Mapping the Informal Care System in Twente: A Systemic Design Approach

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Wednesday 16th April, 2025

***Abstract*—In response to today's rapidly evolving society, design practices are shifting from traditional product-focused approaches towards methodologies addressing technical and societal challenges. One of these emerging design methodologies is systemic design, which can be applied to complex situations, such as healthcare systems. Informal care is a growing concern in the healthcare sector, as the number of informal caregivers continues to increase. This study explores how systemic design approaches are suited for the mapping of this system, with two objectives: assessing the suitability of systemic design in this context and mapping this system in Twente. Although there is no single agreed-upon definition of systemic design, the background research shows it is shaped by facets of systems thinking and design thinking. Based on the *Design Journeys through Complex Systems* book, a workshop consisting of three methods, actors map, stakeholder discovery and actants map, was conducted with two informal care experts. The primary results, related to the method's suitability, highlight how the activities enabled the participants to identify stakeholders and investigate their underlying relations and interactions. The secondary results, related to the mapped system, showed the numerous stakeholder involved and their power dynamics. The restricted data collection and analysis and small sample size highlight several limitations. Therefore, future work could build on this study by incorporating retrospective one-on-one interviews and questionnaires and increasing the diversity among participants.**

Introduction

The nature of design has changed significantly over time. It originated in the Middle Ages when designing and making products was predominantly executed by craftsmen as one creative process (Dorst, 2019). During the Industrial Revolution, its focus shifted towards technically complex products, such as aeroplanes. However, in today's rapidly evolving society, many organisations are struggling with more complex dilemmas, highlighting an increasing need for novel problem-solving strategies (Dorst, 2019). Design encompasses a powerful integration of several facets including, analysis, solution finding and implementation (van der Bijl-Brouwer, 2019). Therefore, in response to new societal needs, design practices have shifted from a traditional product-oriented practice to methodologies addressing technical and societal challenges (van der Bijl-Brouwer & Malcolm, 2020). However, as design practices are moving towards the domain of sociotechnical systems, traditional design methodologies should be adopted for this new shift (van der Bijl-Brouwer, 2019).

Systemic design is one of these emerging design approaches. Jones simplistically defines systemic design "as the application of systems approaches to advanced design problems" (Jones, 2021). This approach recognizes the complexity and interconnectedness underlying a system or a challenge (Design Council, 2021).

Systemic design can be applied to various domains, including the healthcare system, which currently experiences various complex problems. A prominent example is an ageing society, driven by increasing life expectancies and rising infertility rates (Elayan et al., 2024). This ageing society is also prevalent in The Netherlands, where the average age of society has risen from 30.8 years in 1950 to 42.4 years in 2024 (Centraal Bureau voor de Statistiek, 2024b). Currently, 20% of the inhabitants are aged 65 years or older. This percentage is expected to increase and account for 25% of the population by 2040 (Centraal Bureau voor de Statistiek, 2024a), as the so-called 'baby boom generation' reaches the age of 65 in the upcoming years (Rijksinstituut voor Volksgezondheid en Milieu (RIVM), 2020).

This ageing shift challenges the durability of the public (long-term) healthcare (Elayan et al., 2024). In response, governmental institutions are forced to shift away from formal long-term care responsibilities, such as the care provided in nursing homes, and shift towards relying on one's personal networks, thereby aiming to reduce costs and time (Verbakel, 2018). Consequently, individuals in need of care are more reliant on family and close friends for their care. Informal care currently accounts for the majority of care received by individuals aged over 50 years and is only expected to rise in the coming years (Broese van Groenou & de Boer, 2016). Informal caregivers provide unpaid care for (an older) dependent individual who is in need of help (Broese van Groenou & de Boer, 2016). Examples of informal caregivers are a spouse, son or daughter, a close neighbour or other close relatives. While providing informal care to a loved one might be a fulfilling experience, it can also introduce drawbacks such as negative health consequences for the informal caregiver (del Pino-Casado et al., 2021). Thereby not only comprising their well-being but also impacting the quality of the care provided (del Pino-Casado et al., 2021).

As illustrated, informal care is situated in an interconnected system, involving various stakeholders. Understanding this system is essential when aiming to implement meaningful changes. Therefore, the main objective of this study is to explore the suitability of systemic design methodologies to

map the informal care system in Twente. This study has two objectives: the primary objective is to assess the suitability of a systemic design approach in this context and the secondary objective is to map the informal care system in Twente.

BACKGROUND

This section presents relevant background research, which is necessary to gain a better understanding of systemic design as well as this study's field of application, the informal care system.

The Roots of Systemic Design

Systemic design is rooted in two branches of design; systems thinking and design thinking (Jones, 2021). This section explores how these two design practices jointly shape systemic design.

Systems Thinking: Systems play an essential role in systems thinking. The Cambridge Dictionary defines a system as "a set of connected things or devices that operate together" (Cambridge Dictionary, n.d.). In line with this general definition, Bijl-Brouwer and Malcolm (2020) define a system as an integrated unit where essential properties arise given its relations with other parts. This phenomenon is called emergence. It occurs when a complex whole has properties that individual components do not possess on their own, but that arise when the individual components are combined. To illustrate, the emergent property of a car is driving.

However, when exploring how systems play a role in systems thinking, it is evident there is no single agreed-upon definition for systems thinking (Arnold & Wade, 2015), making it essential to find a shared understanding. Since Richmond (1994) introduced systems thinking as concluding the behaviour of a system by gaining a thorough understanding of the underlying structures, there have been numerous attempts to redefine this definition (Arnold & Wade, 2015). However, due to its various application fields, it is difficult to formulate one clear definition.

Besides defining what systems thinking exactly entails, numerous authors also investigated its key characteristics. Bijl-Brouwer and Malcolm (2020), for instance, state that this type of thinking involves synthesis, which involves the comprehension of a phenomenon in the context of the greater whole. Monat and Gannon (2015) add that systems thinking deviates from linear thinking, and instead focuses on the relations among components rather than focussing on the components themselves. Additionally, they emphasize that systems thinking is a holistic approach to a problem (Monat & Gannon, 2015). Arnold and Wade (2015) argue that systems thinking consists of three "kinds of things": elements, the relation between these elements which they call interconnections and the goal or purpose of the system, which is achieved with the interconnectedness of the elements. Additionally, they stress that while not all systems may have clear goals, systems thinking does have an ultimate goal.

To conclude, although there is not a single clear and agreed-upon definition for systems thinking, this approach does emphasize the relations of interconnected elements of a system, which provides a solid foundation for systemic design approaches.

Design Thinking: This design approach emerged in the last decades and is currently applied to various domains beyond design, such as engineering and business (Razzouk & Shute, 2012). The concept was first introduced by the architect Rowe (1987), however, his definition solely covered architectural design practices. Therefore, numerous researchers attempted to redefine this new concept. Nonetheless, in its current wide use, defining design thinking remains challenging (Liedtka, 2013).

Besides attempts to formulate its precise definition, researchers investigated essential characteristics of design thinking, which will be further explored. Design thinking is not only a way of thinking, it also encompasses an iterative way of working. This approach helps to redefine problems in a human-centric manner and it uses solution-based approaches such as brainstorming, prototyping and testing (Dam & Siang, 2019). Altman et al. (2018) also emphasize the iterative nature of this approach, by repetitively going through circles of ideating, prototyping and testing. In their study, they applied design thinking to the healthcare sector and concluded that design thinking might result in acceptable and useful solutions, with some limitations concerning quality and methodology (Altman et al., 2018). Another study investigated several characteristics of so-called 'design thinkers', which include the ability to visualize, having a systemic vision and being human- and environment-centred (Razzouk & Shute, 2012).

To combine and capture the key characteristics of design thinking, researchers have created several Design Thinking frameworks. A widely known framework is the so-called Double Diamond Method, which consists of four key phases, discover, define, develop and deliver (Kochanowska & Gagliardi, 2022). This model consists of two diverging phases, the discover and develop stages, which aim to open the scope of the project and explore possibilities. The define and deliver phase, on the other hand, are divergent phases, aiming to narrow the scope by making decisions (Kochanowska & Gagliardi, 2022). Another widely used framework is developed by d.school and consists of five stages: empathize, define, ideate, prototype and test (Dam & Siang, 2019). These stages are designed to be non-linear and iterative (Dam & Siang, 2019).

To conclude, due to its wide use in various domains, design thinking remains challenging to define. However, design thinking does include iterative phases and solution-based activities such as brainstorming. These characteristics lay the groundwork for systemic design.

Systemic Design as a result of Systems Thinking and Design Thinking: Key characteristics drawn from both systems thinking and design thinking lay the foundation for systemic design. For instance, approaching problems as a system and identifying its essential elements is drawn from systems thinking, while involving relevant stakeholders in the process is drawn from design thinking. Collectively, these characteristics contribute to the main goal of systemic design, which is to

utilize knowledge from systems thinking and design practices to co-design improved organizations, social systems, programs and policies (Jones, 2021).

Social Systems and Wicked Problems

Systemic design is concerned with social systems, more specifically complex social systems. Jones recognizes this by stating that higher-order social systems consist of various sociotechnical subsystems. Social systems can be defined as emergent structures with interconnected elements ensuring a human-intended outcome (Jones, 2021). The informal care system illustrates such a complex system, with its dynamic structure encompassing various relations between multiple stakeholders on national, regional and local levels. Challenges arising in these complex social systems can be described as wicked problems. This term was first introduced by Rittel and Webber (1973) and they claim that wicked problems are undefined. Wicked problems are often ill-defined problems, without straightforward solutions and the absence of objective success criteria (Rittel & Webber, 1973). As these problems are characterized by evolving relations and contradictory stakeholder interests, these problems are extremely challenging and nearly impossible to solve (Broese van Groenou & de Boer, 2016). A systemic design approach embraces this complexity by opening up the systems, understanding and mapping the system and co-designing for an improved system (Broese van Groenou & de Boer, 2016), (Jones, 2021).

METHODS

This section outlines the methods used in this study, which consisted of a workshop with several activities. First, the systemic design approach is presented. Then, the recruitment of participants is discussed. In addition, the procedure is described. This section is finalized with a description of the data collection and analysis plan.

Study Design

Several systemic design tools were selected to assess the suitability of systemic design approaches for the mapping of the informal care system. The methods were selected from the book *Design Journeys Through Complex Systems* (Jones & van Ael, 2022). This handbook offers designers practice tools for systemic design. The book provides an extensive outline of systemic design and proposes 7 stages for systemic design: framing the system, listening to the system, understanding the system, envisioning desired futures, exploring the possibility space, planning the change process and fostering transition. These seven stages are visualized in *Figure 1*. To facilitate reaching the goal of every stage, the book presents five to six fitting methods. Every method is explained in detail and accompanied by posters that can be utilized during a workshop or focus group. Since this study solely focuses on mapping the system, only the first three stages, framing the system, listening to the system and understanding the system, are relevant.

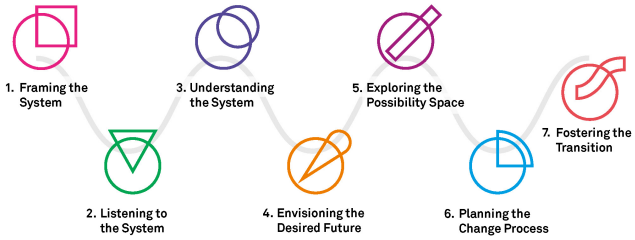

Fig. 1: Seven stages in Design Journeys Through Complex Systems

After exploring the presented methods for these three stages, three methods were selected to incorporate into the study design. These three activities were selected as their outcomes are in line with the study's objectives. The selected methods are the actors map, stakeholder discovery and the actants map. The actors map, is part of the first stage, framing the system, and aims to identify the key stakeholders in a system map and identify possible relations (Jones & van Ael, 2022). This method was selected as it identifies all stakeholders generally involved. Both the stakeholder discovery and actants map are part of the second stage, listening to the system. The activity of stakeholder discovery aims to create persona profiles with important characteristics of key stakeholders (Jones & van Ael, 2022). This method builds upon the actors map and was selected as it facilitates a better understanding of core stakeholders. The final activity, the actants map, aims to map out the dominant relationships in a social system. This activity was selected as it investigates the earlier identified relations in the actors map on a deeper level. This activity identifies the (shared) goals of each of the selected stakeholders, their ambitions and concerns and finally how they do (not) exchange value.

Participants and Recruitment

Ideally, informal care experts in the region of Twente would be recruited for this study. In this case, experts refer to individuals with numerous years of experience in this domain and have various connections with other stakeholders in the field. Through the network of the project's supervisors four potential participants, who meet the criteria of being called experts, were contacted. The sent recruitment email is presented in *Appendix A*.

Although traditional focus groups aim to include five to twelve participants (Prosser et al., 2024), due to limited time and resources this study only aimed to include two participants. Given the explorative nature of this study, the inclusion of only two participants is considered to be sufficient to gain initial insights into the suitability of systemic design in this context. Traditional focus groups enable researchers to yield rich data (Prosser et al., 2024), and the inclusion of two participants can still facilitate this rich group discussion.

Procedure

Prior to the workshop, the participants were asked to complete a short questionnaire. In the questionnaire, they were asked about their experience with informal care. In addition, they were asked to note down present stakeholders in this system. The questionnaire questions are included in *Appendix A*.

The workshop itself was held at the DesignLab, on the campus of the University of Twente. The session was planned to last for two hours. The session started by introducing the research and its objectives. The introduction included an icebreaker activity, which aimed at building rapport between the participants and the facilitator and encouraging an open atmosphere. In this activity, the participants received various value cards, which are based on the Schwarz Value Inventory (Schmitt, Schwartz, Steyer, & Schmitt, 1993). From these various cards, the participants could select two to three values that spoke to them personally. Then the participants were encouraged to introduce themselves by connecting the values to their profession and personal life. Thereafter, some notices were made about the definition and use of stakeholder and informal caregivers. To conclude the introduction, the participants could sign the informed consent form.

After the introduction, the first activity called actors map was held. The participants received a poster with a system map, consisting of four axes, which was based on the template provided by the *Design Journeys* book (Jones & van Ael, 2022). For this workshop, the axes were translated into Dutch and the axes were slightly altered in line with the workshop's goal. The selected axes were as follows: 'kennis $\longleftrightarrow$ macht' for the x-axis (which roughly translates to knowledge and power) and 'beleid $\longleftrightarrow$ praktijk' for the y-axis (which roughly translates policy and practice). A digitalized version of this poster is presented in *Figure 2*. The participants also received stakeholders cards which were based on the stakeholders identified in the questionnaire completed prior to the workshop. After an explanation of the activity, the participants were asked to place the stakeholder cards accordingly on the map. They were also encouraged to come up with new stakeholders if these had not been included in stakeholder cards. Once the participants placed all the stakeholders on the map, they were asked to draw relations on the map between the stakeholders. This activity was planned to last for half an hour.

After a small break, the stakeholder discovery was conducted as the second activity. For this activity, the participants received another poster whose layout was based on the template provided in the *Design Journeys* book (Jones & van Ael, 2022). In this case, however, the template was translated into Dutch and slightly altered to align with this workshop's goal. A digitalized version of this poster is presented in *Figure 3*. After explaining the activity, the participants were asked to select two stakeholders for which they would create two separate profiles on two separate posters. To create the profiles, cards with characteristics and their extremes were provided to the participants. The utilized cards are presented

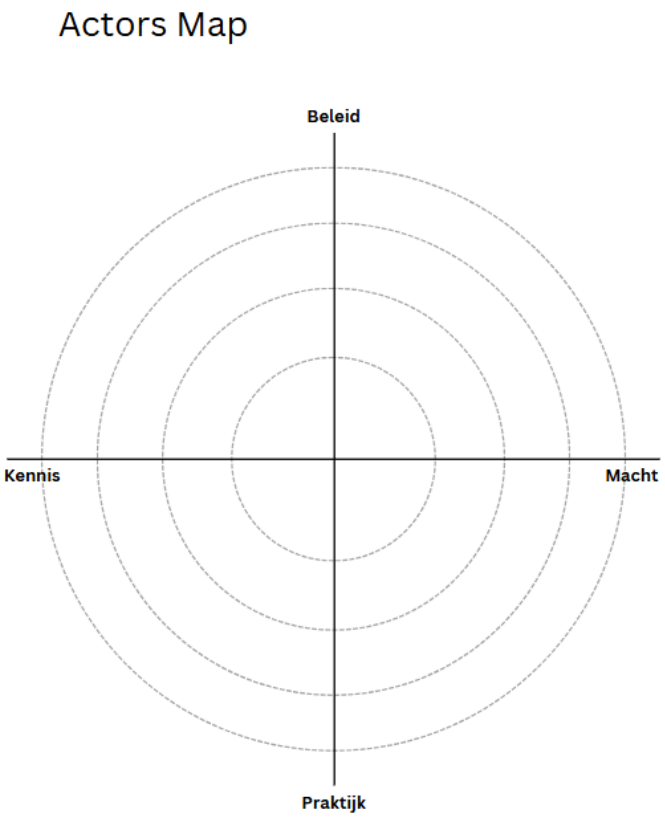

Fig. 2: Actors Map Poster

in *Appendix A3*. While these cards could be used during the activity, the participants were encouraged to define their own characteristics and extremes when better suited. For each stakeholder, they were asked to draw a profile by placing the stakeholder on the spectrum for every characteristic and its extremes. This activity lasted for thirty minutes.

After another small break, the final activity was conducted, which was called the actants map. The participants received two similar posters, which were based on the template provided in the *Design Journeys* book (Jones & van Ael, 2022). For this activity, the template was slightly altered and translated into Dutch. A digitalized version of this poster is presented in *Figure 4*. After explaining this activity, the participants were encouraged to select two pairs of stakeholders whose relation they wanted to analyze more thoroughly. For each selected pair, the participants received a separate poster. This activity lasted for thirty minutes.

Finally, the workshop was concluded by asking the participants if they still had relevant topics which were left undiscussed in the workshop. Thereafter, the facilitator asked how the participants experienced the workshop and they were asked for their opinions about the workshop. At the end, the participants were thanked for their time and input.

Data Collection and Analysis

Based on the procedure described above, this section describes the data collection and analysis plan.

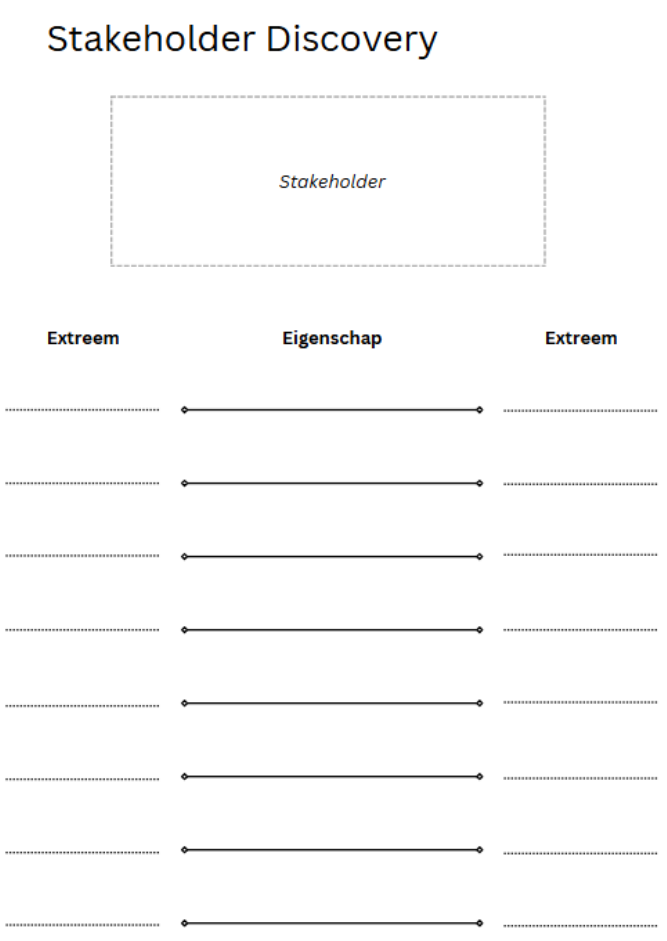

Fig. 3: Stakeholder Discovery Poster

Fig. 4: Actants Map Poster

Data Collection: As stated in the introduction, this study has two main objectives. The primary objective is to assess the suitability of systemic design for mapping the informal care system. The secondary objective is to create a map of the informal care system in Twente. To address both objectives, the discussions held during the workshop are relevant. Therefore, a designated minute taker will note down quotes and provide summaries of the discussions during the workshop.

To address the first objective, the minutes will be collected. Additionally, the workshop's facilitator will note down observations about the suitability of the selected methods. Both the minutes and observations result in qualitative data.

The secondary objective is to map the informal care system in Twente. To address this objective all the produced materials, such as the filled-in posters and written notes of participants will be collected. Additionally, the minutes will also be collected for this objective. Both the produced materials and collected minutes result in qualitative data.

Data Analysis: The collected qualitative data for the primary objective will be analyzed by identifying prominent ideas and thoughts which are frequently mentioned or emphasized during the workshop. These ideas and thoughts will be summarized in key takeaways. The analysis of the results for the second objective will use a similar approach. In this case, the produced materials will be digitalized in the software Canva. Based on the digital representations and the gathered minutes, key takeaways will be formulated.

Results

This section presents the results of the conducted workshop. First, the participants who were involved in this study are introduced, followed by a discussion of the results from the three activities.

Participants

Although all four potential participants replied to the recruitment e-mail, only the first two respondents were included in this study, in line with the recruitment plan described in the previous section. The included participants were a female and a male expert. The male is concerned with developing innovations for the informal care sector. The female is employed as an informal care consultant (mantelzorg consulent in Dutch) in one of the municipalities in Twente.

Questionnaire

Prior to the workshop, the participants were asked to complete a short questionnaire, in which they were asked to identify stakeholders in the informal care system. In total 23 stakeholders were identified. Examples of stakeholders include: family, general practitioners, healthcare providers and the municipality. All the listed stakeholders are included in *Appendix B1*.

Actors Map

For this first activity, the participants first received the stakeholder cards. After reviewing all the stakeholder cards, the participants started placing the cards one by one on the provided map, while discussing what kind of position these stakeholders have within the system. Thereafter, the participants identified connections between stakeholders who have (prominent) relations. A digitalized version of filled in poster is included in *Appendix B2*. A picture of this activity during the workshop is presented in *Figure 11*.

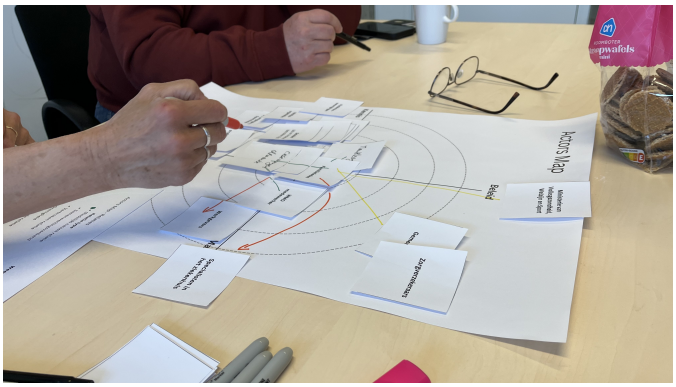

Fig. 5: Photograph of the Actors Map Activity

Primary Results: Considering the primary objectives of this study, several observations were made. First of all, asking the participants to complete a questionnaire prior to the workshop saved valuable time, which allowed for a smooth start to this activity. Additionally, the participants seemed to understand this activity, as they had no questions before starting nor did any unclarities arise during the activity itself. Another notable observation is that one of the quadrants of the map remained relatively empty, as no stakeholders were placed there. Furthermore, drawing the relations between the stakeholders enabled the participants to consider how these stakeholders interact with each other and facilitated an interesting discussion.

Secondary Results: When addressing the secondary objective of this study, all the stakeholder cards were included on the map. When discussing the place of the stakeholders on this map, it was highlighted that both the informal caregiver and the client, the person in need of care, are the most important stakeholders. Various other parties such as the government, municipalities and health insurance companies have great power, however, they have little practical knowledge and limited insight into the current situation. Additionally, it was emphasized that there are evident differences in the system for every municipality as they have their individual policies. Another interesting insight is that the upper left quadrant in *Figure 2*, between knowledge and policy, remained rather empty after placing all the stakeholders on the map. One of the participants noticed this and mentioned that ideally, many stakeholders should be placed in this quartile.

To wrap up this activity the participants were asked to draw connections between stakeholders who have relations with one another. An emerging relation which was highlighted, is between informal caregivers and their employers. One of the participants mentioned that employers are gradually recognizing the role they can play for employees who provide informal care. Additionally, the participants noted the conflicting relations municipalities have due to financial matters.

Stakeholder Discovery

For the stakeholder discovery activity, the participants were first asked to select two relevant stakeholders for whom they would create persona profiles. The stakeholder cards, from the previous activity, were used as inspiration for this activity. After a brief discussion, the municipality and welfare organizations were selected as stakeholders to create a profile for. The digitalized created profiles are presented in *Appendix B3*. A picture of this activity during the workshop is presented in *Figure 6*.

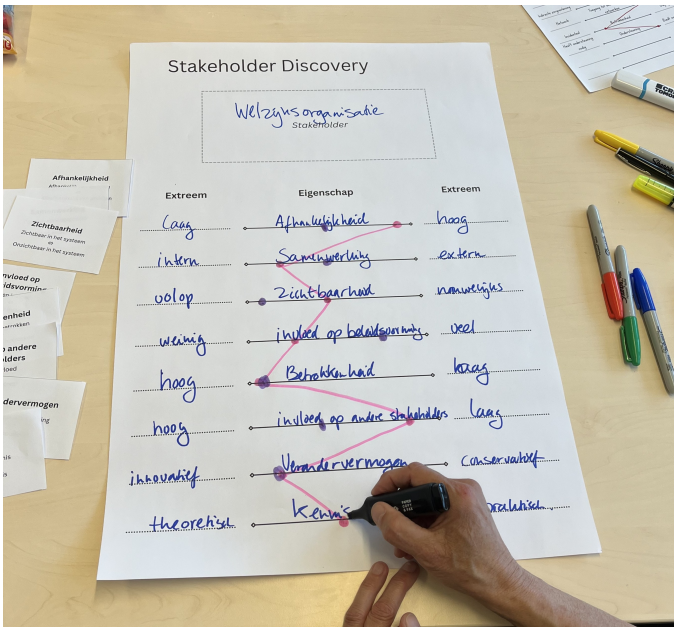

Fig. 6: Photograph of the Stakeholder Discovery Activity

Primary Results: For this activity, several observations were made to address the primary objective of this study. First of all, selecting stakeholders for this activity, based on the actors map facilitated a smooth transition and made the workshop dynamic, as the participants could choose which stakeholders they considered to be important in this system. While the initial assignment was to solely create profiles for the current

situation, the participants suggested including an ideal profile for each stakeholder as well. Furthermore, the provided characteristic cards inspired the participants in some cases to identify new characteristics and extremes. For instance, the characteristic card of collaboration with the extremes 'collaboration oriented' and 'works in isolation', was altered to 'internally focussed' and 'externally focussed'. Using these cards as inspiration helped participants understand what kinds of characteristics they could define and how these could be adapted to fit the selected stakeholders. Another observation is that one of the participants commented that they created these profiles based on their experience. However, if the selected stakeholders were to create their own profiles, it would be interesting to observe the differences between the profiles, highlighting how stakeholders perceive themselves compared to how they are perceived by others.

Secondary Results: The municipality was the first persona profile created. The selected characteristics for this stakeholder include power, collaboration, interests, knowledge, ability to change, involvement and access to supporting networks. Based on the created profile, it becomes evident that municipalities care about their own interests more than those of others. They have great power but mainly focus on internal collaborations. Additionally, they have little knowledge and are considered to be rather conservative. Ideally, however, they would be focused on the interest of others by collaborating with external parties more frequently. With a high level of involvement, they should have more practical knowledge and adopt an innovative mindset.

For the welfare organizations the characteristics of dependencies, collaboration, visibility, influence of policy-making, involvement, influence on other stakeholders, ability to change and knowledge were selected. For the current profile, it is evident that while they have reasonable visibility and a high level of involvement, they are highly dependent on others and have little influence on others. They mostly focus on internal collaborations. They do adopt an innovative mindset and have reasonable practical knowledge. Ideally, however, their profile would be more nuanced, with fewer dependencies, a higher level of influence on policy-making and a greater impact on other stakeholders. Nonetheless, their adopted innovative mindset and practical knowledge should be maintained.

Actants Map

For the final activity, the participants were asked to select two pairs of stakeholders, whose relation they would analyze more closely. The selected pairs were (1) informal caregivers and welfare organizations, and (2) municipalities and healthcare providers. The digitalized created profiles are presented in *Appendix B4*. A picture of this activity during the workshop is presented in *Figure 7*.

Primary Results: While the other two activities were relatively straightforward for the participants, this activity was perceived as more challenging. The selected words on the poster, such as 'zorg' (concern in English) caused some confusion for the participants. Also, the value exchange at the bottom of the

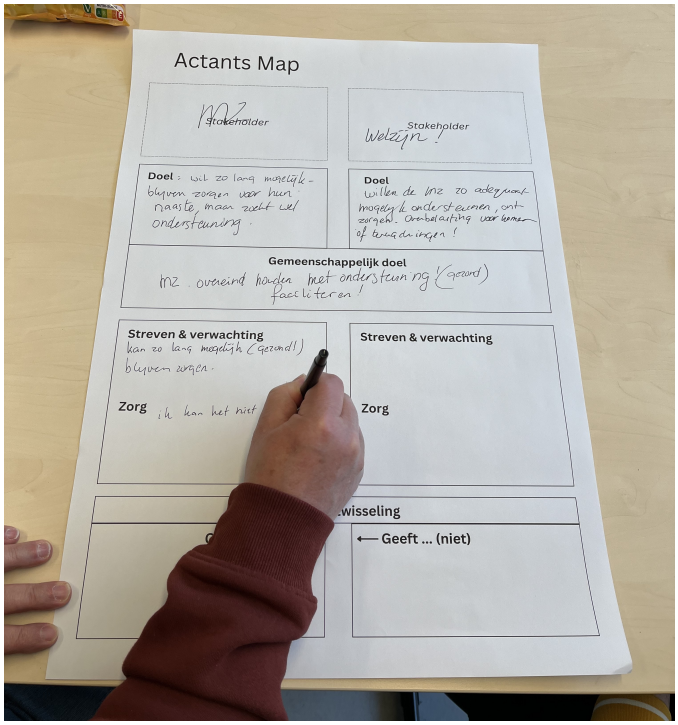

Fig. 7: Photograph of the Actants Map Activity

poster caused ambiguities. However, after another explanation, the participants gained a better understanding of the activity. While the layout of the poster provided writing space for the analysis of the relations, the value exchange space could have been used more effectively. Currently, the value exchange is focused on identifying values stakeholders do and do not exchange, however, during the workshop the participants only noted what values they did exchange and not the values that were not exchanged.

Secondary Results: First, the relationship between municipalities and healthcare providers was analyzed, which is a topical interaction. While municipalities aim to support citizens and healthcare providers aim to provide professional health care, they share a common goal of ensuring that healthcare remains affordable now and in the near future. Municipalities aim to stimulate informal care, however, they have conflicting interests concerning financial matters. Healthcare providers, on the other hand, expect more informal care initiatives to support their duties. Finally, both parties exchange money and valuable knowledge. Besides, healthcare providers also contribute locations and employees to municipalities.

Secondly, the interaction between informal caregivers and welfare organizations was analyzed. Informal caregivers aim to care for their loved one as long as possible, while also seeking support for themselves and the person they care for. Welfare organisations aim to provide appropriate support and prevent the overload of informal caregivers. Their shared goal is to support and maintain the well-being of informal caregivers.

Informal caregivers are concerned about their ability to continue the care for their loved one. Therefore, they strive

to continue providing care while maintaining their well-being. In line, welfare organizations strive to reduce overload of the caregivers and offer support when necessary. However, these organisations face concerns as they are very dependent on subsidies. The two parties have a fair value exchange, as informal caregivers contribute experience and practical knowledge, while welfare organizations offer training, recognition and support, making the caregivers feel seen and appreciated.

Discussion

This study explored the suitability of systemic design methods to map the informal care system in Twente. This study had two objectives: assessing the suitability and mapping the informal care system in Twente. Three methods, actors map, stakeholder discovery, and actants map, were applied during a workshop involving two informal care experts. The first two methods were easily understandable, while the last activity was perceived as more challenging. Despite this, the methods revealed interesting insights about the stakeholders and their dynamics in this system, highlighting powerful stakeholders, such as the government and municipalities, as well as stakeholders such as welfare organizations, who have valuable intentions but limited dominance.

Reflections on Primary Outcomes

The primary objective of this paper is to assess the suitability of systemic design methods for the informal care system. The reflections below provide insights on the effectiveness and encountered challenges for each activity.

For this primary objective, a semi-structured approach was applied. While various sources of inspiration were provided to participants, such as stakeholder cards and characteristic cards, the participants were encouraged to make additions and alterations when necessary. This semi-structured approach seemed to be suitable, as staying open-minded during the workshop is important to capture the complexity of the entire system. One research, applied ecomapping to explore informal child care, while the method itself had a structured approach, creating the map itself required flexibility (Johnson et al., 2017). This is in line with the semi-structured approach for this workshop, allowing for unexpected findings. The balance between flexibility and structure proved valuable throughout the workshop.

Actors Map: One of the main outcomes of the first activity was the relatively empty fourth quadrant (knowledge and policy, in *Figure 2*). While this may imply an actual gap within the informal care system, it could also indicate that the selected axes for this activity were not as suitable. One of the participants noticed this gap and mentioned that ideally, more stakeholders should be placed in this quartile, however, currently, according to one participant, this is not the case. Nevertheless, this does indicate that the axes should be carefully selected as they can affect the outcomes of the activity significantly. While the *Design Journeys* book provides four fixed axes, including knowledge, power, policy and ecosystem (Jones & van Ael, 2022), one should actively reflect on how these axes do (not) fit with the to-be-analyzed system.

Another reflection is that this type of activity is a fitting starting point for a workshop, as it creates an overview of the entire system. Stakeholder mapping is a widely used and recognized tool, as it allows for a complete view of all the stakeholders involved in a particular system (Giordano et al., 2018). In this workshop, this activity served as a useful reference point during the remainder of the workshop.

Stakeholder Discovery: During the second activity, the participants suggested creating both current profiles and ideal profiles for each stakeholder. Although creating ideal profiles moved beyond understanding the system, as it identified opportunities for change, it did provide additional details about why a stakeholder is in its current position. For instance, the municipality should focus on collaborating with external parties, however, due to their small budget they currently focus on internal collaborations.

Another reflection concerns the role of this activity in mapping and understanding the informal care system. By creating these profiles, the key characteristics of each stakeholder can be identified. Persona creation is widely utilized in various design practices, as it helps to empathize with user needs (Salminen et al., 2022). This principle is also applicable to the stakeholder discovery activity. While in this workshop, only two stakeholders were selected for further investigation, creating profiles for additional stakeholders can lead to valuable insights and a better understanding of important stakeholders in this domain.

Actants Map: The final activity proved to be more challenging in comparison to the previous activities, as there were some ambiguities about the wording on the poster. While the *Design Journeys* book provided a template, the translated version of this template led to confusion for the participants. This highlights the importance of carefully selecting formulations on the templates to minimize ambiguities. In addition, the value exchange section was unclear, which resulted in outcomes which solely identified exchanged value, while the original intention was to also identify value which is not exchanged. To tackle this in future workshops, the template could be altered to include separate sections for both types of exchange.

This type of activity fits well with the other two activities. Especially, since this activity investigated the identified relations of the first activity more thoroughly. Even the profiles created in the previous activity played a role in identifying the goals, strives and concerns in this activity. This deeper understanding of the stakeholders and their relations reflects one of the characteristics of systemic design, identifying elements and recognizing their interconnectedness (Monat & Gannon, 2015).

Reflections on Secondary Outcomes

The secondary objective of this study was to map the informal care system in Twente. This section reflects on the preliminary results gained during the workshop.

First of all, the actors map activity placed the stakeholders in this system in relation to each other on a predefined map.

This activity revealed, that there is a gap in the fourth quadrant, which may suggest, as one of the participants mentioned, a possibility for change. Additionally, it showcased how the stakeholders are positioned in terms of power, knowledge, policy-making and practice.

Municipalities and welfare organisations were selected for the stakeholder discovery, to create persona profiles for. This activity showcased the tensions between the current profiles and the desired profiles, as big changes are necessary. However, the municipalities' profiles showed that they are expected to facilitate external collaboration, while they have financial restrictions. Welfare organisations, on the other hand, ideally should have a big influence on policy-making, however, currently, this is limited due to their dependency on other stakeholders.

The actants map, investigated the underlying relations between selected stakeholders. For municipalities and healthcare providers, this activity revealed tensions in their direct goals, however, it also highlighted the values they exchange such as funding and knowledge. The relationship between informal caregivers and welfare organisations, on the other, was more aligned and highlights future opportunities for more strategic collaboration.

Overall, these exploratory findings show the potential of systemic design approaches to map the system and to reveal underlying relations, tensions and opportunities in complex systems.

Strengths and Limitations

During the development of this research, several strengths and limitations were encountered, which are discussed below.

Strengths: One of the strengths of this study is the semi-structured approach during the workshop activities. This approach allowed and also encouraged the participants to think of additions and alterations when desired. To illustrate, during the stakeholder discovery activity, this approach encouraged the participants to define characteristics and extremes which were better aligned with the selected stakeholders. These additions resulted in more tailored and representative profiles for the specific stakeholders.

Another strength of this research, is the accessibility for non-designers. While using a systemic design approach might exclude non-designers, the activities and posters which were used during this workshop were accessible for participants who do not have a background in design. This inclusivity might result in richer and more representative insights.

Limitations: This study also recognizes some limitations. First of all, the analysis of the results was executed without the guidance of a validated analytical framework. This study, currently, investigated the notes and observations and loosely determined important aspects. Ideally, however, a stricter data analysis plan would be applied, to gain more reliable and representative results. For instance, using observations as a data collection method is suitable, however, prior to the workshop the focus of the observations could be determined. In addition, to analyze qualitative more systematically, a thematic analysis could be used (Kiger & Varpio, 2020).

Building upon the previous limitation, the suitability of this systemic design approach is currently solely evaluated on observations and a brief discussion with the participants after the activities. However, additional methods could be used to assess the suitability. For example, one-on-one interviews could be conducted after the workshop to ask about participants' experiences and how they think that these activities (did not) succeed in mapping the system. In addition, a questionnaire could be utilized to gather quantitative data about their experience, by utilizing Likert scale questions. Another limitation of this study, is the fact that only three systemic design activities were utilized to explore the suitability of this approach to map the informal care system. The *Design Journeys* book, however, recommends a total of eighteen activities in the first three stages, which focus on framing, listening to and understanding the system. While these three selected activities, give an insight into the exploration of using these types of activities, they are definitely not representative of the other fifteen activities.

Finally, there was little participant diversity, which may result in the over-representation or under-representation of specific stakeholders. Both participants mostly had relatively similar views on the informal care system, as there was little discussion between the two. As a result, the outcomes of the workshop regarding the informal care system and the experience of the methods could be biased.

Future Recommendations

Based on the discussion, various future recommendations can be made. The primary recommendation is to conduct another workshop with a more extensive data collection and analysis plan, as outlined in the limitations. Conducting one-on-one interviews and questionnaires in retrospect allows for a more extensive evaluation of the suitability of systemic design approaches to map the informal care system. With a thematic analysis, the observations during the workshops and the interview results can be analyzed systematically. When combined with a statistical analysis of the questionnaires, the results can offer a more reliable and representative assessment of the suitability of systemic design for mapping the informal care system.

Another future recommendation is to include a more diverse group of participants in the studies. This not only offers more representative results for the suitability of systemic design, but it also offers more reliable results for the mapping of the system. By conducting these activities with various perspectives, the varying results can be combined to make a well-informed conclusion.

Finally, while this study aims to explore the suitability of systemic design to map the informal care system, systemic design encompasses more than solely mapping a system. The framework presented in the *Design Journeys* book outlined various phases, including: envisioning the desired future, exploring the possibility space, planning the change process and fostering the transition (Jones & van Ael, 2022). Therefore,

future work could focus on exploring how these other phases could be applied to the informal care system.

Conclusion

This study explored the suitability of systemic design methods to map the informal care system in Twente. To this end, the primary objective was to explore the appropriateness of these methods, while the secondary objective was to map the informal care system in Twente. The *Design Journeys through Complex Systems* book guided the application of systemic design in this context. Three activities, the actors map, a stakeholder discovery and the actants map, were applied in a workshop with two informal care experts. The primary outcomes, related to the method suitability, suggest that these tools have the potential to map complex care systems. After explanation, these methods enabled the participants to pinpoint and classify stakeholders and investigate their relations more thoroughly. Secondary outcomes, related to the mapped system, show that there are numerous stakeholders involved in this system. While informal caregivers and care receivers are the most central stakeholders, municipalities, health insurance companies and healthcare providers play a dominant role in the system. Welfare organisations, on the other hand, possess less power despite their active support of informal caregivers. The restricted data collection and analysis plan and the small number of involved participants highlight the limitations of this study. Therefore, future work could focus on conducting this study again with retrospective one-on-one interviews and questionnaires to assess systemic design's suitability. In addition, the workshop can be conducted with diverse participants, resulting in more reliable and representative results. Overall, this study demonstrates that systemic design has the potential to map the informal care system in Twente, as it enabled participants to identify stakeholders and their underlying relations and interactions.

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APPENDIX

A. Methods

1) Recruitment email: Beste,

Gerelateerd aan het project "Samenwerkingskracht Mantelzorg" zou onze masterstudent Floor Lieverse graag een workshop uitvoeren waarin wij een nieuwe methode willen testen om mantelzorgsystemen beter in kaart te brengen. Ik heb hieronder wat meer informatie ingevoegd. Wij zoeken voor deze workshop twee deelnemers en dachten i.v.m. jullie expertise meteen aan jullie. Graag horen wij of jullie hiervoor open staan.

Wat is het doel van de workshop?
Het mantelzorgsysteem in Twente is complex. Naast verschillende typen mantelzorgers zijn diverse partijen en organisaties betrokken die ondersteuning kunnen bieden en verantwoordelijk zijn voor beleidsvorming. Voor mantelzorgers zelf maar ook andere belanghebbenden is het niet altijd even makkelijk om dit complexe systeem te doorzien. Het doel van deze workshop is het testen van een nieuwe methode om mantelzorgsystemen beter in kaart te brengen. De methode is gebaseerd op technieken vanuit ''systemic design".

Wie zoeken wij?
Voor deze kleine workshop zoeken wij 2 deelnemers met kennis van het mantelzorgsysteem in Twente.

Wie voert de workshop uit?
De workshop wordt uitgevoerd door Floor Lieverse, master student aan de Universiteit Twente. De workshop is gerelateerd aan het project Samenwerkingskracht Mantelzorg, geleid door de Twentse Koers.

De workshop
Duur: De workshop zal maximaal 2 uur duren.
Tijd: Het tijdstip zal samen met de deelnemers worden geselecteerd.
Locatie: De locatie zal zsm bekend worden gemaakt, bij voorkeur de Universiteit Twente.
Inhoud: We gaan drie activiteiten doen, genaamd 'actors map', 'stakeholder discovery' en 'actants map'. Deze worden tijdens de workshop verder toegelicht.
Benodigheden: U hoeft niets mee te nemen naar de workshop. Wij brengen lekkere snacks mee.
Resultaten: U ontvang een samenvatting van de resultaten zodra deze zijn verwerkt.
Cadeau: Voor deelname aan deze workshop ontvangt u een cadeaubon ter waarde van 20 Euro.

Voorbereiding op de Workshop
Ter voorbereiding op de workshop zouden wij u willen vragen om vooraf deze korte vragenlijst in te vullen: https://forms.gle/5UfqpdStShfhK3kN7.

Hoe kunt u zich aanmelden?
Wilt u graag meedoen? Dan kunt u een email sturen naar Floor Lieverse: f.lieverse@student.utwente.nl. Wij stellen uw deelname zeer op prijs.

Met vriendelijke groet,
Christian Wrede

2) Questionnaire: The questions of the questionnare were formulated as follows:

- Wat is uw naam?
- Wat is uw rol in het mantalzorgsysteem?
- Bent u (ooit) mantelzorger geweest?
  - Hoe heeft u de mantelzorg ervaren?
- Welke personen, groepen of organisaties ziet u als de belangrijkste stakeholders binnen het mantelzorgsysteem? (Denk aan zorgverleners, overheidsinstanties, familieleden, etc.)
- Welke stakeholders zijn minder invloedrijk, maar spelen toch een rol in het systeem?
- Welke stakeholders worden vaak over het hoofd gezien, maar spelen volgens u wel een belangrijke rol in het systeem?

The exact questionnaire can be accessed through this link: https://forms.gle/kpF5EshebnW4S5CNA

3) Characteristic Cards5111: The following stakeholder cards were utilized during the workshop:

Fig. 8: Characteristics Cards

Invloed op andere stakeholders

Geen invloed
⇔
Grote invloed

Formele scholing in zorgsector

Geen opleiding in zorgsector
⇔
Hoogopgeleid in zorgsector

Kennis van wet en regelgeving

Weinig kennis
⇔
Volledig op de hoogte

Technologische vaardigheden in zorgtools

Geen ervaring
⇔
Geavanceerde gebruiker

Toegang tot ondersteunende netwerken

Geen netwerk
⇔
Breed netwerk

Werk-privé balans

Goede balans
⇔
Sterke overbelasting

Mate van zorgverlening

Directe zorgverlening
⇔
Indirecte zorgverlening

Emotionele betrokkenheid

Sterke emotionele band
⇔
Neutrale band

Fig. 9: Characteristics Cards

Fig. 10: Characteristics Cards

B. Results

1) Questionnaire: The following stakeholders were mentioned in response to the question to the questionnaire:

- Family members
- Friends
- Neighbours
- Home care providers
- Informal care consultants
- 'WMO' employees
- General practitioner
- Physiotherapist
- Occupational therapist
- Speech therapist
- Client
- Municipality
- Healthcare provider
- Welfare organizations
- Schools (if children are involved)
- (Sports) Associations
- Hospitals
- Employers
- Nursing homes
- Health insurance companies
- Patient associations
- Ministry of Health, Welfare and Sports
- Organisations for volunteers

2) Actors Map: The image below showcases the created actors map.

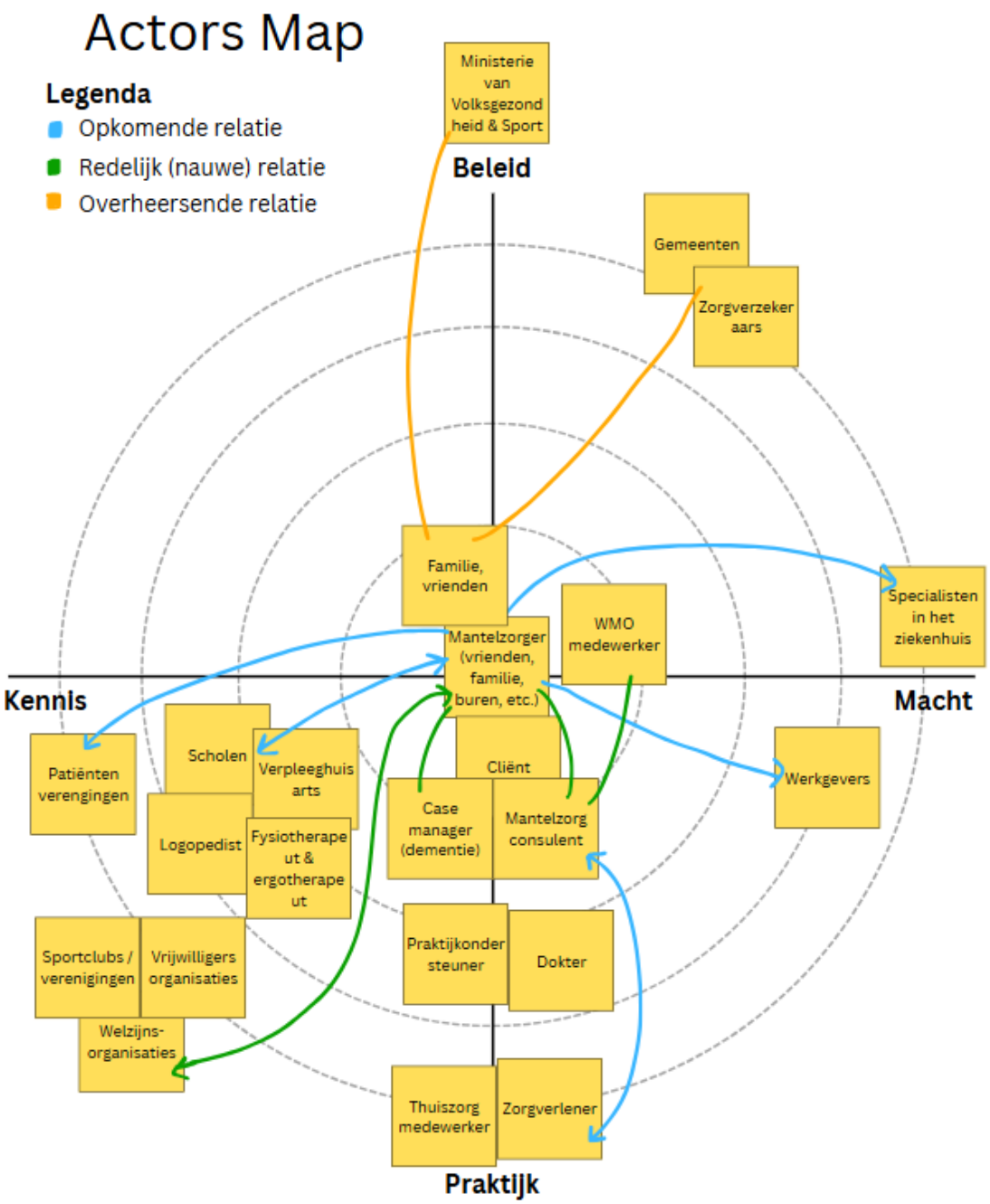

Fig. 11: Digitalized version of the created actors map activity

3) Stakeholder Discovery: Below the created persona profiles are showcased.

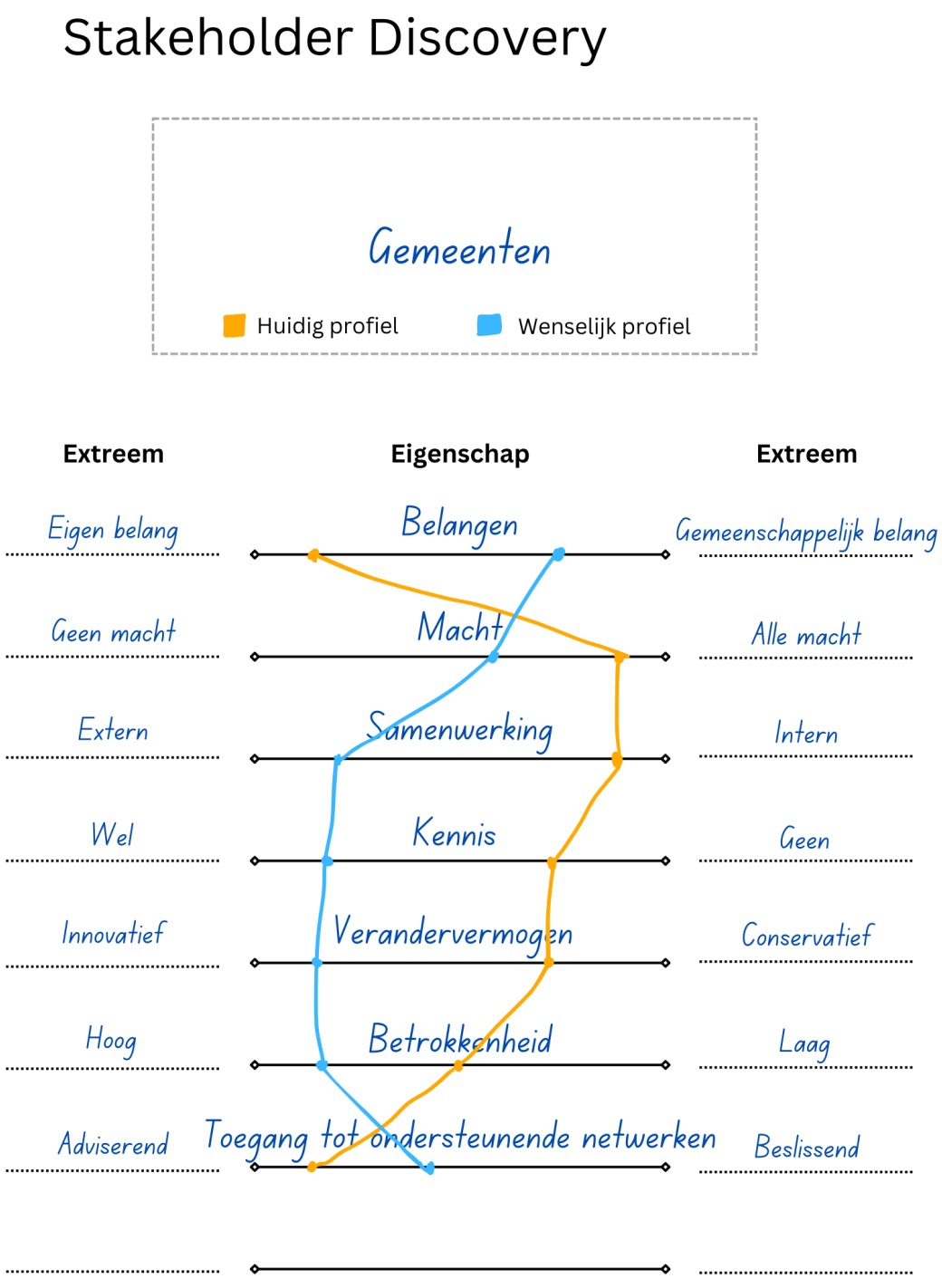

Fig. 12: Digitalized version of the stakeholder discovery activity for municipalities

Stakeholder Discovery

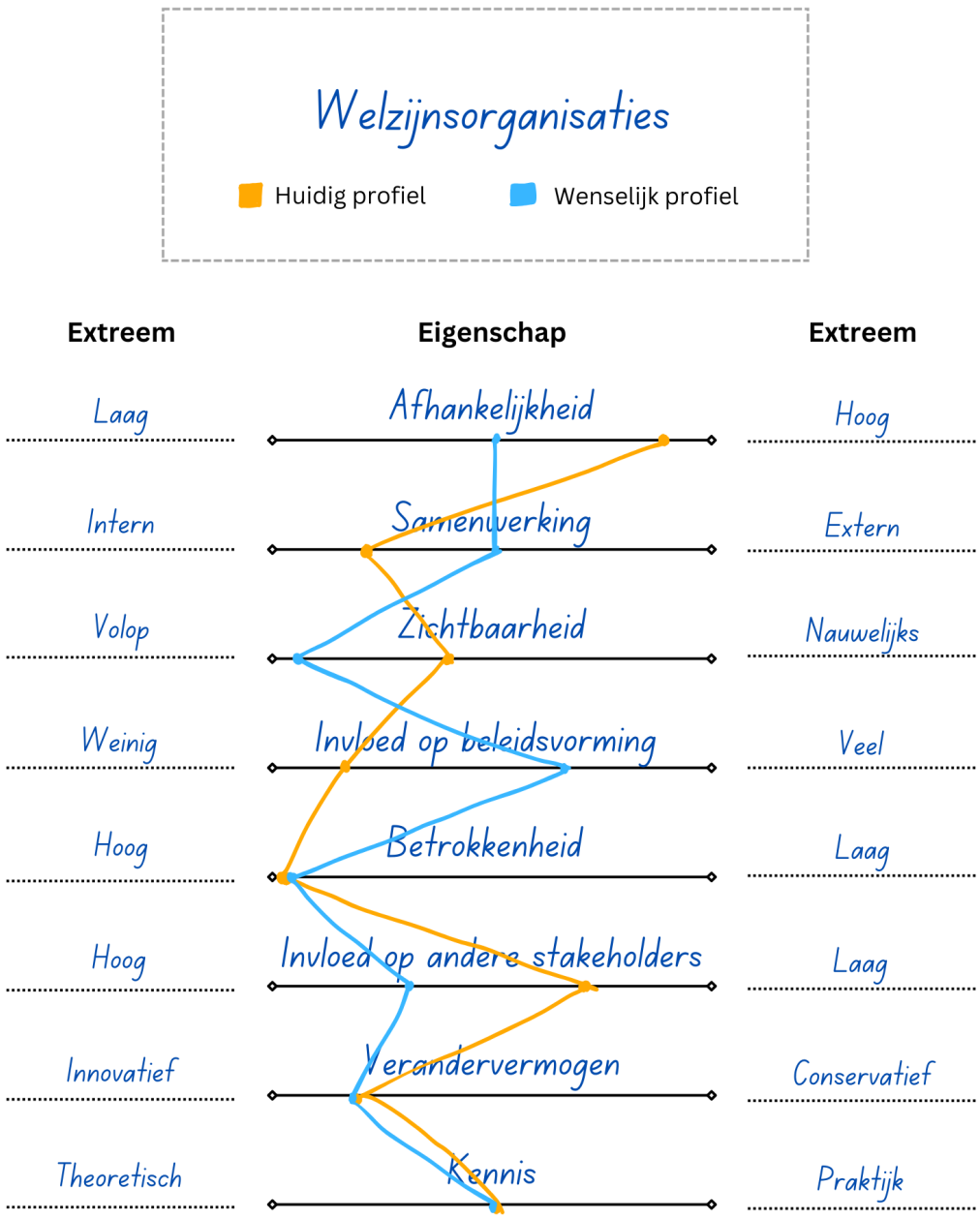

Fig. 13: Digitalized version of the stakeholder discovery activity for welfare organizations

4) Actants Map: Below the created actants maps are showcased.

Fig. 14: Digitalized version of the actants map for municipalities and healthcare providers

Fig. 15: Digitalized version of the actants map for informal caregivers and welfare organisations