

Sustainability of networks

Master Thesis Organization Studies



Innovate
Dementia

**European
Network of
Living Labs**



Abstract

Networks are increasingly important in the current society. Especially complex health innovations require collaboration between different parties. Despite the growing importance of networks, a high number of networks are not able to become sustainable. Therefore goals will not be achieved, scarce resources will be lost and community support is likely to decrease. In this research we attempt to organize for network sustainability by looking at the variables that influence the sustainability of a whole network focused on health innovations. A data analysis, two surveys and interview were conducted to shed light on the different variables that influence the sustainability of whole networks. Collaboration, financing and community support are found to be the most important influencing variables of the sustainability of whole networks. Formal propositions have been formulated. Furthermore, the importance of several other influencing characteristics are mentioned. This research adds to the relatively limited scientific insights on sustainability of networks. Furthermore, by suggesting characteristics that influence the likelihood for the sustainability of health oriented innovative whole networks, some practical insights are gained, which enables networks to organize for sustainability.

Keywords: sustainability of networks; legitimacy; achieved benefits; community support

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1. Foreword

More or less one year ago, in the beginning of February 2014, I started a complete new challenge; a traineeship at the (X). The start of a year were I learned a lot, both professionally as personally, both during the different projects I worked on as during my thesis. In the first weeks I explored the possibilities for a thesis topic. Researching the sustainability of a living lab, or a network, turned out to be my first choice. Not an easy topic, but very interesting and relevant to the (X), which has an own living lab called '(X)'.

Now, almost one year later, with many ups and some downs, I can look back on the complete process of writing a thesis. One of the things I enjoyed the most was the ENoLL (European Network of Living Labs) summerschool in Amsterdam in the beginning of September. The ENoLL summerschool was crucial for the data collection. Before this week I send many emails to potential respondents, but got very few reply's. During the week, I was able to interview 5 people and speak with many more. People were genuinely interested in what I did and were very willing to help me get in touch with other respondents. So from this point on, data collection was no issue anymore. Transcribing turned out to be. It was the most easiest task, but very time consuming. On my way to deliver a completed, finalized and qualitative acceptable thesis one of the other hurdles was the re-writing of my theoretical framework. Some unclarity about the concepts used in my theoretical framework, increased the time pressure and raised stress levels. However, I understood why it was necessary and I hope and think my thesis did improve after the changes being made. I would like to thank my supervisors, (X) and (X) for their feedback, help and suggestions during the last year. (X) for the first half of the year, and (X) for the second half of last year. Moreover, I would like to thank (X) and (X) for their input during the go or no go sessions.

I would also like to thank my family and friends who were supporting me throughout the process, especially at one of the 'downs'. They were a good audience for my complaints, were able to cheer me up and keep me motivated. I would like to give a special thanks to (X), who gave very valuable feedback, and (X) who was watching over the grammar and orthography. Furthermore, I would like to thank the complete team of 'onderzoek & ontwikkeling' of the (X). My colleagues were very supportive and always willing to answer some questions. I would especially like to thank (X) for her very detailed feedback and suggestions and (X) for her advice, feedback and valuable insights in the functioning of a living lab.

Tilburg, 15-01-2015

2. Research problem and relevance of the research

Introduction

Whole networks, defined as "consciously created groups of three or more autonomous but interdependent organizations that strive to achieve common goals and jointly produce an output (Raab & Kenis, 2009, p. 198)", are growing in number in many areas. A reason for this growing number can be found in the policies, that increasingly require firms and institutions to work together (Ferlie & Pettigrew, 1996). Especially in the public sector the incentives to collaborate are strong. Client-wellbeing depends namely on the integration and coordination of actions over several organizations (Provan & Milward, 1995). Moreover, Turrini, Chirstofoli, Frosini and Nasi (2010) argue that the integration of services through a network in the health sector can lead to a greater coordination of services, which will eventually lead to more effectiveness. This greater coordination of services and more effectiveness, facilitate a network to produce more than the joint output of the single organizations in the network would produce, if they would all work independently (Raab & Kenis, 2009). The network could, for example, produce more in terms of knowledge, finance, market access or reputation (Oerlemans, Gössling & Jansen, 2007). Firms in the private sector are often more inclined to focus on their organizational goals instead of network outcomes (Provan and Milward, 1995).

Because of the benefits of network collaborations described above, and the willingness of organizations in the public sector to establish networks, we see an increasing number of innovative health networks. In these innovative networks, products or services are developed in close collaboration between research institutions, companies, industry and public institutions. The networks are mostly designed to achieve certain long-term goals. However, the majority of networks seem to fail and are thus unable to achieve their goals (Zineldin & Dodourova; 2005). This can be illustrated with the findings from a report of the Dutch 'Inspectie voor de gezondheidszorg' (health control inspection) from 2006. The report showed, that networks aiming to reduce alcohol consumption, smoking and depression almost all failed. Some networks used invalid methods, other potentially promising networks were not able to reach their target group (Inspectie voor de gezondheidszorg, 2006). Moreover, with the failure of networks, invested money will be lost. Only in the Netherlands, already billions are lost because of the failure of governmental initiatives (Abels, 2014). An example of a failed initiative, is the development of a new system that was meant to pay child support and state pension, but it turned out to be inoperable (Abels, 2014). Also community support for comparable initiatives in the future will decrease with this high number of terminated networks (Shediac-Rizkallah & Bone, 1998).

In the Netherlands, on average, 7% of the network initiatives will be terminated in the first year of existence. In the second year another 14% of the initial initiatives will be terminated, adding up to a total of 53% terminated initiatives in the 5th year of existence (Bangma, Bruins, Snel & Timmermans, 2013). In industries that acquire a lot of preparation on forehand and more start-up money to enter, the numbers are expected to be lower. However the numbers give an indication of the major problem networks nowadays are facing (Bangma, Bruins, Snel & Timmermans, 2013). Even when networks are able to sustain themselves, the continuation of all aspects the network was concerned with, is unlikely. Mostly no more than partial sustainability can be accomplished (Wiltsey Stirman et al., 2012).

What the cause is for the difficulty of establishing or organizing for sustainability remains unclear, because of the limited scientific insights (Provan, Fish & Sydow, 2007; Wiltsey Stirman et al., 2012; Shediak-Rizkallah and Bone, 1998). Especially in network literature, sustainability is a topic that is not explored extensively. Most research on network outcomes is designed around the theme of network effectiveness (Provan, Fish, Sydow, 2007). This research on effectiveness, revealed actually also something about sustainability. Provan and Milward (2001) for example, implicitly state about sustainability in their research on network effectiveness, that a network "must become a viable interorganizational entity if it is to survive" (p. 417). Turrini et al., (2010) indicated sustainability and viability as one of the indicators of network effectiveness in their literature review on public services.

More concrete insight on sustainability, however, can be found in the organizational literature. In the organizational literature three categories of influencing characteristics on program sustainability are defined; network design and characteristics, organizational setting and broader community environment (Shediak-Rizkallah & Bone, 1998, Scheirer, 2005; Evashwick & Ory, 2003; Wiltsey Stirman et al., 2012). Even though this might offer some interesting insights for the sustainability of networks as well, the network sustainability not only depends on the ability to sustain an organization or a program, but is concerned with the network as a whole. With the sustainability of networks, some other dynamics might be influential in comparison with program sustainability.

Because of the increasing number and value of networks, the disadvantages of network failure and the limited research on network sustainability so far, a research on network sustainability should be conducted. More insight on the variables influencing sustainability is required, in order to be able to anticipate on them and increase the likelihood of the sustainability of networks in the future. Therefore we can formulate the following research question:

What are the variables that influence the sustainability of a whole network focused on health innovations?

In this research a data analysis, two short surveys and 17 qualitative interviews with members of whole networks focused on health innovations, will shed light on variables that influence the sustainability of innovative whole networks. This reveals which characteristics facilitate a whole network to become sustainable, which can be used as a guideline to increase the likelihood of sustainability in whole networks.

3. Theoretical framework

Sustainability of innovative whole networks

The network form of organization is becoming increasingly important. Turrini et al., (2010) described a network in general terms as "a set of organizations (and not individuals or parts of organizations) that coordinate their joint activities through different types of peer-to-peer relations" (p. 529). Despite differences, nearly all definitions of networks refer to certain common themes, including social interaction (of individuals acting on behalf of their organizations), relationships, connectedness, collaboration, collective action, trust, and cooperation (Provan, Fish & Sydow, 2007).

Importance of network form of organization

Working in a network seem interesting for organizations. Especially in the public sector the incentives to collaborate are strong. Client-wellbeing depends namely on the integration and coordination of actions over several organizations (Provan & Milward, 1995). According to Ferlie and Pettigrew (1996), the network form of organization has been adapted because of the need for flexibility and learning, to reduce market uncertainty, to manage joint production and to manage cultural diversity. Furthermore the move to more high-tech organizations has caused the shift towards the network form of organization, since working in a network is especially important in situation where complex issues are at hand. The complex issues are mostly concerned with opposing interest of a variety of involved parties (Delden, 2010).

Concerning flexibility and learning, Ferlie and Pettigrew (1996) argue that in these times, customers have more choice and want to have more choice in products and services. Moreover, in industries there is a quicker innovation pace in comparison with a few decades ago. To be able to provide more choice, better service and quick innovation, more flexible modes of production are needed. The network form of organizing offers these flexible modes of production, by facilitating internal changes, organizational learning and the possibility to consult more sources of information, which prepare for changes and create reciprocal learning opportunities (Ferlie and Pettigrew, 1996). Especially when dealt with advanced service technology or in high-tech organizations, the exchange of knowledge and learning is very important.

The network form of organization is also beneficial in reducing market uncertainty (Ferlie & Pettigrew, 1996). Market uncertainty is for example due to limited information about (potential) collaborating partners. In networks, collaboration is often taking place with well-known partners based on shared experiences. Therefore more knowledge is available about the price and quality, but also about service and reliability of a partner. This will reduce the level of uncertainty and can provide advantages based on low cost computing and communications systems, because of repeated collaboration with the same partners (Ferlie & Pettigrew, 1996).

All these reasons to adapt to the network form or organization, can be strategic grounds for organizations to form or become part of a network, in order to eventually increase survival capacity (Provan and Milward, 1995).

Network failures

However, many networks are at risk. According to Zineldin and Dodourova (2005), the failure rate for networks is seven out of ten. In other words, seven out of ten networks are not sustainable. Oerlemans, Gössling and Jansen (2007) point out several reasons for this high number of network failures. The most important theoretical explanations can be found in the transaction cost theory, the

social exchange theory, the evolutionary theory of organizations and the organizational learning theory (Oerlemans et al., 2007). In the transaction cost theory it is argued that by implementing coordination mechanisms, organizations are trying to minimize their transaction costs. In some cases this can best be done by a hybrid organizational form, like a network. But if the uncertainty increases, working in a network might be less beneficial. If uncertainty increases, risks are bigger and that causes higher transaction cost. Uncertainty might therefore lead to the termination of a network (Oerlemans et al., 2007). The social exchange theory is about exchanging all kind of resources based on reciprocity. For reciprocity trust and power are very important. If there is some unbalance, this can cause the failure of a network (Oerlemans, et al., 2007). The evolutionary theory of organizations explains that each organization goes through cycles of negotiation, commitment and execution. Both time and balance between formal and informal processes influence the likelihood of network failure (Oerlemans et al., 2007). Also environmental dynamics might influence the likelihood of network failure (Koka, Madhavan & Prescott, 2006). The last theory that might explain network termination is the organizational learning theory, which explains that unequal learning processes and thus benefits, might cause the failure of a network (Oerlemans et al., 2007).

With the increasing value of these networks in more and more complex environments, it is important to be able to lower the failure rates of networks and thus increase the sustainability. Increasing the sustainability of these networks will be beneficial for the allocation of scarce resources that, in the future, will actually be spend in an useful manner. Moreover, problems targeted by the network will actually be solved before network termination. Especially when important issues, like developing technological solutions that improve life quality of elderly, are at hand it is important to be able to achieve the set goals. Furthermore community support is likely to increase, when more networks are actually surviving and will serve the needs of the community or target their issues (Shediac-Rizkallah & Bone, 1998).

To be able to spend money in an useful manner, serve the needs of the community and possibly increase community support for health innovative networks, we should organizing networks for sustainability. Therefore we have a look at the influences characteristics on sustainability.

Schreier (2005) defines sustainability as follows: "the program components developed and implemented in earlier stages are (or are not) maintained after the initial funding or other impetus is removed". Other terms used to describe sustainability are 'integration', 'institutionalization' and 'continuation' (Shediac-Rizkallah & Bone, 1998). Despite the plentiful terminology, a clear model on characteristics of whole network sustainability is lacking. Human and Provan (2010) mention that network literature does not give much insight in how networks evolve over time, which is among others concerned with network sustainability.

Most scientific knowledge around sustainability is based on sustainability or organizational literature. However the scientific research on sustainability, also in these fields, is underdeveloped and nascent. Little consensus exists on the conceptual and operational definitions of sustainability.

Combining the limited insight of previous research from different fields of study, make it possible to define maintenance of legitimacy, maintenance of the level of achieved benefits and maintenance of community support as dimensions of sustainability. These dimensions are being influenced by factors of network design and characteristics, the organizational setting and the broader community environment as influencing factors. See for more in depth explanation the section below. Combining these insights leads us to the following conceptual model:

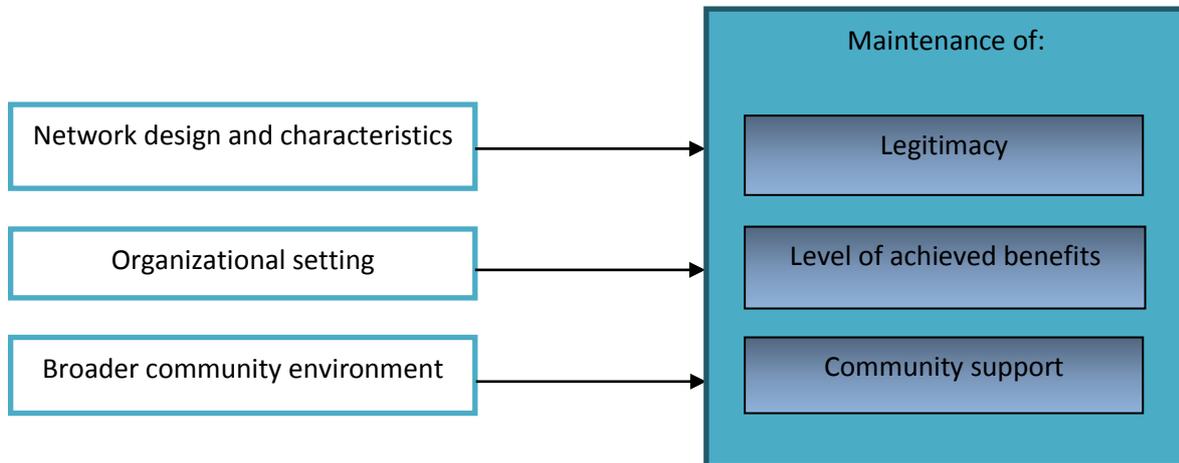


Figure 1: Model for the sustainability of innovative whole networks

In this research, based on the model presented above, we attempt to add scientific knowledge about the sustainability of networks by focusing on the variables that influence the sustainability of a whole network. A whole network is a group of three or more organizations that are oriented towards the achievement of common goals (Provan, et al., 2007). This means that these networks are often formally established and governed. Only by examining the whole network, we can understand such issues as how networks evolve, how they are governed, and ultimately, how collective outcomes might be generated (Provan et al., 2007). Therefore this is important in examining sustainability of networks.

Consequently we focus on the network level of analysis. The network level of analysis focuses on the structures and processes of the entire network, rather than on the organizations that compose the network. This can be based on the input of individual organizations or of the interorganizational network as a whole. In this study we adapt the network level of analysis with the input of individual organizations on the structures and processes of the entire network. The network level of analysis is relevant, because the functioning and sustainment of a network depends not only on individual organizations, but on the interplay between the different network partners (Provan and Milward, 1995).

Dimensions of sustainability of whole networks

The model for the sustainability of innovative whole networks presented above, is based on a combination of knowledge from previous studies on program sustainability and network sustainability. The dimension of sustainability based on the network literature is legitimacy (Human & Provan, 2000). The dimensions based on the organizational and sustainability literature are the maintenance of achieved benefits and building community support (Shediac-Rizkallah & Bone, 1998).

Legitimacy

According to Human and Provan (2000), societal acceptance of a network and therefore its survival depends on how well a network is able to gain legitimacy and support of both internal and external stakeholders, like member firms and funders or customers. Legitimacy is therefore an dimension of sustainability. Human and Provan (2000) define legitimacy as "a generalized perception that the actions, activities, and structure of a network are desirable and appropriate" (p. 328). The acceptance by internal and external stakeholders results in cognitive support, commitment and resources, which will ultimately determine whether the network is able to be sustained (Human & Provan, 2000). Also according to Provan et al. (2007), legitimacy and reputation are generally very important in collaborations, particularly in networks where collaborations among organizations within a network vary over time.

Legitimacy should be build along three dimensions: network as a form, networks as entity and networks as interactions (Human & Provan, 2000). The establishment of legitimacy as a form is concerned with the acceptance of the network as a form of organizing. This should happen in an early evolutionary process. Network as entity is about the recognition of the identity of the network, which makes it possible for members and outside parties to perceive the network as a legitimate entity. In order to be legitimized, the network as interaction, should establish and sustain relationships with firms, which sometimes might be competitors as well. Firms in networks should be able to realize, that cooperation could create benefits for them and the network as a whole. Therefore the interaction process itself should be legitimized (Human & Provan, 2000).

According to Human and Provan (2000) network as a form and network as an entity had primary focus in establishing a network. In a later development phase, legitimizing the network as interaction becomes more important. In order to be sustained all forms of legitimacy should be obtained. Both an internally oriented or an externally oriented approach, might be successful in doing so, however a strong and early inside-out emphasis is more likely to achieve this goal than an early outside-in focus (Human & Provan, 2000).

Level of achieved benefits

Claquin (1989) defined sustainability as "the capacity to maintain service coverage at a level that will provide continuing control of a health problem". Shediac-Rizkallah and Bone (1998) add that "a program is sustainable when it is able to deliver an appropriate level of benefits for an extended period of time after major financial managerial and technical assistance from an external donor is terminated".

The dimension that derives from this definition is the maintenance of the level of benefits of a network achieved through the initial network (Shediac-Rizkallah & Bone, 1998; Schreier, 2005). This emphasizes, above all, the continuation of the level of benefits of the network after the initial funding or initial time span has ended.

The dimension of maintenance of level of achieved benefits is based on the sustainability of programs, but it can be applied for networks as well. For a network it is namely also important to be able to continue benefits after the initial time period ended. Most networks serve long term goals, so continuation of level of benefits may prevent financial damage or any negative effect for involved stakeholders.

Community support

Jackson et al. (1994) emphasize the building of community support as dimension of sustainability. The logic behind this is based on participation and ownership. Communities should be able to participate and have ownership in defining the solutions to their own problems, which leads to increased capacity or competency of the network and therefore to a higher likelihood of network sustainability (Shediac-Rizkallah & bone, 1998). Especially in the health area, a community or individuals being involved in solutions for their own health issues might be very important.

While the dimension of community support is based on the literature on sustainability of programs, the dimension is also relevant for networks. Also health oriented innovative networks are involved with several stakeholders and need to know what the community wants in terms of solutions for health issues. Therefore building community support might be an essential dimension of sustainability.

Influencing factors of sustainability of whole networks

The three dimensions of sustainability (maintenance of legitimacy, maintenance of achieved benefits and maintenance of building community support) described above, are influenced by several influencing factors.

In network literature the style of management (Ferlie & Pettigrew, 2010) and several environmental factors (Human and Provan, 2000) are said to influence the sustainability of networks. Concerning style of management, Ferlie and Pettigrew (2010) argue that a network is a distinctive form of organization and therefore needs another managerial style. This managerial style enables the network to function optimal. Especially important is the presence of a lead (contact) person, which has some excellent networking skills (Ferlie and Pettigrew, 2010).

The environmental factors that are said to influence sustainability are the pre-network climate for cooperation, the legitimacy of the industry in the location where the network emerges and the preliminary support of key stakeholders (Human & Provan, 2000).

Since the network literature on sustainability is rather limited, we will also include influencing factors as described in the organizational literature, with some adjustments to make it suitable at the network level of analysis.

According to the organizational literature three categories of factors that are important for the likelihood of sustainability can be distinguished. These categories are aspects of network design and

characteristics (1), factors within the organizational setting (2) and factors in the broader community environment (3) (Schreier, 2005; Evashwik & Ory, 2003; Shediac-Rizkallah & Bone, 1998). These influencing factors are not only seen in the articles of Shediac-Rizkallah and Bone (1998), Evashwik and Ory (2003) and Schreier (2005), but also overlap the most with a literature review of Wiltsey Stirman, Kimberly, Cook, Calloway, Castro and Charns (2012).

Aspects of network design and characteristics are concerned with the start-up and design process of the network, the sources of funding the network started with and how long a network exists. Furthermore, the ability to modify and adapt to the needs of the end-users and the evaluation data that give insights in the effectiveness of the network, are important aspects of network design and characteristics (Schreier, 2005). Shediac-Rizkallah and Bone (1998) mainly emphasize the availability of resources.

According to Shediac-Rizkallah and Bone (1998), factors concerned with the organizational setting are organizational and managerial structures and processes. Schreier (2005) describes the following factors as part of the organizational setting: strategically network leader (champion), the 'fit' of the new innovative network with the existing organizational goals and procedures and the capacity of the organization. The capacity of the organization can for example be explained in terms of age or growth. The broader community environment is, according to Schreier (2005), concerned with the stability and favorability of external factors, like the socioeconomic and political factors. These can be for example legislation or support from influential parties. Shediac-Rizkallah and Bone (1998) also mention the involvement of the community.

Since the knowledge on sustainability mostly derives from organizational literature and the knowledge on sustainability of networks is rather limited, the categories of influencing factors described above and the single factors they consist of, are the starting point of this research. We will explore if and how they influence the different dimensions of sustainability.

The different categories of factors influencing sustainability will be explained more in depth below.

Network design and characteristics

For network design and characteristics, the important influences that increase the likelihood of sustainability are effectiveness, duration, financing and training (Shediac-Rizkallah & Bone, 1998; Evashwik & Ory, 2003). Effective collaboration is also emphasized by Marek, Mancini and Brock (2007). Furthermore negotiation processes came about as one of the influencing factors (Shediac-Rizkallah & Bone, 1998; Evashwik & Ory, 2003). Negotiation processes are concerned with the way stakeholders are involved and the kind of starting point that is chosen. When networks are modified at the local level, for example via input of stakeholders, it is more likely to be sustained. Moreover when a networks is the result of a equal negotiating process between funders and governments, it is more likely that the network will be sustained as well (Shediac-Rizkallah & Bone, 1998). Evashwik and Ory (2003) and Marek, Mancini and Brock (2003) named comparable parts of the category 'negotiation processes', community involvement or understanding the community. Another influencing factor of network design and characteristics is type. Type can be both preventive or curative (Shediac-Rizkallah & Bone, 1998; Evashwik & Ory, 2003). Schreier (2005) also emphasis the use of evaluation data as important influencing factor of network design and characteristics. Marek, Mancini and Brock (2003) name responsiveness as an important influence for sustainability. They also mention that demonstrating the potential of the network is important for sustainability. This can

be found in one of the recommendations of Evashwick and Ory (2003) as well, who emphasize the importance of marketing and communication.

Shediac-Rizkallah and Bone (1998) define financing as the most prominent influencing factor of sustainability. This factor is concerned with the sources of funding, the financial help of the community and the strategies for self-supporting. Networks are mostly funded by national funding, but an increased reliance on financial community support can be seen (Shediac-Rizkallah & Bone, 1998). Financing is also important for Marek, Mancini and Brock (2003) and Evashwick and Ory (2003). Evashwick and Ory (2003) mainly emphasize the importance of becoming financially self-supporting. According to Schreier (2005), the use of volunteers or other inexpensive means of delivering services is important for the financial sustainability. Even though Shediac-Rizkallah and Bone (1998), Evashwick and Ory (2003) and Schreier (2005) underline the importance of financing when it comes to sustainability, the financing seems a major challenge for many networks (Evashwick and Ory, 2003).

Factors within the organizational setting

The influencing factors for this category are, according to Shediac-Rizkallah and Bone (1998) and Schreier (2005), integration with existing services and leadership. The integration is concerned with the integration into standard practices, the way goals, objectives and approaches are defined and about who is receiving the funding. When the goals of a network become dominant objectives of the partner organizations, it is more likely that the network will be sustained. Network leadership is about the presence (or absence) and the characteristics of a leader (Shediac-Rizkallah & Bone, 1998). For Evashwick and Ory (2003) it is important that a leader remains present. Also the study of showed the relatively large influence of leadership competence. The importance of a leader is in line with the style of management as described in the network literature (Ferlie & Pettigrew, 2010). Marek, Mancini and Brock (2003) furthermore name the influence of staff involvement and integration. Shediac-Rizkallah and Bone (1998) emphasize, besides the factors described above, the institutional strength. The institutional strength is about the maturity of the implementing organizations and the probable strength of these organizations, when it comes to support the new network. Networks that are situated in relatively large partners organizations with a long (individual) history are more likely to be sustained (Evashwick and Ory, 2003). However the core mission of partner organizations is more relevant than the organizational size (Evashwick and Ory, 2003).

Evashwick and Ory (2003) do not mention institutional strength, but they came up with the importance of a governing or advisory board, university involvement and project staff as influencing factors within the organizational setting.

Factors in the broader community environment

The influencing factors of the broader community environment are socioeconomic and political considerations and community participation. The socioeconomic and political considerations are concerned with the favorability of the environment. In the influencing factors from the network literature two aspects of the socioeconomic and political considerations are specified, namely the pre-network climate for cooperation and the legitimacy of the industry in the location where the network emerges (Human & Provan, 2000).

Community participation is about the different kinds of involvement of the community (depth and

range) (Shediac-Rizkallah & Bone, 1998). Evashwick and Ory (2003) and Schreier (2005) moreover specify the relationships with other organizations as important influence for factors in the broader community environment, even as the greatest successes and challenges. Schreier (2005) mentioned that a network is more likely to be sustained, if key stakeholders perceive benefits to themselves. In the network literature preliminary support of key stakeholders was mentioned as an influencing factor (Human & Provan, 2000). This is partly reflected in community participation and partly in the importance given to relationships with other organizations. The preliminary support is however not directly present in one of these categories, so this will be taken into account as a separate influencing factor.

4. Methodological Framework

In this research we had a look at the variables that influence the sustainability of a whole network focused on health innovations. Based on a limited amount of studies, conducted in different fields, we drew a model to be able to explain which variables influence the sustainability of a whole network. To be able to answer this question, ENoLL data was analyzed and two small surveys and interviews were held with several health oriented, innovative whole networks.

4.1 Research design

In order to explain which variables influence the sustainability of whole innovative networks we selected health oriented living labs as the unit of analysis.

Living labs are research environments in which many partners, collaborate closely together to provide products or services, that are as oriented as possible to the needs of users. Those partners can be for example universities, social care organizations and industrial partners. Also end-users are invited to make an active contribution to the different phases of design and development of new products or services (Stahlbrost, 2008). In that sense, living labs are probably more user centric than other kind of health oriented whole networks. Furthermore living labs are per definition focused on innovations and therefore might be regarded as an distinct type of network. However, because of the collaboration structure, living labs are a good example of innovative whole networks and are therefore chosen to serve this research. The different living labs, hereafter referred to as innovative whole networks, will be compared to gain insights in the different variables that influence the sustainability, so in this research a comparative case analysis is made.

This research started with an analysis of ENoLL (European Network of Living Labs) data. In the analysis different descriptives of innovative whole networks were reviewed. After the analysis several members of networks were invited to participate in the semi-structured interviews and fill out two surveys. The interviews and surveys allowed a more in-depth view on the sustainability of these networks. The overall findings have been reported and discussed with two experts which are closely collaborating/supervising several health oriented living labs. Their findings are used as input for the discussion. Each of the mentioned phases here, are explained below.

4.2 Data collection and sample strategy

The ENoLL network served as the basis for the sample used in this research. ENoLL stands for "European network of Living labs". Before the 8th membership wave in September 2014, the ENoLL network consisted of 332 innovative whole networks. On their website ENoLL has information documents and applications documents available about those 332 innovative whole networks. Furthermore they provide a link to website of the network (if available). The information documents are made up of a description, references and a track record and contact details. The application document consist of basic facts, membership motivation, thematic domains, description and characteristics, organization, openness, resources, users and reality, value and direction and plan for the future. The content of the websites of networks varied. For almost all networks an information document was present, the application documents were present by about 20% of the networks. Almost all networks have a website.

The analysis of ENoLL data started with the search engine of the ENoLL website. We started the selection using keywords like "healthcare", "health" or "care". Unfortunately many networks which are not somehow linked to health, well-being or healthcare came across. This led to some suspicions

concerning the accuracy of the search engine. It was likely that also networks who are concerned with healthcare where not included in the results. Therefore all available information documents where scanned on information related to, or about, healthcare. These criteria led to the first selection of 92 health-oriented networks. From these 92 networks additional application documents where read (if available) and/or the website was visited. Only networks which were mainly concerned with health and existed for at least five years were included in the next selection. If not enough information was available about the living labs (for example because a website was just available in a language other than English, French, German or Dutch and the absence of an application document) this network was excluded from the sample. About 60 of the networks in the ENoLL database are (mainly) health oriented. After excluding the cases that existed for less than 5 years and the cases where we didn't have enough information about, 31 networks where included in the sample. The decision to exclude cases that exist for four years or less is motivated by the likelihood of sustainability. According to Banga et al. (2013) a total of 53% of the networks will be terminated up to the 5th year of existence. After this period the chances of sustainability increase. With the inclusion of networks that are more likely to be sustained, we expect the influencing characteristics on sustainability deriving from this study to be more accurate. The sampling method described above, can be categorized under purposive sampling (Babbie, 2001).

The cases included in the sample were reviewed based on several descriptives: sources of funding, goals, maintaining of core elements, network partners, multi-disciplinarity and team size.

The respondents for the interviews and surveys were selected based upon the outcomes from the analysis. We tried to select networks that differ on as many aspects as possible, in order to get a broad picture of differences among networks that might explain differences in influencing factors of sustainability. Therefore an analysis of the networks was needed. How the categorization of networks was done, can be found in the next section: measurements.

4.3 Measurements

Data analysis

For the data analysis, the total content of the ENoLL data is reviewed on descriptives which are considered as most relevant for this research, namely: sources of funding, goals, maintaining of core elements, network partners, multi-disciplinarity and team size. These descriptives are influencing factors of sustainability, based on the organizational literature, as described in the theoretical framework. Although no research on importance of influencing factors of sustainability has been conducted so far, and other influencing factors might be relevant as well, these factors are seen relatively often (Marek & Mancini, 2003; Casper, 2007; Shediac-Rizkallah & Bone, 1998; Stirman et al., 2012). The characteristics of the innovative whole networks matching these categories are all included in a table and afterwards coded in atlas.ti. Coding was thus inductive. An example of this table is showed below.

<i>Innovative whole network (I.W.N.)</i>	<i>Sources of funding</i>	<i>Goals</i>	<i>Maintaining of core elements</i>	<i>Network partners</i>	<i>Multi-disciplinary</i>	<i>Size of team</i>
1	Grant	Needs of end-users	Yes	Hospital, industry (50)	Yes	10
2	Grant, philanthropic	Developing technology	Yes	23	No	2
3	Government, funding org.	Co-creation	No	University, social care	Yes	3
4	Grant, private	Products to market	Yes	Private companies, international, 22	Yes	17
Etc.						

Table 1: Simplified example of data analysis on Enoll data

The codes for funding are: grant (EU), grant (local), grant (national), grant (not specified), incubator, membership, private, public. The codes for goals are: co-creation/ideation, continuation or expansion, marketing, networking or knowledge sharing, serve the needs of the target population and service for another organization. The codes for maintaining of core elements are: in line with core elements of the company and not in line with core elements of company. Furthermore, maintaining of core elements described if this cases was a stand-alone or not by the codes: stand-alone or company. Last, the codes for the network characteristics, can be divided in network partners: governmental institutions, business and industrial partners (other than medical), healthcare/medical, universities/laboratories, user association. The size of the team was operationalized by the following codes: large (10+), medium (5-10), small (5 or less).

See the operationalization table (table 2) for an overview.

Discriptive	Definition	Operationalization
Funding	Different specifications of possible grants or other money flows.	Grant (EU) Grant (Local) Grant (National) Grant (Not specified) Incubator Membership Private Public
Goals	Possible goals of an innovative whole network.	Co-creation/ideation Continuation/expansion Marketing Networking/knowledge sharing Serve the needs of the target population Service for another organization
Maintaining of core elements:	Describes if a network is integrated or not and if it is in line or not in line with the core mission and vision of the company.	Stand-alone
- Institutionalization		Company
- In line/not in line		<u>And:</u> In line with core elements of the company Not in line with core elements of the company
Network characteristics:		Governmental institutions
- Collaborating partners		Business and industrial partners (other than medical)
		Healthcare/medical
		Universities/laboratories
		User associations
		<u>And:</u>
Team size		Large (10+) Medium (5-10) Small (5 or less)

Table 2: Operationalization table

By reviewing the characteristics of the descriptives ordered by codes, some differences and similarities between networks were revealed. This showed how much the network were alike on each of these descriptives. To be able to see if and what the influence of these differences are on the influencing characteristics of sustainability , we selected the cases that where least alike.

Interviews and surveys

After the data analysis a selection of 15 living labs was contacted between the 13th of August and 17th of September. The first 5 interviews and surveys were conducted during the ENOLL summerschool. Some of these networks interviewed during the summerschool, were already included in the first sample of the data analysis. Some interviews and surveys were held with networks that were not included in the original sample. However, the same selection criteria (health oriented and at least five years in existence) were used for these living labs. That these living labs were not included in the first sample was due to new membership. These living labs became ENOLL members in the 8th wave, but matched the selection criteria we used. Therefore these networks were additionally included.

During the interviews the respondents were asked semi-structured questions about what they thought are important factors influencing the sustainability of their innovative whole network. The interview started with a broad question on what these members of the innovative whole networks thought influences the sustainability of the network. This room for a broad answer was important, to get as much information as possible about the dimensions and influencing factors of sustainability (Schreier, 2005).

In the second part of the interview questions around the categories of influencing factors of the models of Shediac-Rizkallah and Bone (1998) and Schreier (2005) were asked. These influencing factors are factors of network design and characteristics, organizational setting and broader community environment. Both models are still valuable, since they were found to overlap most with the findings of a literature review on sustainability from 2012 (Stirman et al., 2012). Furthermore aspects of these models can be found in network literature as well (Human & Provan, 2000; Provan & Milward, 1995). The models from the organizational literature are originally based upon intra organizational programs, they are adjusted to make them useful on the network level. Example of adjustments can be found in appendix 2.

The surveys were conducted during and after the interviews. The goal of the survey was to identify potential missing influencing factors on sustainability and to create insight in the importance of different characteristics. In the first survey respondents were asked to identify the characteristics that influenced the sustainability of their network and identify with 100 points which the most important characteristics are. In the second survey the same question was addressed, however the factors from the categories of influencing factors, as described in the model of Shediac-Rizkallah and Bone (1998) and Schreier (2005) served as answer categories. Respondents were again asked to identify the most important characteristics of sustainability for their network by dividing 100 points. Since both surveys were designed around the same question, it is interesting to compare the answers from both surveys, featuring the open and closed question. The open questionnaire gives insight in the characteristics which are directly thought of by respondents without any steer, the closed question gives more direction in answering. Furthermore these answers are aligned with the current state of the field of sustainability. The open question leaves room for additional important characteristics of network sustainability, which might not be included in current literature yet or underestimated in literature so far.

Besides the innovative whole networks that are health oriented, and do exist for at least five years, also one network that no longer exist and was health oriented was included in the interview and surveys to shed another light on the sustainability of a innovative whole network.

A total of 10 networks, out of the 31 from the data analysis were interviewed and included in the surveys. Nine of these networks did exist for at least five years, one network no longer exist. In the case of seven networks two separate interviews were held, mostly with the program coordinator or manager, and one other well informed colleagues of the program coordinator. Two of these interviews where with two employees of the living lab at the same time. In one case an additional interview was held. In the case of two networks labs just one interview was held. Surveys were conducted with the same people. Unfortunately respondents from two whole networks were not willing to fill out the survey and two people just completed one survey.

The program coordinator was in most cases appointed, because we expected him or her to have the best overview of the program and its characteristics, but by conducting more interviews within the same living lab information can be verified and it is possible to create a clearer picture of the sustainability of the network.

The results from the surveys were collected in "Excel 2010" and ranked on importance as indicated by the respondents. The interviews with the selected networks were recorded and verbatim transcribed (Glaser & Strauss, 1967) using "Word 2010". The transcripts were divided into sections that match different categories, also called coding. The adjusted categories of the Shediac-Rizkallah and Bone (1998) model and Schreier (2005) model (see appendix 2) served as the basic for the coding scheme. Codes were marked with different colors in the word documents. Afterward these codes were copied into excel. An excel sheet provided an overview of all transcribed interviews per code, both with quotes and with keywords.

Transcribing and conducting interviews was an interwoven process, since transcripts can offer new insight for further interviews. These insight sometimes led to new codes. When the codes developed in the first few rounds of conducting interviews, give no need for the development of new codes, saturation is reached. Due to the timeframe and the great variety of living lab characteristics, saturation was not reached. After the transcription and coding of the last interview, codes were overlooked carefully, to combine categories and to make a distinction between the main and the subcategories. Throughout the whole process the information given in the interviews was analyzed using the constant comparing method (Glaser & Strauss, 1976).

4.4 Data analysis

The coding and comparison of all data led to findings based on the interviews and surveys. These findings have been reported, compared with the literature and compared with the different descriptive of networks as identified during the data analysis. By doing so, insights in the influence of these differences between networks on the variables influencing sustainability of health oriented innovative whole networks are gained. Based upon the structure found during the data analysis, certain distinctions between networks can be made. These distinctions will be explained and further elaborated with the data from the interviews. Moreover two additional interviews with people who have much knowledge about the sustainability of innovative whole networks will be used to discuss the results. This will finally lead to an answer on the research question: what are the variables that influence the sustainability of an health-oriented innovative whole network?

5. Results

To be able to gain insight in the variables that influence the sustainability of whole networks a data analysis, two small surveys and interviews were held. The results of the data analysis, surveys and interviews are presented below.

5.1 Descriptives

The aim of the data analysis was to gain insight in the differences between the innovative whole networks, in order to make sense of possible differences deriving from the survey and interviews.

During the data analysis we had a look at the following network characteristics: goals, sources of funding, the maintenance of core elements, network partners, multidisciplinaryity and the size of the team. With goals, different type of goals are described. Under sources of funding, the different sources of funding are mentioned. Maintenance of core elements is about the fit or alignment with the existing procedures of the 'mother' organization. The network partners gives an insight in the kind of network partners collaboration is established with. The multidisciplinaryity and the size of the team give some insight in the team characteristics per network. The following table presents an oversight of the network characteristics (see table 3).

Innovative whole network (I.W.N)	Goals	Source(s) of funding	Maintenance of core elements	Network partners	Multi-disciplinary	Size of team
1	Dedicated to the older adults, mostly with cognitive impairments, working on technology.	Different funds (national, international projects), companies.	Yes	A large network of stakeholders and industrials working in related initiatives at the regional, national and international level.	Yes	7 employees, 13 others (students/PhDs)
2	Research and development of technology and services in the Ambient Intelligence context through the use of pervasive sensors and actuators, promoting a wide range of services and applications.	Different funds (several EU Research Programs, Spanish Research Council, locally), companies	-	European partners, links to hospitals.	No	2 fulltime, other researchers depending on projects going on
3	Focuses on promoting wellbeing and health, business and production, as well as learning and creativity. User-driven innovation	Applied for funds (European research programs), customers, own organization	Yes	Private and public sector organizations. Operates locally, regional and internationally within the Nordic Countries, Europe, and other countries and continents.	Yes	1,5fte fulltime, more involved, many students
4	User studies and evaluations of products. Investigate future technological solutions.	Different funds (national and European research projects), own organization.	Yes	Cooperate with hospitals as well as user associations.	No	4 full-time researchers, supported by several research
5	Support development of new products and services, meeting future healthcare need.	Fund (nationally), government, regional stakeholders	Yes	County Councils, municipalities and about 50 member companies.	Yes	3 structural, in total 6 employees engaged
6	Support people of all ages to be empowered to live independent at home with dignity. Human-centric approach.	Different funds (EU calls, governmental funds) Industry, charitable money.	Yes	Collaborate with people from commercial, academic, industrial, governmental and third sector partners.	Yes	The core team is about 12 people, many more who are less involved
7	Design, build and test products and services for improving the lives of older people, involving different parties. Enhance the quality of life and wellbeing of older people and those who care for them.	Funds (EU), philanthropical grants, industry and SMI's	Yes	Industry and other research partners in applied research, (social) care, county.	Yes	22(+) team members
8	Identify and satisfy the needs of end users and the associations that represent them.	Research programs (funds from health areas, industry and social action), companies.	-	Public institutions, enterprises and clusters, associations and foundations.	Yes	Fourteen researchers, more (foreign) students
9	Developed a constant consulting system to support caregivers of people with dementia	Calls, ministry, insurance	Yes	Municipality departments and various health and welfare institutions	Yes	-
10	Create 4G communication and create and sustain a coherent research and knowledge community in the area of intelligent communication solutions.	-	-	-	-	-

Table 3: Descriptives per innovative whole network

The data analysis showed much variation among the innovative whole networks. Concerning the goals, we can mainly identify two different types of goals. One type of goal can be described as a user-centric approach. An example of this is "we want to promote independent living for older adults". The other approach is more technology driven. In this case the main aim is to develop technology which can benefit older adults, people with disabilities or other groups that are having health issues. The starting point in one case is the end-user with his or her needs, and in the other case the technology. In most cases the goals are described in terms of benefits for the end-user. In two innovative whole networks the technology is the starting point of the goal, in one network it is not clear.

The review on sources of funding shows, that innovative whole networks are financed in different ways. The majority of the networks receive a large amount of their total funding from project funding. This can be from a (regional) government, the European Union or research funds. In one case the majority of the funding comes from the own organization. Furthermore, sources as charitable money or philanthropic grants were mentioned as source of income. Last, collaborations with industry or companies were mentioned as a source of income. The last two often formed a minor part of the total amount of money.

The maintenance of core elements showed, that all innovative whole networks have a 'fit' with the mother organization. No cases of 'stand-alone' innovative whole networks were found in the data analysis. In most cases the new innovative whole networks was the missing link between the mission and vision of the founding organization and the realization of the mission and vision. This was realized by the practical approach of the innovative whole network.

About the network partners we can state, that there is much variation among the new innovative networks. All networks collaborate within a rather extensive network. Mostly consisting of regional, national and international partners. The majority of these partners are public institutions, but also partners in the private sector are reported. In one case the main collaboration seems to take place with international partners, in contrast to another case, which just emphasis local collaborating partners.

The size of the teams differ much. The smallest innovative whole networks has 1,5 fte permanent employed. The biggest team reported, consists of 30 team members. Furthermore, there is much variation in the involvement of students, PhD's, or project-based involvement of employees. Most networks have a multidisciplinary team.

From the data analysis research we can conclude, that the innovative whole networks show a lot of variation.

5.2. Interviews and surveys

The interviews with members of several innovative whole networks and the surveys conducted, give us a chance to zoom in on the different influencing characteristics of the dimensions of sustainability. In the interviews the focus is on the different influencing factors of sustainability. Furthermore, the interviews shed light on the differences between the innovative whole networks as deriving from the data analysis. This might explain an different importance of influencing factors among networks. The surveys indicate which influencing characteristics on the dimensions of sustainability are considered to be important. In the first survey respondents were asked to define the main important aspects influencing the sustainability for their innovative whole network. This was formulated as an open question, so all kind of possible influencing factors could be mentioned. An open question was chosen because of the little consensus in the current literature about network sustainability. Respondents might potentially have come up with additions to the current literature. After the first survey, a second survey with categories based on the influencing factors for sustainability - network design and characteristics, organizational setting and the broader community - was held. This was formulated as a question with multiple answers reflecting these different categories of influencing factors.

We will explain the influences of network design and characteristics, the organizational setting and the broader community environment on the maintenance of legitimacy, level of achieved benefits and community support as dimensions of sustainability.

The model below, as presented in the theoretical framework, serves as the starting point for both the surveys and the interviews (see figure 2).

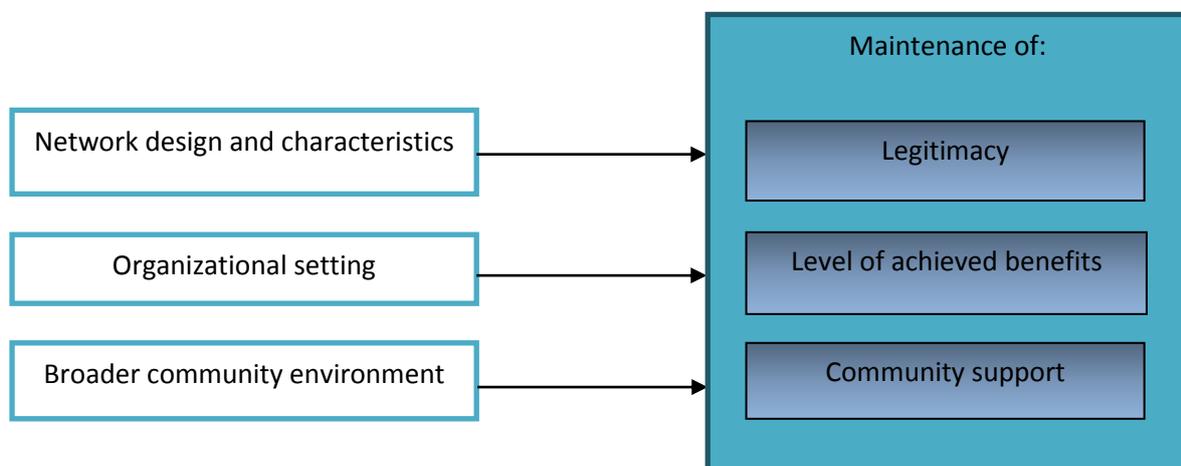


Figure 2: Model for the sustainability of innovative whole networks

Legitimacy

Legitimacy as a form

As described in the theoretical framework, the establishment of legitimacy as a form is concerned with the acceptance of the network as a form of organizing (Human and Provan, 2000).

In the interviews, legitimacy as a form seemed to be confirmed by the government or governmental institutions and by the support and recognition of the ‘mother organization’. Involving companies, however, remains difficult, which might imply that legitimacy as a form is not (fully) recognized by companies. The influence of government or governmental institutions is part of the broader

community environment, the influence of the 'mother organization' is part of the organizational setting and involving companies can be found as characteristic of both network design and characteristics as factors in the broader community environment.

In the open survey, respondents mentioned the importance of the ability to add value or relevance and believe in the value of the network as the fourth most important influencing characteristic for sustainability. The ability to add value possibly facilitates the establishment of legitimacy as a form. In the closed survey, respondents pointed out the importance of the effectiveness of the network as the fourth important influencing factor of sustainability. Also the effectiveness of the network might facilitate the establishment of legitimacy as a form.

Governmental support

The main importance of governmental support for respondents is the translation into (research) grants or funds. Health promoting innovative networks are relatively often given a research grant, which reflects the legitimacy as a form of organizing. Because of the scarce resources, the governments and governmental institutions who provide grants, have long and extensive procedures to decide to whom or to which initiative the grant will be awarded. Since health is an important issue for many governments and the European Union, more and more grants are concerned with health and given to the innovative networks. Some respondents mentioned, that their work as innovative network is even getting increasingly important for their national government, and that it might lead to (more) financial support from the government in the future.

Besides providing financial support, governmental support can be more practical as well. One respondent gave a specific example of their local government initiating a network of exemplary networks which are functioning very well. The acknowledgement of the municipality created a positive image and due to this initiative, the network was offered help as well. This is illustrated with the following quote:

"We added value and being able to show it." (I.W.N. 10, respondent 1).

"We have started to be part of a network in the (X) community and euh, this is something that is new and it comes from the political (..)

Some national governments have currently much attention for health or the ageing population and also translate this attention in research grants. Other governments might have attention for health or ageing, but they do not seem to translate this into research grants. An example of a government which directs much attention towards health and ageing is given in the following quote:

"At the moment there is an initiative of the (X) government about silver economy, which is an economy dedicated to care for older adults. So we try to participate in the meetings and euh, in the well, let's say network of the silver economy in order to be part of it and participate through projects calls." (I.W.N. 1, respondent 2).

An example of a government which might have attention for health or ageing, but none or just very few, small grants available derives from the following sentence:

"You have to be really recognized and eh, the work of the living lab"

The difference between national governments might reflect a difference in attention for health issues or a difference in the allocation of resources, but it might also indicate, that the innovative network as a form of organizing did not reach (full) legitimacy yet in all countries. The European Union however offers several research grants on health for innovative whole networks, so network as a form of organizing seems to be regarded as legitimate by the European Union.

For most innovative networks not being able to acquire new grants, is something to be concerned with. For many innovative whole networks this would be a major threat for the sustainability. Therefore maintaining the legitimacy as a form, confirmed by the government and governmental institutions has high priority.

'Fit' with the existing organization

Legitimacy as a form is also reflected and reinforced by the alignment between the goals and procedures of the innovative network and the 'mother organization'.

All networks addressed in this research had a mother organization and there was a 'fit' or alignment between the goals and procedures of the mother organization and the innovative network. Generally respondents thought that having a fit with a mother organization, should be beneficial for the legitimacy of a network as form of organizing.

"You have to be really recognized and eh, the work of the living lab being acknowledged by the hosting institution (...) to assure sustainability." (I.W.N. 1, respondent 2).

Especially being able to profit from the good reputation of the mother organization, the established connections and the knowledge, would increase legitimacy as a form.

"As part of a network of university and being part the university a important university in (country), so you, we euh, we receive a lot of influence from that, from being part." (I.W.N. 2, respondent 1).

*"R: If you want to have a sustainable living lab, it is very hard to come from outside and start this work, because you have to know a lot about the municipality and about the companies, and so, and so, it is hard.
I: Right, okay, so it is beneficial if you are in the middle of it?
R: Yes, absolutely" (I.W.N. 5, respondent 2).*

That a mother organization is willing to let the network benefit from the reputation, connection and knowledge reflects the legitimacy of the network as a form of organizing. Furthermore, it underlines the trust in the network. If things do not work out as hoped, for example within a collaboration between a partner of the mother organization and the network, which is recommended by the mother organization, the mother organization puts the collaboration with this particular partner for themselves at risk. Therefore, the willingness to share these contacts, shows trust.

However, although integration with the host organization, is said to have a positive effect on the sustainability of a new network, there need to be enough flexibility for a new network to adapt to the needs of the environment. When there is no or little flexibility, being located within the structures of a big hierarchical institution is not beneficial for the innovative whole network, because it might slow down processes that should be done as quick as possible. If this was the case, respondents mention the value of exploring alternatives, like working as an individual association or as a commercial business. The reasoning of respondents is reflected in the quote below:

"We are collaborating with an association, an expert centre, on cognitive stimulation, and they have this association status, so for them it is easier, like to sign a small contracts and to (...) fracture and euh, make expenses easily, so now we are trying to see if this way of functioning through them eh, could be better for us, instead of passing always through the hospital." (I.W.N. 1, respondent 2).

Involving companies

A group, which seems less convinced by the network when it comes to legitimacy as a form, are (commercial) companies. This is well described in the following quote:

"In the end you want companies to pay for research conducted by living labs. You organize something with the intention that companies can come and experiment, and of course the idea behind it is, that it add value. If that value is big or small, you don't know yet, but there has to be some value of the infrastructure. It turned out that it is difficult, for a long time already, to convince companies of

According to many respondents, it remains difficult to convince companies of the added value of the network.

So, legitimacy as a form seems to be acknowledge by some parties, but not by all parties involved in networks yet.

Legitimacy as entity

As a reminder, according to the network literature, network as entity is about the recognition of the identity of the network, which makes it possible for members and outside parties to perceive the network as a legitimate entity (Human and Provan, 2000).

According to the respondents, team and team leader, communication and focus influence the legitimacy as entity. Team and team leader are aspects of the organizational setting. Communication is part of the network design and characteristics. Focus is not mentioned as aspect of one of the influencing categories as defined in the model used in this research.

Team and team leader

According to the respondents, the team and team leader of a network are important to perceive the network as an entity. Especially a team leader that 'stays in place for a while' and is 'communicative strong' towards outside parties, is important to present the (recognizable) network to outside parties.



"One crucial point is eh, I would say customer relations management. So we have a platform. For example we have costumers that are our eh, many times in a year using our services, so eh, to create this customer potential and keep in contact and keep in, the customers with us, is very crucial for the continuity of operations." (I.W.N. 3, respondent 2).

Some respondents mentioned, that a degree of stability in the team is needed as well. To be able to maintain contact with the same person over a longer period, will reinforce the ability to perceive the network as a legitimate entity for outside parties.



"If you start off with somebody, that team can change, but you need a structure in that, like a snowball." (I.W.N. 6, respondent 2).

Communication

Communication is, according to the respondents important for the visibility of the network and the way outside parties perceive the network. Especially communicating about what you do and what you do not do is important for outside parties to perceive the identity of the network. Some networks do have a physical location, whereas other do not have such a location. For networks that do have a physical location, being open and welcoming to visitors helps to perceive the network as an entity as well.



"If you have something to show, of course that makes a difference, eh, so, eh I think it is important to have those living labs, if only to to have an address for eh, ja, becoming visible and eh doing different kind of things under one common eh, eh, name and framework." (I.W.N. 4, respondent 2).

Focus

Some respondents argue, that a certain focus or mission is beneficial for the legitimacy as an entity of the network. This focus can for example be characterized by the choice for a specific target group or by a special interest in certain parts of the city. A clear focus can facilitate the recognition of the boundaries of the network.



It is probably good to have some clear mission statement, euh in order to motivate a team and in order to have a clear visibility from the euh, all the stakeholders around the living lab." (I.W.N. 1, respondent 1).

Some networks however, seem to broaden their focus, by expanding into another research area. By expanding, the respondents thought that their innovative whole network could benefit more, they could be more effective or it would be easier to obtain grants. However, in line with the arguing presented above, broadening the focus of the network might have some negative implications for the legitimacy of the entity of the network.

Legitimacy as interactions

According to Human and Provan (2000), to obtain legitimacy as interaction, the network should establish and sustain relationships with firms, in order to be legitimized. These firms might sometimes be competitors as well. Firms in networks should be able to realize, that cooperation could create benefits for them and the network as a whole. Therefore the interaction process itself should be legitimized (Human & Provan, 2000). From the surveys and interviews we suggest that collaboration influences legitimacy as interactions. Collaboration can be described as characteristic of network design and characteristics and as characteristic of factors in the broader community environment as well.

Collaboration

The respondents mentioned in the interviews, that collaboration with different partners in the network can offer some interesting benefits to an innovative network. First of all, partners can offer insights, input and information that you do not hold yourself. Secondly, these different insight make it more likely, that goals will be accomplished. Also in the surveys the importance of collaboration was underlined. In the open survey, collaboration or networking with other companies or stakeholders was considered to be the second influencing characteristic on sustainability. In the closed survey not the collaboration as such, but the perceived benefits from collaboration for key stakeholders was pointed out as the second influencing characteristic on sustainability. In the interviews respondents emphasized the importance of benefits for all partners as well. The respondents stated that all partners should experience benefits from collaborating, in order to create successful collaboration. Mostly in the case of collaborating with businesses or governmental organizations, the benefits for these parties are quite clear. An example of a benefit of collaboration around health for the government, might be that the elderly are able to live longer independently at home. This decreases the cost for elderly people for the society. For a business, working in a network setting might lead to a successful product, which they can commercialize. Making these benefits clear, increases the likelihood of collaboration, because of a better understanding of benefits from collaboration on organizational level and on network level. Whereas the benefits for businesses or governmental organizations are quite clear, the benefits for the end-users are less clear. Often end-users are engaged in the development phase of a product. This means that it can take years before the product is actually available on the market. After these years the product or service might not be beneficial for them anymore because of changed living conditions. End-users are basically collaborating for the benefits of the next generation.



I think the tricky one is the user, what are they getting out of it? Because often I think there is a danger in the user being used." (I.W.N. 6, respondent 1).

Innovative networks are, despite the difficulties, very much concerned with a mutually relevant collaboration between the network and the end-user. The way they give shape to this collaboration differs a lot among the networks.

Some respondents suggest that having a lead organization in place might facilitate collaboration between the different partners, since someone is specifically responsible for the coordinating of the collaboration. Also the second survey pointed the importance of a lead organization out. Having a lead organization in place, is considered to be the fifth important influencing factor on sustainability.

To increase the benefits of collaboration, it is important that partners are complementary. Since the innovative health oriented networks are often dealing with complex innovations, having different expertise present in the network is extremely important. Collaborations between different parties that were often mentioned, were collaboration between technological companies and healthcare providers or institutions.

“It is important that the expertise from the people involved complement each other. You know, you have some softer, expertise, some harder expertise, you have some management expertise, you have some expertise for carrying out field trials, end-users organizations and so on, so this mix is eh, of eh, different kind of expertise is important, but each of them of course has to be well established in his or her own area to be successful.” (I.W.N. 4, respondent 2).

Even though collaboration offers important benefits for networks, in some case it remains difficult to collaborate because of concurrency. Networks want to keep their advantage over others and therefore keeping some information for themselves might be wise.

“We collaborate with other living labs, for example when a living lab has a technology that we don’t have. (...) But it is difficult. (...) There is rivalry in terms of funding. Let’s be honest.” (I.W.N. 1, respondent 1).

Especially, working with (commercial) companies remains difficult. This not only affects the legitimacy as a form as described above, but has also implications for legitimacy as interaction. One of the difficulties that occur when working with companies, is concerned with speed and flexibility. Companies require a quick solution, which asks for speed and flexibility at the side of the network. Unfortunately, in many cases, that cannot be provided. Innovative whole networks have often a specific organizational structure, closely linked to a big hierarchical institution. Because of this dependency on this institution, decisions go over many layers. Therefore it is difficult to work as rapid as the companies are asking for.

“One of the challenges is that the timescales are different. It might be that next year we are looking at issues around uhm, the challenges in the (X) in a three-year project, with half-million pounds and some egos, we need to bring the results next month.” (...) “So we can’t do the research project, we can’t engage those users.” (I.W.N. 6, respondent 1).

Besides the problem with the speed and flexibility while working with companies, another problem that came across is, that it seems that companies cannot or are not willing to invest much money outside their own organizational infrastructure. In many cases cooperation between companies and innovative whole networks is therefore done through applying for a fund. Obtaining a grant by applying for a fund can take up to two years from project plan to the actual start. This leads us back to the first problem of speed and flexibility. As soon as the money is there, the problem or question from a company might be solved already or is not relevant anymore.

Moreover some companies tend to think that universities can offer their services for free, which is certainly not the case.



"I think they are most of the time thinking that we as university are a free, a free resource or something like that, but that is not the reality. We need the money to keep alive and continue working." (I.W.N. 2, respondent 2).

What an innovative whole network indicated as a potential solution for working with companies without losing much time, was working from previous experience on a topic instead of initiating a new research. This is obviously only possible in a limited amount of special cases.

For the stability of the network, most respondents preferred to collaborate with partners they knew from previous projects, or that were recommended by organizations they trusted.



I have made the mistake also in some cases to approve partners that I didn't know so well, so it have to be, especially also by bad experiences that I give this recommendation eh, to only work with people that you know well and trust." (I.W.N. 4, respondent 2).

However, because innovative networks are often involved with new technologies, also relatively new innovative companies where considered to be interesting partners for collaboration. Some respondents mentioned, that the combination of older stable partners and new innovative companies had to be in balance. The maturity of older stable partners was for some respondents a benefit, however others mentioned that the maturity is not so important. The experience of the people working in a network was considered to be more important:



Organizations and the maturity of them is really about the experience of the team in place, uh, and the experience of the team is quite necessary and I think mainly because the skills needed are so much interdisciplinary and that you need a kind of quite skilled team, which is in all the organization to have those skills." (I.W.N. 7, respondent 1).

The maturity of the own network was thought of as a beneficial in the establishment of collaboration with other partners. It would make you more visible for potential partners by published papers or on the internet for example, thereby former (positive) results would make you a more reliable partner.

So, according to the respondents the importance of collaboration is widely acknowledged among the networks, which points in the direction towards legitimacy as interaction. Much effort is putted in creating benefits for all stakeholders and establishing collaboration with (preferably) trusted and new network partners. However, collaboration with companies remains difficult. Therefore some more steps should be made in order to establish legitimacy as interaction.

Level of achieved benefits

The level of achieved benefits is the continuation of the level of benefits after the initial funding or time span has ended (Claquin, 1989; Shediak-Rizkallah & Bone, 1998). The level of achieved benefits is influenced by financing, modification of the network and a motivated team. Financing and modification are aspects of network design and characteristics, a motivated team is an aspect of factors within the organizational setting.

Financing

Financing is an important factor in the maintenance of the level of achieved benefits. In order to be able to keep going, each network needs namely a certain amount of financial resources. Also the surveys indicated the importance of financing or funding. According to the results from both surveys, financing or funding is the most important influencing factor of the sustainability of innovative whole networks.

In the interviews different sources of financing where mentioned, most financial resources of innovative networks come from project funding through grants. These grants can for example be grants from a national government, research institution or the European Union. Some networks mentioned that obtaining these grants was very difficult, others thought they did well with obtaining grants.

“

"I really think that funding is the most important." (...) "I am completely as, you know, completely euh, I have problems to sleep with this hahaha (...), it is my obsession." (I.W.N. 1, respondent 1).

“

*"I: So you would say you don't have any problems eh, with obtaining grants or having enough funding?
R: If anything, often we have too much work to do." (I.W.N. 6, respondent*

The funds through calls are always for a limited amount of time. This means per definition, that we can put major question marks by the financial sustainability of these innovative whole networks. It depends on how well networks are able to acquire new funding during, or after the projects they have been running already, to continue. Therefore the maintenance of achieved benefits depends partly on the ability to acquire new grants.



R: "For me, being sustainable means not being constraint by the time funded by the project." (I.W.N. 1, respondent 2).

One of the respondents mentioned, that the innovative whole network will continue to exist in a less extensive form, also when the network will not be successful in acquiring funds. In these cases they can still make use of a small amount of permanent money coming from the university, municipality or hospital where they are situated. When this is the case, there probably will be less staff involved and the innovative whole network will mainly be used for teaching purposes. Some benefits will therefore still be maintained, while others will not be achieved any longer.

In some other innovative whole networks a small amount of permanent money is available. This money is mostly in terms of salary for one or several staff members. More innovative whole networks, mentioned that in the start-up phase money from the overarching organization, like the hospital, university or municipality, was available to get started and build the necessary infrastructure.

Modification of the network

According to the respondents, also modification of the network is an important way of securing the maintenance of achieved benefits of the network and possibly extend the benefits of the network. The underlying principle is he who does not advance goes backwards, which means that changes or improvements have to be made in order to be able to remain on the same level. This can be illustrated with the following quote:



"We have to become different because otherwise you become irrelevant somehow." (I.W.N. 6, respondent 2).

The open survey also indicates the importance of the modification of the network for the sustainability. According to the respondents, the ability to adapt or flexibility is the fourth most important influencing characteristic of sustainability. In the second survey however, the category modification scored quite low and seems thus less important than presumed on the basis of the first survey.

Modification can be explained in terms of alteration of the infrastructure, procedures, team composition, organizational structure or domain of interest. A few respondents explicitly stated that not the vision or mission is or would be changed, but it was mostly about changes in terms of technology, procedures or infrastructure. Especially for innovative whole networks in the domain of ambient assisted living, with a physical lab, technological changes are essential in order to keep up a viable network.



"In order to, to, to be able to still be a living lab that allows to test visionary things, eh, or just to show case visionary things as well, then you need to be able to adapt the lab and to reconfigure it." (I.W.N. 4, respondent 1).

By adapting to the changing needs for testing technologies, the network remains an interesting partner in projects. Therefore the network continues to be able to acquire funding through project calls, which makes it possible to continue working and maintain the level of benefits.

For some networks the infrastructure in terms of the team had changed over time. Because of the changing needs for projects or in collaboration with other parties, the composition of the team became more multidisciplinary. By modification of the team, collaboration with partners they could not work with previously, became feasible.



When we started, most of us where having eh, have a clinical related eh, background, I would say psychology or medicines or eh, I don't know, physical therapy, but then eh, when we start working, well I don't know, closer with enterprises for the conception of new products and services we started eh, also recruiting people with a more technical background." (I.W.N. 1, respondent 2).

In many innovative whole networks, procedures tended to change as well, because of previous experiences. An example of a procedure that changed in a certain network was the way they approached end-users with dementia. This specific target group requires a special approach, which this innovative whole network developed over time.

For other networks modification of the network was about expanding into different research areas, as mentioned in the section of legitimacy as entity above already. Also in this case, vision and mission stayed the same, but respondents expected the network to be more effective, easier to obtain grants or gain more benefits by expanding.

In two cases respondents were talking about modification of the organizational structure, in order to have a bigger chance of reaching sustainability. Respondents were arguing, that modification of the organizational structure would be beneficial for the speed of decision making process, which would benefit the flexibility and make potential commercial collaboration easier. Modification would namely lead to less hierarchy, for example by working as an individual association or as a commercial business, instead of closely linked to an university or hospital. Respondents mentioning this type of modification, were still exploring alternatives and it is not sure if actual changes will be made.



We are collaborating with an association, an expert centre, on cognitive stimulation, and they have this association status, so for them it is easier, like to sign a small contracts and to (...) fracture and euh, make expenses easily, so now we are trying to see if this way of functioning through them eh, could be better for us, instead of passing always through the hospital." (I.W.N. 1, respondent 2).

Motivated team

The team and team leader might also be important influencing characteristics of the organizational setting for an innovative whole network. Having a motivated or committed team and team leader is often seen as the key to success. Representing the network with passion and believe in its value, might increase the likelihood of success and therefore maintenance of the level of benefits.

"I believe in the project, in the big project of the living lab. So, I, this is how it works for me, it is a work, but I don't do it as a work. I do it is as a, with big pleasure because I believe in it." (I.W.N. 8, respondent 1).

"A good team is essential (...), if you have a good team with people, professionals motivated and eh, working well, it is the secret euh, of your success." (I.W.N. 1, respondent 1).

Also in the surveys the importance of the team was emphasized. The team was considered to be the fifth (open survey) and sixth (closed survey) most importance influencing factor for sustainability.

Permanent employment of employees cannot be guaranteed in many networks. Because of the financial structure of the innovative whole network, employees can only be paid if there is enough money coming from calls. This disadvantage which comes with working in an innovative network, underlines the motivation of the employees. The commitment of a team can be illustrated with the following exemplary quotes:

"People can be hired if we get money in fact, so we also have to find euh projects or fundings euh to be able to to pay the people for us on the long term." (I.W.N. 1, respondent 2).

Well, I'm permanently paid, so I will continue it (activities of the living lab red.), but uhm, but it is important to know that, this is of course difficult for those persons like (X), who are paid by the project, so if the projects ends, there have to be a new one." (I.W.N. 3, respondent 1).

Community support

In the theoretical framework, the importance of building community support is described based on literature from Shediac-Rizkallah and Bone (1998). They argue that communities should be able to participate and have ownership in defining the solutions to their own problems, which leads to increased capacity or competency of the program (or network) and therefore to a higher likelihood of program (or network) sustainability (Shediac-Rizkallah & bone, 1998). In the interviews and surveys community participation came about as influencing characteristic of community support.

Community participation

Based on the interviews, we can state that end-users and volunteers are important to involve in the development process of new products and services. Respondents explained the importance of the involvement of end-users as follows:

“Of course the right approach is to begin with the expectations of the end-users and euh, and then build up with this knowledge euh, in euh, within, in iterative process to build up a right devise for the people that should match their expectations and needs.” (I.W.N. 1, respondent 1).

“That is always important, that the community is with you from the beginning on, with you in the living lab. That you really talk and align the things being said. And yes, it is also always important to get them (the community, red.) on board and work on shared goals.” (I.W.N. 9, respondent 1).

The surveys indicate the importance of community participation as well. In both surveys the involvement of end-users or volunteers was the third most important characteristic for the sustainability of innovative networks.

The way end-users are involved differs among the networks. Some networks invest a lot of time and effort in building and maintaining a pool of (potential) end-users. Other networks do not maintain a pool of end-users themselves, but engage end-users through the companies they are collaborating with. The networks that are maintaining a pool of (potential) end-users, often actively try to keep in touch with these end-users. This is for example done by offering different courses of English or lessons in "how to use a tablet" and by creating a good atmosphere between the different end-users. Also already existing groups were approached in order to have this bonding present already. One network offered small amounts of money to end-users for their collaboration. Trust between the network and the end-users seems to be a key factor.

“For the living lab and the sustainability of a living lab, that it works, (...) you have that deep and broad connection within the region, that makes it extremely strong. (...) we can use the strength of the brand, of (regional care network, red.) and the (living lab, red.) in the region to appeal people (...) because there is trust there and because there is a local face.” (I.W.N. 7, respondent 1).

The benefits of working with an pool of people is, that you can connect companies to their target populations easily. If the networks do not maintain a pool of end-users themselves, the population of end-users is often changing from project to project. A benefit of this way of working is, that you are sure your population serves the purpose and that it is up-to-date. One respondent mentioned that it

saved a lot of overhead costs. A disadvantage is, that for reaching end-users you are dependent upon third parties. This can be illustrated by the following quote:



We have end-users organizations and they should find it easy to, that's what we thought, that it would be easy for them to find end-users for our experiments, but then, these end-users organizations are also specialized. For example in Netherlands we have (X), eh, "stichting" (X) in Utrecht, and their end-users are visually impaired people, but in fact it turns out that these people are in fact multiple impaired, so they are also mentally impaired and that is not the end-users we need for, for tests with elderly people for example." (I.W.N. 4, respondent 2).

These two different approaches seemed to be due to the different orientation of the networks. The networks strongly connected to the municipality, or the hospital tended to have a pool of end-users themselves, however the living lab connected to the universities were more often not involved in this task themselves. This was mostly handled by one of their partners in the care sector.

One innovative network mentioned that end-users were very important, but not directly for the sustainability of their network. It was not considered as a main issue for the sustainability.

Also the involvement of 'regular' volunteers, who for example organize focus groups or computer lessons, are important for the community support. They carry out a positive message to the rest of the community by their involvement in the network, which might increase enthusiasm of others.

6. Discussion

In this research we focused on the influencing characteristics on the sustainability of whole networks. The data analysis provided an overview of differences between innovative whole networks. The results from the surveys and the interviews, highlighted the most important characteristics of sustainability and underlying logic. In the discussion, we will interpret these results, link the results to the literature and see if the differences between innovative whole networks as derived from the desk research, led to difference in importance of influencing characteristics of sustainability.

6.1 Implications

Networks have an increasing importance in the current society (Raab & Kenis, 2009). Unfortunately many networks are unintended terminated, causing relatively high costs and unresolved issues. To counter the unintended termination of networks, it is important to have more insight in the influencing characteristics of network sustainability. Sustainability has not gained much attention in literature so far (Turrini et al., 2010; Stirman et al. 2012, Shediac-Rizkallah & Bone, 1998), but both in the organizational literature, network literature and sustainability literature, some research is conducted. The combined results from these studies formed the input for the model we developed as starting point for this study (see figure 3).

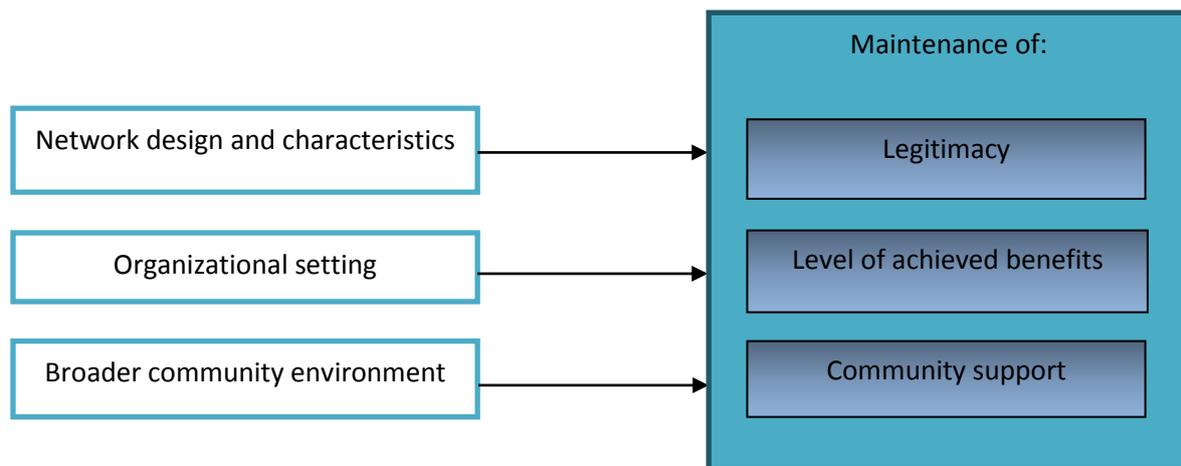


Figure 3: Model for the sustainability of innovative whole networks

To answer the research question, we had a look at influencing factors of network design and characteristics, the organizational setting and influencing factors in the broader community environment on the different dimensions of sustainability: maintenance of legitimacy, maintenance of level of achieved benefits and maintenance of community support. Thus far we have presented the quantitative and qualitative results. Underneath we will distinguish primary and secondary findings, connect the findings to the existing literature and suggest directions for further research.

Primary findings

Through the research on the influencing characteristics of the sustainability of a whole network, we have been able to identify three influencing factors that are considered to be the most important influencing characteristics. These characteristics are collaboration, financing and community support. Collaboration positively influences the legitimacy as interactions, financing positively influences the level of achieved benefits and community participation positively influences the community support.

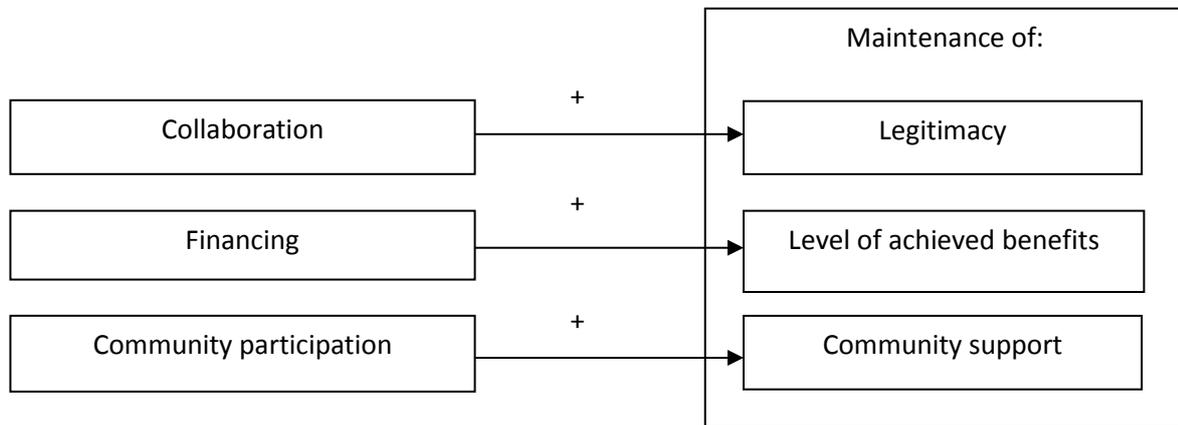


Figure 4: Model of the primary findings for the sustainability of innovative whole networks

Legitimacy as interactions

Collaboration

According to Human and Provan (2000), to obtain legitimacy as a form of interaction, the network should establish and sustain relationships with firms in order to be legitimized. The results of the study confirm the finding of Human and Provan (2000). In general, respondents underlined the importance of establishing and sustaining relationships with firms. One of the interesting benefits of collaboration mentioned, is the complementary knowledge network partners most likely have, which might facilitate innovation processes. With establishing and sustaining the relationships with firms, networks seem to aim for or grow towards legitimacy as interaction.

Respondents preferred to create and maintain relationships with partners they worked with on previous projects, or that were recommended by organizations they trusted. The trust lowered the risk of collaborating. According to trust literature, trust might indeed enhance cooperation, safe transaction cost, improve capability and increase strategic flexibility (Gulati, 1995; Mayer, Davis & Schoorman, 1995). To which extend however, depends partly on the length of the relationship between partners, the level of risk and the strength of the interpersonal connections (Inkpen & Currall, 1997). Luo (2002) found that a positive relationship between trust and performance will be stronger with a high market uncertainty, more resource interdependency, equal risk sharing or with a greater reciprocal commitment. All these characteristics can be applied on health oriented innovative whole networks. The market uncertainty is relatively high, because of the involvement in developing a new product or service. There is resources dependency, especially concerning knowledge sharing. Also risk sharing can be seen, by collaboration, partners share successes but risks as well. Last, because of the relative high investment, we presume that commitment is high. According to Luo (2002), the positive link between trust and profitability is stronger for younger networks. In general, the type of innovative whole networks we addressed in this network are

relatively young. They all exist for at least five years, but just very few over ten years. Therefore we can argue, that working with trusted partners is a strategic decision for those innovative whole networks. However according to Granovetter (1973), collaboration with new partners instead of the trusted, old partners might be very beneficial for the network. New partners might form a bridge, which is the only path between two points (Granovetter, 1973). This bridge is thus the only way to exchange information and influence between two points. Also for the indirect contacts of these two points, obtaining new information is only possible by the use of the bridge. Therefore, in order to diffuse new ideas, influences or information, the bridge is very important (Granovetter, 1973). If we apply this for the innovative whole networks, new collaborations with partners that are not strongly connected to the network yet, might bring in new ideas and information. Especially for networks concerned with innovations, new information is extremely important. Some of the networks mentioned that, besides the collaboration with trusted parties, relatively new innovative companies were thought of as interesting partners for collaboration as well.

Even though collaboration offers important benefits for networks, respondents mentioned that, in some cases, it remains difficult to collaborate because of concurrency. Networks want to keep their advantage over others and therefore, keeping some information for themselves might be wise.

Especially engaging firms in the collaboration in networks remains difficult. One of the reasons is the fact that firms need quick solutions for their problems. Innovative networks are struggling to be able to provide them with quick answers. Furthermore, the networks addressed in this network were often closely linked to a hierarchical institution. This means that decision have to go over many layers, which slow down the process as well. Moreover companies are not very willing to spend money outside their own organizational infrastructure, which increase the dependency on research grants and the long period of applying which comes with it. This again, effects the disability to provide quick solutions to pressing questions.

According to the respondents, the importance of collaboration is widely acknowledged among the networks, which points in the direction towards legitimacy as interaction. Much effort is putted in creating benefits for all stakeholders and establishing collaboration with both trusted and new network partners. However, collaboration with companies remains difficult. Therefore, some more steps should be made in order to establish legitimacy as interaction.

Putting the findings described above in the form of a formal proposition we can state:

Proposition 1: Other things being equal, the likelihood of sustainability as legitimacy as interaction, will be highest when networks are able to establish and sustain collaborations with as many different kind of network partners as possible.

As described in the theoretical framework, legitimacy should be built along three dimensions. Not only legitimacy as interaction should be achieved, also legitimacy as a form and legitimacy as an entity are necessary to establish and maintain, in order to increase the likelihood of sustainability. The respondents however, especially emphasized legitimacy as interaction. In contrast, Human and Provan (2000) argue that the primary focus in establishing legitimacy should be on the legitimacy as a form and legitimacy as an entity. If networks are not or not sufficiently concerned with the establishment of these forms of legitimacy, it might be difficult to obtain these forms of legitimacy in later phases.

Since we just included networks that are at least established for five years, it might be that the legitimacy as a form and legitimacy as an entity are perceived as sufficient established already. This might explain the emphasize on legitimacy as interaction, reflecting their current focus.

Maintenance of level of achieved benefits

Financing

Shediac-Rizkallah and Bone (1998) define financing as the most prominent influencing factor of network design and characteristics on sustainability. Financing is concerned with the sources of funding, the financial help of the community and the strategies for self-supporting (Shediac-Rizkallah & Bone, 1998). From the interviews and the surveys we can conclude, that the respondents named financing as a very important factor for the sustainability of networks as well. Each network needs namely a certain minimum level of financial resources to be able to continue its activities.

The most important source of money for networks, is coming from research funding or grants. The funds or grants through calls are always for a limited amount of time. This means per definition, that we can put major question marks by the financial sustainability of these innovative whole networks. It depends on how well networks are able to acquire new funding, during, or after the projects they have been running already, to continue. For most innovative networks, not being able to acquire new grants is something to be concerned with. For many innovative whole networks it would be a major threat for the maintenance of the level of achieved benefits and therefore for the sustainability.

Most other types of funding, like charitable money or financial support from the mother organization, have in many cases a structural character. This is beneficial for the financing over the long term. Therefore, trying to create other revenue streams, besides income from research funds, is important. A few networks mentioned that the network can continue with just these other types of funding. Making use of the different financial resources lowers the dependency on grants and thus makes the network less vulnerable. With different sources of income a network might be easier sustained.

Another potential interesting money flow for networks, comes from collaborations with companies. For many networks however, it remains complicated to engage companies in the collaboration. In general, the network is able to enhance the development process of a service or product for a company, by facilitating close collaboration with end-users. Because of this close collaboration the product or service is more likely to actually add something to solve the needs of these end-users. In principal a product or service is therefore more likely to be successful, which is interesting for a company. Even though it might be very interesting for companies to work with these innovative networks, it remains complicated to get them on board and actually pay for the service a network can deliver. The main cause seems to be the lack of flexibility in many networks. Because of slow and hierarchical decision making processes, it takes time to actually start working for a company. For companies, getting an answer on their question as rapid as possible is important. This leads to a misfit between the wishes of a company and the abilities of a network. Therefore many networks are unable to set up a successful collaboration with a network.

Our findings on financing can be stated as the following formal proposition:

Proposition 2: Other things being equal, the likelihood of sustainability through the level of achieved benefits, will be enhanced when a network can depend on a wide range of financial resources.

Structural means of resources are preferred over non-structural sources of income, like research grants.

In the traditional firm theory, it is said that every decision that has been made in an organization, is economically driven and should lead to the maximization of profits (Doyle, 2013). Most networks however do not even earn enough to cover their expenses. This means that networks are not able to be financial sustainable on their own, let alone create some profit. Instead of maximizing profits, most networks aim at providing products or services to improve health-related issues for their end-users as their main goal. This different approach is in line with one of the main critics on the traditional firm theory. This criticism suggests that it is too simplistic that businesses or networks are just motivated by profits. They are motivated by other goals as well (Doyle, 2013). Therefore, it is important to have a broader view than just economically. In this research we did so by looking at the influences of different influencing factors on legitimacy, maintenance of level of achieved benefits and community support.

Community support

Community participation

Shediac-Rizkallah & Bone (1998) specified the importance of community participation in the literature. They argue that communities should be able to participate and have ownership in defining the solutions to their own problems, which leads to increased capacity or competency of the network and therefore to a higher likelihood of network sustainability (Shediac-Rizkallah & bone, 1998).

Based on the interviews and surveys, we can state that community participation, in the sense of involving end-users and volunteers, in the development process of new products and services is important. According to respondents it is important to start working from the perspective of the end-users. Therefore, the early involvement of these users is very important. Although the importance of including end-users in this particular kind of innovative whole networks, might seem trivial, some interesting differences between the networks asks for further explanation.

The approach of involving end-users differs among the networks. Some networks build and maintain a pool of (potential) end-users, other networks do not maintain a pool of end-users but engage end-users through the companies they are collaborating with. Both approaches held different advantages and disadvantages. The networks that work with a pool of people, can connect companies to their target population easily, but have higher costs to maintain such a pool. For networks that do not maintain a pool, this works the other way around. Furthermore, when you approach new end-users for each project, you are sure that your population serves the purpose and that it is up-to-date. However, the support of the end-users might be less strong, since they do not have a long term committed towards the network.

The two approaches seem to be due to the different orientation of the networks. The networks strongly connected to the municipality, or the hospital tended to have a pool of end-users themselves, however the networks connected to the universities were often not involved in this task themselves. This was mostly handled by one of their partners in the care sector. The insights described above result in the following proposition:

Proposition 3: Other things being equal, the likelihood of sustainability through community support will increase with the involvement of the community throughout the whole process and by long-term commitment of the community. Therefore the networks that are maintaining a pool of end-users themselves are more likely to be sustained.

Von Hippel (1976) takes the role of the user in the development of new products and services to an even higher involvement level: the user recognizes the need, solves the problem via an intervention, builds a prototype and proves the prototype's value in use. Furthermore, the user deals with the diffusion of the intervention. The role of the manufacturer is thus very limited (Von Hippel (1976). Although the networks embrace the important role of the user, especially in recognizing the need, suggestions for potential solution and evaluation of products and services, the network remains responsible for the development of a prototype and the commercialization.

To summarize, collaboration, financing and community participation are the main influencing factors on sustainability. These insights are important, because in previous studies no differentiation on importance of influencing characteristics have been made. The differentiation makes it possible to actually work towards establishing the 'ideal' situation, as outlined in the propositions, to increase the likelihood of sustainability of a whole network. The insights on the main influencing factors on sustainability are also important because previous research was for a large extend based on the organizational literature. This research, in contrast, focused on the sustainability of networks, and gives therefore more accurate insights in the characteristics influencing sustainability then organizational research could provide. In future research the propositions on network sustainability can be taken into account.

Secondary findings

Besides the main findings of the research described above, we can also distinguish some other influencing factors on the sustainability of a whole network that are worth mentioning.

Legitimacy as a form

The important characteristics for legitimacy as a form are governmental support, the 'fit' with the existing organization and involving companies.

Governmental support

The importance of governmental support for legitimacy as a form is mainly concerned with the financial resources. When a government perceives the network as a legitimate form of organizing, it is more likely that the network will be given a research grant. Thereby the acceptance of legitimacy as a form, by the government, might increase the positive image of a network. The positive influence of governmental support on sustainability is in line with the expectations, but we can now specify the influence of governmental support on sustainability, to the influence of governmental support on legitimacy as a form.

'Fit' with the existing organization

Legitimacy as a form is also reflected and reinforced by the alignment between the goals and procedures of the innovative network and the 'mother organization'. The positive influences of the fit of the network within the existing organization, are deriving from a good reputation, knowledge and connections of the mother organization. That a mother organization is willing to let the network

benefit from the reputation, connection and knowledge reflects the legitimacy of the network as a form of organizing. The 'fit' with the existing organization was not considered to be an important characteristic in one of the surveys.

However, although integration with the host organization, is said to have a positive effect on the sustainability of a new network, there need to be enough flexibility for a new network to adapt to the needs of the environment. Network partners might desire quick answers to urgent issues, so therefore it is important to anticipate on changing demands.

The insights on 'fit' with the existing organization appear to be in line with the expectations based on the literature: a positive influence of 'fit' with the existing organization on sustainability. However, maintaining enough flexibility needs to be continuously considered. Furthermore the specific relation between the fit with the existing organization and legitimacy as a form became clear.

Involving companies

A group which seems less convinced by the network when it comes to legitimacy as a form, are (commercial) companies. According to many respondents, it remains difficult to convince companies of the added value of the network.

Legitimacy as an entity

The important characteristics of legitimacy as an entity are team and team leader, communication and focus.

Team and team leader

According to the respondents, the team and team leader of a network are important to perceive the network as an entity. Especially a team leader that 'stays in place for a while' and is 'communicative strong' towards outside parties, is important to present the (recognizable) network to outside parties. Also being able to maintain contact with one team member is important. Therefore some degree of stability in the team would be beneficial for the recognition of the network as entity. This confirms the positive expectations of influence of team and team leader on sustainability, based on the literature. The specific relation between team and team leader and legitimacy as an entity can be added.

Communication

Especially for the network that has a physical location, being communicative and open and welcoming to visitors helps to perceive the network as an entity. For all networks, openness what you network is able to do, and what not is important to perceive the network as an entity.

This is in line with Marek, Mancini and Brock (2003) and with the recommendations made in a study of Evashwick and Ory (2003).

Focus

A clear focus can facilitate the recognition of the boundaries of the network and therefore facilitate the legitimacy as an entity.

The importance of the focus of a network seems not reflected in the influencing factors on sustainability so far. For certain categories the goals, which imply a certain focus, are important, for example in relation to the integration with the existing services of the mother organization and when

it comes to collaboration. However, the type of goal or the importance of certain goals, are in these cases important for the function of something else, like collaboration or integration. The focus as such, to be able to increase the legitimacy as an entity, has not been taken into account.

Legitimacy as interaction

For legitimacy as interaction the implications are described under main findings.

Level of achieved benefits

For the level of achieved benefits the modification and having a motivated team are important influencing characteristics, besides the influence of financing.

Modification

Making changes or alternations over time is necessary for networks to be able to maintain the level of achieved benefits. Both making technology changes, in order to remain being able to test innovative technologies and making changes in team composition, in order to remain being able to participate in a certain project, can be important changes. Also enhancement of procedures and expanding into different research areas, are - for some respondents - considered to increase the likelihood of the maintenance of the level of achieved benefits. Making changes or alternations in terms of organizational structure might also be important. If changes in organizational structure are successfully made, it can facilitate the persistence of collaboration with companies. All changes are made in order to remain an interesting partner for collaboration, being able to achieve goals or remain relevant in some way. Therefore the likelihood of the maintenance of the level of achieved benefits increases when modifications are made. This is in line with the positive expectations based on the literature. We suggest the specific influence of modification on level of achieved benefits, instead of all dimensions of sustainability.

It is interesting to mention, that modification of the network was indicated as a very important characteristic influencing sustainability during the interviews and the open survey, however in the second survey modification scored quite low.

Motivated team

The team has been put forward as important characteristics for the sustainability of an innovative whole network. Especially having a motivated team came across as important feature. Representing the network with passion and believe in its value, might increase the likelihood of success and therefore sustainment for the long term. This finding is in line with the suggestions made in the literature, however the specific influence on the maintenance of level of achieved benefits has not been suggested so far.

Community support

For community support the implications are described under main findings.

To summarize, most influencing factors on sustainability are in line with the expectations we had based on the model we started this research with. However, we can add 'focus' to the influencing characteristics and we should moderate the positive influence of 'fit' with the mother organization, with the negative influence of 'fit' with the mother organization concerning collaborations. Furthermore, this research gained insights in the specific relations between certain influencing characteristics and certain dimensions.

Practical implications

The results from the interviews and the survey give us a better understanding on the influencing characteristics of sustainability on the different dimensions of sustainability. Something that should be taken into account as well, are the differences between the innovative whole networks and the implications of these differences for the likelihood of sustainability. The main differences between innovative whole networks found during the data analysis are type of goal and sources of funding.

Two different types of goals that can be distinguished, are goals using the user-centric approach and goals which are more technology driven. These different goals lead to different starting points of developing products or services in the innovative whole networks: in one case is the end-user with his or her needs, and in the other case it is the technology. This orientation can be connected to the way end-users are involved in the process. As we found out in the interviews, there are two ways of involving end-users in the process. The first approach is maintaining an own pool of end-users, the second approach is engaging end-users through companies the network is collaborating with. The innovative whole networks that are more technology driven, often use the second approach of engaging end-users, whereas networks that are more user-centric oriented, often maintain a pool of end-users themselves. The goal orientation of the innovative whole networks might depend on the orientation of the mother organization as well. We see that networks strongly connected to the municipality or the hospital, tended to be more user-centric and have a pool of end-users themselves. In contrast, networks that are connected to universities seemed more technology oriented and did not maintain an own pool of end-users as often as the networks connected to the municipality or the hospital.

Both approaches of engaging end-users seem to have advantages and disadvantages. An example of an advantage of maintaining an own pool of end-users, is a relatively easy access to the target population, an example of a disadvantage are the high overhead costs. An example of an advantage of engaging end-users through companies the network is collaborating with, is the approach of a specific target population per project. By doing so, it is more likely that the target population serves the purpose. A disadvantage is that you are dependent upon third parties. Furthermore it might lower the community support, since no long term commitments will be created. This influences the creation and maintenance of legitimacy and thus the likelihood of sustainability. Therefore, when possible, the maintenance of a pool of end-users is preferred.

However, the orientation of the mother organization and the goal definition, should be taken into account.

As both ways of involving end-users have advantages and disadvantages and seem to be related to the orientation of the mother organization and the goal definition, it is very likely that the best way of engaging end-users depends on the characteristics of the network described above. By taking into account the way of engaging end-users can be decided.

Besides the goal orientation and its implication, also the sources of financing differs a lot among the innovative whole networks. Some innovative whole networks are financed by project funds, others receive a part of their funding from their own organization, some can make use of charitable money and a few innovative whole networks are able to work with companies or industrial partners. In general most financing is coming from project funding. After the interviews, we can conclude that acquiring funds is mainly essential for the maintenance of level of achieved benefits. Funds are, however, always available for a limited amount of time. Therefore, to be able to secure follow-up

funding or financing and try to create other sources of income, are extremely important. Very few innovative whole networks are able to successfully collaborate with companies. Most networks are namely embedded in an organizational structure which is more equipped for a research orientation, where much time can be spend on designing and setting up an extensive research. This time is needed due to the hierarchical structures of the organization. To be able to engage companies, a network should however be as service oriented as possible. Service oriented means being aware of the wishes of the 'client'. One of the main wishes of the client is to be able to have an answer as quickly as possible. Therefore, reacting rapidly to the demands of your potential clients is essential. Furthermore to be able to involve companies in the collaboration process, it is important to convince the companies or potential 'clients' of the benefits they will have from collaboration. Thereby previous, positive experiences of industrial partners make it more likely that companies are willing to invest money in the network. If a network is able to engage companies who are willing to pay for the services of the network, this is an important way to secure or enlarge the financing. The spread of income lowers the risk and the network will be less dependent on project funding.

In sum, networks that are in line with the orientation of the mother organization concerning goals and adapt the way they engage end-users to it - if possible by maintaining a pool of end-users themselves - and furthermore are able to engage industry and companies, are expected to be most likely sustained. This is also an important practical implication for health oriented innovative whole networks.

6.2 Limitations

Due to the limited scientific insights on sustainability of networks, relatively limited insights on the dimensions of sustainability were found up front. By trying to fit the pieces of different fields of research together, in a logical model on network sustainability, decisions to include the maintenance of legitimacy, maintenance of level of achieved benefits and the maintenance of collaboration support have been made. Possibly other decisions on dimensions of sustainability or influencing characteristics could have made sense as well. An example of another possible dimensions of network sustainability is network resilience. Network resilience is the ability to recover quickly from illness, change or misfortune. Some aspects of network resilience can be found in the modification of the network, which is, in the current study, taken into account as an influencing factor of sustainability.

Due to practical consideration, the case selection had to be slightly altered during the process. Therefore the variety of the descriptives addressed in the data analysis, reflected in the networks, might be lower than initially planned. However the cases have been selected based on the same main criteria (at least five years in existence and health oriented) as other cases, and these cases can therefore be considered to be accurate for the purpose of this research. Initially, we aimed to include a higher representation of terminated innovative whole networks. However, getting in touch with these networks was harder than expected. The insights on variables influencing sustainability in this research are therefore mainly based on experiences of successful innovative whole networks.

Another limitation of this research is the operationalization of innovative whole networks as living labs. Living labs are a certain kind of innovative whole network, addressing other kind of innovative whole networks might reveal other implications for sustainability. Only among living labs themselves

there are many differences already. This makes it difficult to draw conclusion about sustainability based on a small sample. Furthermore, time constraints in combination with the broad range of slightly different living labs did not allow for saturation.

Moreover, in order to be able to draw accurate conclusion on sustainability, it might be relevant to address the sustainability of networks at two points in time or over a period of a few years. This allows researchers to get more insight in the influence of different characteristics of sustainability, like collaboration and ways of financing, on the sustainability. However time constraints did not allow us to do so.

6.3 Future research recommendations

This research adds to the current state of sustainability and network research providing insights in influencing factors of sustainability of health oriented innovative whole networks. Furthermore this research provides practical implications for innovative whole networks wanting to establish a sustainable innovative whole network. Besides these insights, this research leaves us with some interesting research directions as well.

A direction for future research can be found in the dichotomy between a preference for collaboration with trusted partners, but also admitting the value of new, innovative partners. Since we are dealing with innovative networks, the preference for working with known and trusted partners is an interesting fact. For innovative networks we can namely argue that it would be more beneficial to work with unknown partners, to increase the flow of new input (Granovetter, 1973). This will increase the creativity, by access to new influences and information. It would be interesting to see what the influence of this dichotomy is for health oriented innovative whole networks.

Financing is for almost all networks a major issue. Most money comes from project funding through grants provided by governmental institutions or the European Union. Working together with companies is for many networks an interesting direction. To engage companies however remains a difficult task. It would be interesting to focus in future research on the wishes of companies in working with these networks in order to facilitate cooperation.

Although the collection of data on terminated whole networks might be an hurdle to overcome, being able to compare the insights of this research with a comparable study on influencing characteristics on sustainability among terminated whole networks might offer interesting insights. Therefore research on the influencing variables on the sustainability of innovative whole networks among terminated networks is an interesting research direction.

Another research direction is conducting a quantitative study as follow-up of this mainly qualitative study. The insight of this study may form the starting point of a quantitative study. Quantitative research offers the possibility to use a larger sample which adds to the generalizability of the results of the research.

A last suggestion would be to conduct this research in another geographical context. Since this research is conducted in the European context, the results are applicable for this particular context. Because of cultural differences that might influence network design and characteristics, the organizational setting and especially the community environment research in another continent might reveal other important influences due to cultural differences. Therefore it would be interesting to repeat this research in another continent.

7. Conclusion

In this research we had a look at several influencing characteristics on the sustainability of health-oriented innovative whole networks. These influencing characteristics were grouped in three categories: network design and characteristics, organizational setting and broader community environment. The influencing factors were related to the dimensions of sustainability, namely the maintenance of legitimacy, maintenance of level of achieved benefits and maintenance of community support. The surveys and interviews made it possible to identify the most important influencing characteristics of sustainability, according to the respondents of these innovative whole networks. Furthermore, the relation of these characteristics to the dimensions of sustainability have been described.

We suggest that collaboration, financing and community participation are the most important influencing characteristics for the sustainability of innovative whole networks. Collaboration positively influences the maintenance of legitimacy as interaction. This is stated in the following proposition: other things being equal, the likelihood of sustainability as legitimacy as interaction, will be highest when networks are able to establish and sustain collaborations with as many different kind of network partners as possible.

The proposition describing the positive influence of on the maintenance of level of achieved benefits is: other things being equal, the likelihood of sustainability through the level of achieved benefits, will be enhanced when a network can depend on a wide range of financial resources. Also for the positive influence of community participation on the maintenance of community support a proposition has been formulated: other things being equal, the likelihood of sustainability through community support will increase with the involvement of the community throughout the whole process and by long-term commitment of the community. Therefore the networks that are maintaining a pool of end-users themselves are more likely to be sustained. This propositions can be used in further research.

Besides these main findings, governmental support, the 'fit' with the existing organization and involving companies were found to influence the legitimacy as a form. Team and team leader, communication and focus were found to influence the legitimacy as an entity and modification and a motivated team were found to influence the maintenance of level of achieved benefits.

From the data analysis, we can conclude that the characteristics that might be the most difficult to control, accomplishment of goals and resource munificence, also have important (practical) implications for the sustainability of health-oriented whole networks.

In order to increase the likelihood of successfulness of accomplishing goals, it is important to take the goal orientation and its implications into account. Two types of goals with different focus can be

identified. One type of goals focuses on the end-users, where the other focuses on the technology. This has important implications for the way end-users are approached, either through their own pool of end-users or via contacts with other parties. Networks that are strongly connected to the municipality or the hospital, tend to be more user-centric and have a pool of end-users themselves. In contrast, networks that are connected to universities, seemed more technology oriented and did not maintain an own pool of end-users as often as the networks connected to the municipality or the hospital. As both ways of involving end-users have advantages and disadvantages and seem to be related to the orientation of the mother organization and the goal definition, these characteristics (orientation of the mother organization and the goal definition) should be critical in the decision of the best way to engage the end-users. Thus alignment with the mother organization and the goal definitions is important to increase the likelihood of success of accomplishing goals.

Besides the importance of goal orientation, also taking the potential of different sources of financing into account, is important in terms of sustainability of the network. The sources of financing differs a lot among the innovative whole networks, but the biggest money flow comes in most cases from governmental or European grants. Since the grants are always temporarily, it is interesting to have a look at additional means of income. In this sense collaboration with companies plays an important role. If a network is able to engage companies who are willing to pay for the services of the network, this is an important way to secure or enlarge the means of financing. The spread of income dependency lowers the risk for a lack of resource munificence.

This research gave us insight in the variables that influence the sustainability of a whole network focused on health interventions. In sum, this research suggests that financing, collaboration and community participation are the most important influencing characteristics on the different dimensions of sustainability. Therefore, three propositions have been formulated.

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9. Appendices

9.1 Influencing factors on network level

To make the factors that influence sustainability applicable for the network level, I will provide the following conversion:

Factors on organizational level	Factors on network level
<u>Program design and characteristics</u>	<u>Network design and characteristics</u>
<ul style="list-style-type: none"> • Use of evaluation data • Modification of the program on the local level • Use of volunteers or other low-cost ways of delivering services. • Project negotiation process • Project effectiveness • Project duration • Project financing • Project type • Training 	<ul style="list-style-type: none"> • Use of evaluation data • Modification of local network • Use of volunteers or other low-cost ways of delivering services • Negotiation about network goals, targets and time frames • Network effectiveness • Network duration • Network financing (resources, fund?) • Network type (preventive/curative?) • Training (Does the network have a training component?)
<u>Factors within the organizational setting</u>	<u>Factors within the network</u>
<ul style="list-style-type: none"> • Role of program champion • 'Fit' of the new program within the existing organizational goals and procedures • Become a dominant service of the providing organization • Perceived benefits from key stakeholders and/or clients • Institutional strength 	<ul style="list-style-type: none"> • Role of the lead organization/network champion • 'Fit' of the network with the existing goals of the different network partners • Achieving the network goals as dominant objectives of the partners collaborating • Perceived benefits from key stakeholders and/or clients • How mature is the network? (or how mature or partners that collaborate in the network)
<u>Factors in the broader community environment</u>	<u>Factors in the surrounding environment of the network</u>
<ul style="list-style-type: none"> • Socioeconomic and political considerations and community participation • Key support from other organizations • Funding from other sources 	<ul style="list-style-type: none"> • Socioeconomic and political considerations and community participation • Key support from organizations close to the network and from other networks • Funding from other sources

9.2 Interview questions

Sustainability questions interview:

- How would you in general describe sustainability?
- What are, according to you, characteristics of sustainability? (strengths of living lab?)
- Are these characteristics represented in your living lab?
 - If yes, how are they represented? If not, why not? Would you like them to be represented, why? Some more than others?
- Are there more factors influencing sustainability, besides the characteristics mentioned above?
 - Network design and characteristics
 - factors within the network
 - factors in the surrounding environment of the network
- Which of the characteristics mentioned during the interview would you describe as the most important (or indicators) of sustainability?
(use form)

9.3. Surveys

Characteristics of sustainability - part 1

Name of living lab:

Foundation (started):

Sector (area(s) of interest):

1. Which characteristics are important for the sustainability of your living lab?

Characteristics	

2. Can you divide a total of 100 points to the characteristics you mentioned above, to indicate which are the most important for the sustainability of your living lab?
Please write the points down in the second column of the table above.

Characteristics of sustainability - part 2

3. Based upon research, several characteristics are said to have influence on the sustainability of a living lab. I would like to ask you to divide a total of 100 points to the characteristics which are most important for the sustainability of your living lab.

	Characteristics	Points
1	Use of evaluation data	
2	Modification of the living lab	
3	Use of volunteers	
4	Negotiation about (changes of) network goals, targets, time frames	
5	Effectiveness of living lab	
6	Role of the living lab team	
7	Maturity of the living lab (duration)	
8	Financing	
9	Training/learning	
10	Role of living lab leader	
11	Role of a lead organization	
12	'Fit' of the living lab with existing organizational goals and procedures (not applicable for stand-alone living labs)	
13	Achieving the goals of the living lab are dominant objectives the 'founding' organization (e.g. university, hospital etc.)	
14	Perceived benefits for key stakeholders and/or clients	
15	Maturity of the partners you collaborate with	
16	Political considerations	
17	Socioeconomic considerations	
18	Shared goals and procedures among collaborating partners (network)	

9.4. Detailed survey results

In this table a detailed division of the points per influencing characteristic for all innovative whole network is given.

Category	Dimension	Total points	I.W.N 1	I.W.N 2	I.W.N 3	I.W.N 4	I.W.N 5	I.W.N 6	I.W.N 7	I.W.N 10
1. Financial	Funding	215	42,5	50	20	20	42,5	12,5	27,5	
	Cost effectiveness	5							5	
2. End-users	Respond to the needs of end-users/trying to continuously provide products and services to community/user-centric approach	79,17			16,67				12,5	50
	Involving end-users	47,5		15	5		22,5	5		
3. Added value	Add/ value or relevance/ believe in value	55						25	10	20
	Being active	25		25						
	Durability and quality	10			10					
	Useful with new/adaptable technologies	20		10						10
	Physical availability	10				10				
4. Network	Collaborate/network with other companies/stakeholders (consumers)	83,33	12,5		33,33		32,5	5		
	Governmental support	12,5	12,5							
	Recognition of institution/org. structure	17,5	17,5							
5. Methodology	Use of theory and background/research	28,33			8,33		2,5		7,5	10
	Reproduce experiments	10				10				
	Maintain knowledge	10				10				
	Ability to adapt/flexibility	55				10		25	10	10
	Having diverse activities	10				10				
6. Team	Critical mass of skilled, trained and committed employees/ availability of staff and building on knowledge	41,67			6,67			20	15	
	Multi-disciplinary team	15						7,5	7,5	
	Volunteers	10	5						5	
	Learning	7,5	7,5							
7. Legislation	Legislation	2,5	2,5							
	Contracts with end-users	20				20				

Table 4: Descriptives survey characteristics of sustainability (per innovative whole networks (I.W.N) added up to 100 points)

Influencing factors	Characteristics	Total points	I.W.N 1	I.W.N 2	I.W.N 3/3	I.W.N 4	I.W.N 5	I.W.N 6	I.W.N 7
1. Network design and characteristics	Use of evaluation data	22,17	2,5	5	2,67	1,5	5	2,5	3
	Modification of the I.W.N./network	38,33	1,5	10	6,33	6,5	1	8,5	4,5
	Effectiveness of the I.W.N./network	54,83	2,5	7,5	4,33	5	12,5	12	11
	Training/learning	18,67	1	2,5	3,67	1,5	2,5	2	5,5
	Use of volunteers	56,17	15	15	3,67	10	2,5	2	8
	Negotiation about (changes of) network goals, targets, time frames	19,5			7	1	1	4	6,5
	Financing	104	25	17,5	7	15	15	7	17,5
2. Organizational setting	Role of I.W.N. leader	44,33	2,5	5	4,33	9,5	10	7,5	5,5
	Role of the I.W.N. team	45,17	21,5	2,5	6,67	4,5	5		5
	'Fit' of the living I.W.N. with existing organizational goals and procedures	30	2	10		6,5	7,5	2	2
	Achieving the goals of the I.W.N. are dominant objectives of the 'founding' organization	21,67	1	5	1,67	7,5	2,5	2	2
	Perceived benefits for key stakeholders	70	4	10	25	5	10	10,5	5,5
	Maturity of the I.W.N.	20	4		2	5	2,5	1,5	5
	Maturity of the collaborating organizations (network)	20,83	4	2,5	4,33	5	1	2	2
	Shared goals and procedures among partners (network)	29,33	1		8,33	7,5	5	3	4,5
	Role of the lead organization	46,5	5	2,5	5	7	12,5	9,5	5
3. Broader community environment	Community participation	27,17		2,5	5,67			16	3
	Political considerations	17,42	5	2,5	1,17	1	3,5	3,25	1
	Socioeconomic consideration	12,42	2,5		1,17	1	1	3,25	3,5

Table 5: Descriptives survey, based on the influencing characteristics of sustainability