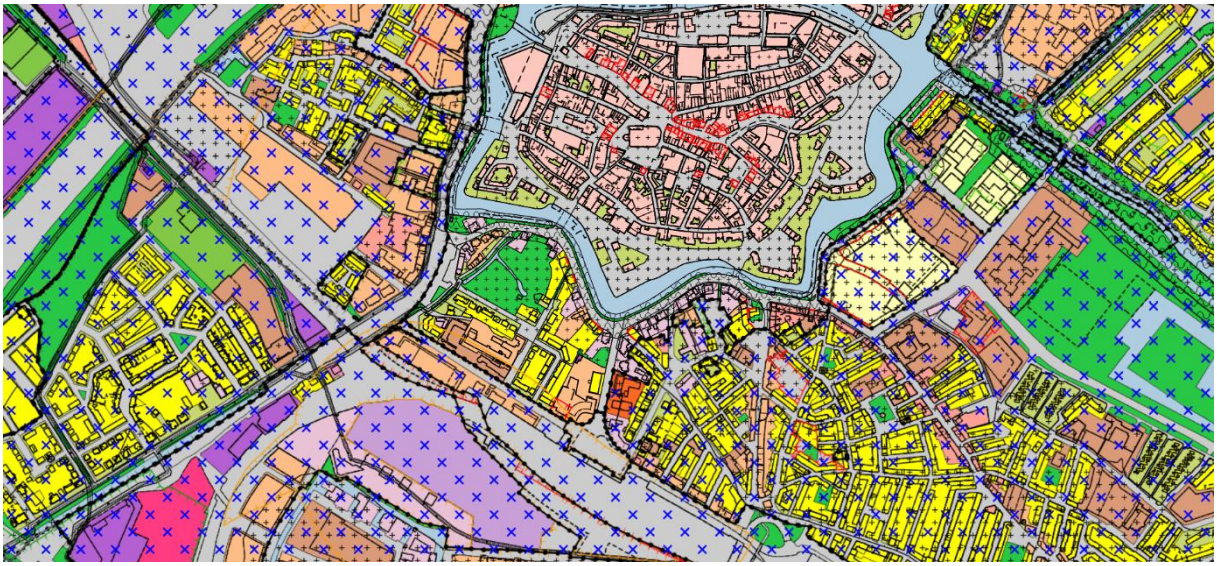
Note: Population density (inhabitants per square meter) in the two case neighborhoods. Own presentation based on CBS (2016b).

Appendix 50: Cultural historical value of the areas with high potential



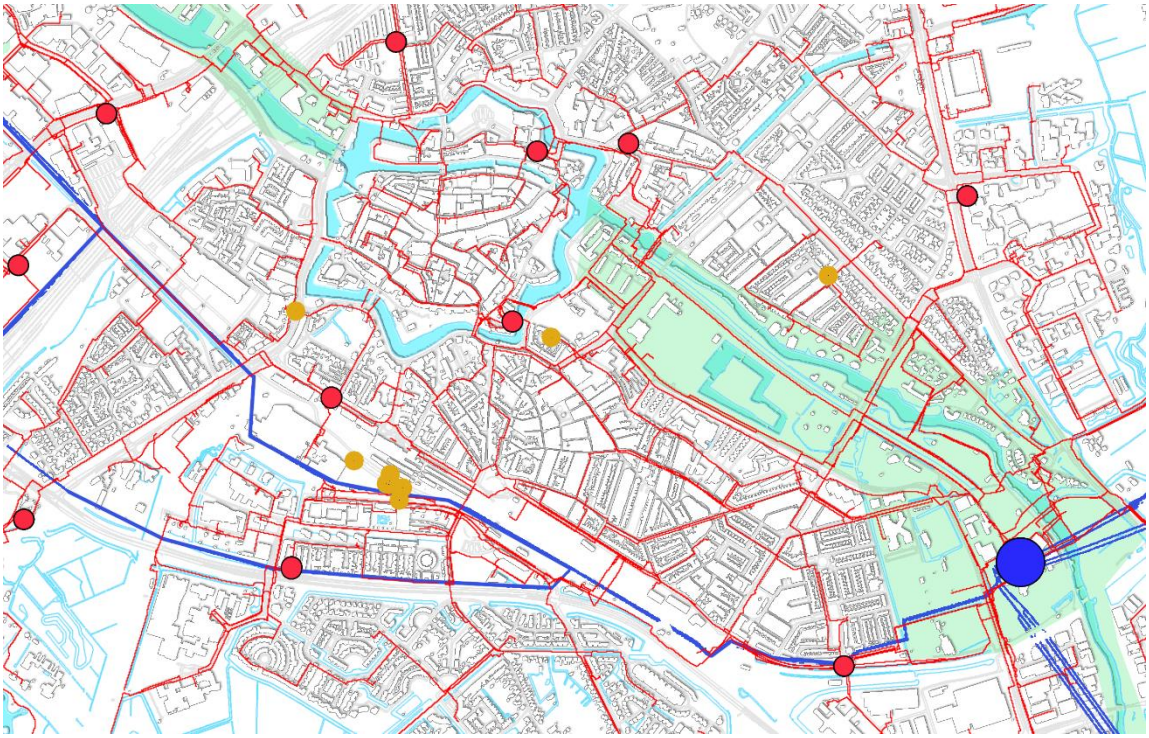
Note: Cultural historical value of the areas with high potential. Paraluplan bouw- en cultuurhistorie. Derived from Ruimtelijkeplannen (2020).

Appendix 51: Zoning plan for the areas with high potential



Note: Zoning plan for the areas with high potential. Assendorp, bestemmingsplan; Kamperpoort, bestemmingsplan; Binnenstad en omgeving, bestemmingsplan. Derived from Ruimtelijkeplannen (2020).

Appendix 52: Segment of the energy network plan of the municipality of Zwolle



Note: Information provided to &morgen by the municipality of Zwolle. Presentation by &morgen.

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