



AALBORG UNIVERSITY
DENMARK

Aalborg Universitet

How Actor-Network Mapping informs the early stages of System Innovation

a case study

Tuyfzand, Lucy Johanna; Bregenov Jönsson, Julie ; De Götzen, Amalia

Published in:
DRS2022: Bilbao

DOI (link to publication from Publisher):
[10.21606/drs.2022.295](https://doi.org/10.21606/drs.2022.295)

Creative Commons License
CC BY-NC 4.0

Publication date:
2022

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Tuyfzand, L. J., Bregenov Jönsson, J., & De Götzen, A. (2022). How Actor-Network Mapping informs the early stages of System Innovation: a case study. In *DRS2022: Bilbao* Design Research Society. Proceedings of DRS <https://doi.org/10.21606/drs.2022.295>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Jun 25th, 9:00 AM

How actor-network mapping informs the early stages of system innovation: A case study

Lucy Johanna Stuyfzand
Aalborg University Copenhagen, Denmark

Julie Bregenov Jönsson
Aalborg University Copenhagen, Denmark

Amalia de Götzen
Aalborg University Copenhagen, Denmark

Follow this and additional works at: <https://dl.designresearchsociety.org/drs-conference-papers>



Part of the [Art and Design Commons](#)

Citation

Stuyfzand, L.J., Jönsson, J.B., and de Götzen, A. (2022) How actor-network mapping informs the early stages of system innovation: A case study, in Lockton, D., Lenzi, S., Hekkert, P., Oak, A., Sádaba, J., Lloyd, P. (eds.), *DRS2022: Bilbao*, 25 June - 3 July, Bilbao, Spain. <https://doi.org/10.21606/drs.2022.295>

This Research Paper is brought to you for free and open access by the DRS Conference Proceedings at DRS Digital Library. It has been accepted for inclusion in DRS Biennial Conference Series by an authorized administrator of DRS Digital Library. For more information, please contact dl@designresearchsociety.org.

How actor-network mapping informs the early stages of system innovation: A case study

Lucy Johanna Stuyfzand^a, Julie Bregenov Jönsson^{b,*}, Amalia de Götzen^c

^aKPMG Denmark, Denmark

^bRockwool Foundation, Denmark

^cDepartment of Architecture, Design & Media technology, Aalborg University, Denmark

*corresponding e-mail: juliejonsson@gmail.com

doi.org/10.21606/drs.2022.295

Abstract: This paper discusses how the participatory mapping of an actor-network map can inform the early stages of system innovation as described in the approach adopted by the Rockwool Foundation. It argues that mapping actors with an external expert at the beginning of a design process allows to explore not only the macro, meso and micro levels of a given complex system, but also the different key components of it, such as relations, resources, power and purpose. The Mental Health Initiative carried out at the Rockwool foundation, will be used as a case study to present and analyse the actor-network mapping process of the Danish School System in relation to youngsters' wellbeing, derive the main system insights and discuss limitations and opportunities towards its innovation.

Keywords: system innovation; actor network mapping; service design; design tools

1. Introduction

Today, society faces a plurality of challenges that seem not to be solved by the welfare state as a social system (Cottam, 2018). It is argued the welfare state was designed for the industrial era, and that societies today face quite different challenges, such as chronic diseases, climate changes, pandemics, ageing societies, and escalating inequality (ibid.). There are proposals for alternatives, such as the partner state, or the relational state (Bauwens & Lievens, 2013; Cottam, 2021; Tassinari et al., 2013) and in fact, multiple organisations experiment with small initiatives pointing towards a paradigm shift from a welfare state to an alternative state (ibid.). However, one does not achieve an alternative system through solely small initiatives: a recent publication on how to apply a more systemic approach provides some guidelines on where to start a process of innovation that can change the system itself and hopefully last (Leadbeater & Winhall, 2020). The work of the Rockwool Foundation addresses how system innovation is initiated, how it happens on three levels in the system, the keys to unlock existing systems, and the crucial roles in the process.



One of them is the convener role, which is described as a person who convenes both insiders, outsiders, and other relevant stakeholders to produce a common strategy for systemic change. This role can be held by designers (ibid.) who can engage with different stakeholders initiating and facilitating participatory and co-creation processes, who can model, simulate and visualise possible solutions and who can imagine feasible, possible and desirable futures with their vision building capability (Morelli, de Götzen, Simeone, 2020) . The authors have been acting as designers/convenors in the case under consideration in this paper, which will discuss in particular how, in the initial phases of a system innovation process, the actor network map can be used as a strategic tool to inform the system innovation framework. The actor network map is a tool to generate a visual overview of actors and components in a system and has proven itself to be a beneficial tool to create a holistic overview in complex systems during a design process (Morelli & Tollestrup, 2007). In this paper, we will discuss how a participatory activity around an actor network map can inform the initial stages of the innovation process of a complex system. The Mental Health initiative at the Rockwool Foundation (<https://www.rockwoolfonden.dk/>), with the specific focus on kids within the school system, will be used as a case study.

2. Systems thinking and system innovation

“A system is a relationship of parts that work together in an organized manner to accomplish a common purpose.” (Buchanan R., 2019)

The discipline of design empowers practitioners to intervene in a system on many levels. One could argue that the practice of design is systemic, as designers are able to navigate between their design process as a whole and the phases of it. Besides, designers also need to establish crucial relationships to the components in their designs and be systemic in their overall approach (van der Bijl-Brouwer & Malcolm, 2020). Having a systemic approach means to explore and analyse the different components of a system and understand how they affect each other. The overall ambition with the approach is to either develop a strategic plan to design interventions in systems or design a whole new system, but while technical systems can be completely re-designed, social systems can only be intervened as they are more complex and difficult to change (van der Bijl-Brouwer & Malcolm, 2020).

Designers continuously intervene in systems through, for instance, new products and services, new designed processes. From time to time, some systems call for a more radical change with system innovation. System innovations are defined as large-scale transformations in how societal functions such as transportation, communication, housing, and feeding are fulfilled (Elzen et al., 2004).

It is articulated that the conditions for system innovation occur when:

- Society faces a systemic challenge in need of a systemic response, which pushes for innovation.

- Society has a systemic opportunity to create a new kind of system, which will pull innovation.

The conditions can start system change separately or together. When there is a systemic challenge, a systemic opportunity, or both, system innovation can happen. Geels has divided systems into three levels, and he suggests we should engage on all three levels to perform system innovation (Geels, 2002). The three levels are the macro, meso, and micro (see Figure 1): the macro level is the landscape, and addresses values, ideologies, demographics, and economic context. The meso level is the regime, where we place frameworks, rules and norms embedded in infrastructure, institutions, and markets. Finally, there is the micro level, where ‘niche’ innovations happen: new practises, technologies, and lifestyles.

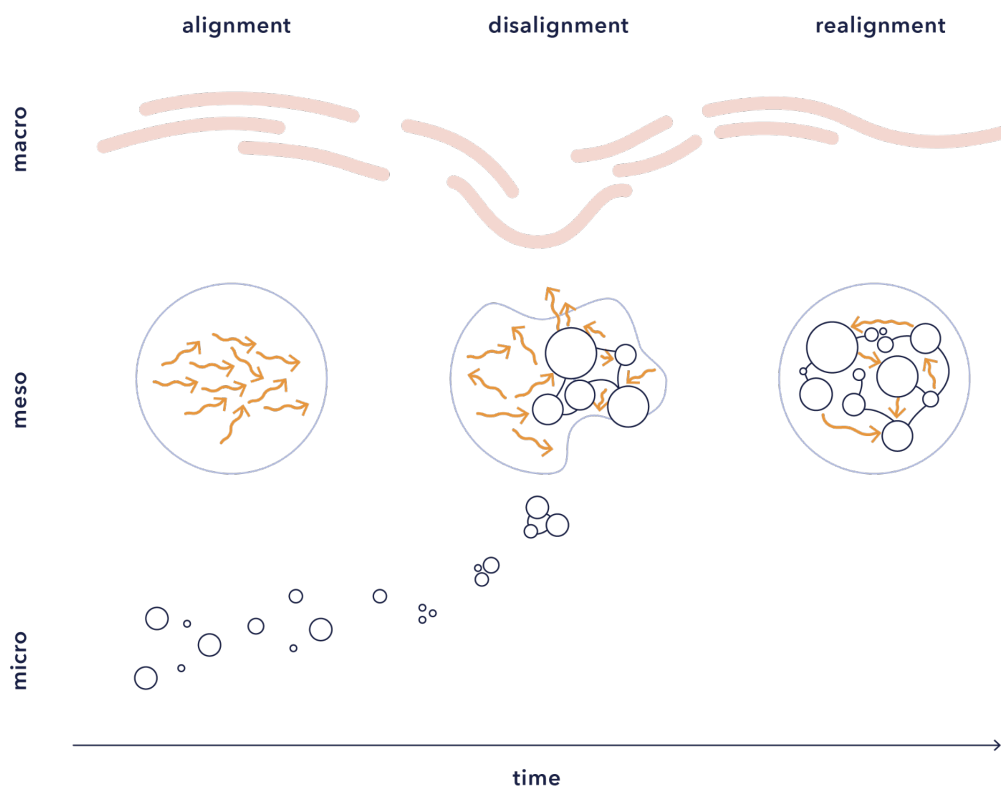


Figure 1. How system innovation happens on three levels, visually re-designed. This process is initiated when there is a change in the power structure, the relationships, the use of resources of the purpose of a system is altered (Geels, 2002)

Systemic change happens in each of the levels. On the micro level, entrepreneurs and creatives develop radical new solutions, habits, and ways of life. These changes are not necessarily focused on the entire system but rather on a local need. On the macro level, or the landscape, change happens in societal values and political ideologies, demographic trends, and economic patterns. Altogether, these shape the context in which a system operates. New developments, both on the micro and macro levels, create contexts where change becomes possible at the meso level. The meso level represents ‘the regime’: the

combination of institutions, technologies, markets, and organisations that give a system its structure. In figure 1, one can see how these three levels behave in three phases of system innovation: alignment, disalignment, and realignment. Small, radically different initiatives emerge on the micro level in the alignment phase, whereas the meso and macro levels are aligned. The initiatives slowly move up to the meso level, where the system becomes misaligned. A new balance must be found where the regime and landscape change to fit with the micro level. Once a balance is found, we have a phase of realignment where the system operates differently on all levels (Geels, 2002; Leadbeater & Winhall, 2020).

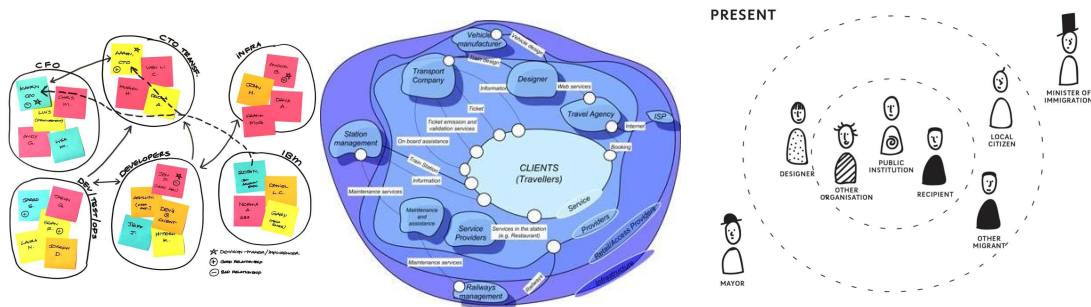
Where do we start with system innovations? Systems innovation is a process of resistance and momentum. Leadbeater and Winhall propose to approach system innovation by thinking about four keys to unlock systems: power, resource flows, relationships, and purpose (Leadbeater & Winhall, 2020).

- **Power:** Unlocking systems also includes a shift in who has the power, how resources flow, what takes priority, who matters, and what counts as a priority. Power can be embedded in culture or be observed in explicit instructions.
- **Resource flows:** Systemic change happens when resources suddenly become constrained or when resources of a new kind suddenly become cheap and widely available. These resources could be money, time, knowledge, reputation, technologies, etcetera.
- **Relationships:** Systems change when new patterns in relationships emerge. In other words, actors are reconfigured, and thereby new values are created.
- **Purpose:** One key to unlocking a system is changing its purpose. In other words, to change the point around which people, activities, and resources are organised. Changing the purpose does not mean we need a different goal to reach but rather an alternative philosophy to be enacted.

Nevertheless, changing a system is complex and it is argued that the role of designers is crucial to produce a common strategy for a systemic change (Leadbeater & Winhall, 2020). Designers can in fact bring to the arena their analytical, representation and modelling capabilities (Morelli, de Götzen & Simeone, 2020). Designers apply their analytical and representation capabilities to address the context and map the system in which they are operating, to make it more understandable and to explore how the different stakeholders are directly or indirectly influencing each other, what are the strategies, policies and institutional arrangements that shape the specific system under consideration. At the same time designers bring in their modelling capability by facilitating opportunities for co-creation and defining boundary objects (Star & Griesemer, 1989) that can support participation. These capabilities are applied throughout the whole design process and by adopting different tools. The tool that will be the focus in the specific case under analysis is the actor network map and more specifically the process of building it through participatory sessions.

2.1 Actor Network Mapping

The (service) design community has developed many tools to help experts understand the state of things (Manzini, 2015, p. 38). Designers can use tools to manage communication and facilitate discussions. The tools usually have a visual format to help (non-)designers organise the information in an easy-to-grasp structure (Stickdorn & Schneider, 2018)(Service Design Lab, n.d.). An actor network map is a design tool that helps to give an overview of the different actors and components that compose a system (Morelli & Tollestrup, 2007). Creating a holistic network is in the literature described with various terms and can be done visually in several ways. Other terms for the actor network map are system map, stakeholder map and ecosystem map (Stickdorn & Schneider, 2018; Morelli & Tollestrup, 2007; Giordano, Morelli, de Götzen, Hunziker, 2018). All tools hold more or less the same purpose of providing an overview of all actors with a role in a particular system. Nevertheless, every title represents minor tweaks on how to arrange the map and what the focus should be (see Figures 2, 3, and 4)(ibid). The core of an actor network map is usually based on the roles of each actor, how they are grouped in different arenas, and what relationships they have with another (Morelli & Tollestrup, 2007).



Figures 2, 3 and 4. An off-centred (left) and two centred actor network maps (middle & right) (ibm, n.d.; Morelli & Tollestrup, 2006; Giordano, de Götzen, Morelli, & Hunziker, 2018)

Creating an actor network map has several potentials for system innovation. First, a systemic map of actors and stakeholders is sometimes applied as a conversation starter to support discussions about the role of actors and the power structure of a system (Giordano, Morelli, De Götzen, Hunziker, 2018). Moreover, an actor network map provides a diagrammatic representation to understand issues and challenges within a system (Manzini, Jégou and Meroni, 2009) and to identify the leverage points of the system that can be acted upon to produce the desired change (Medow, 2008) Furthermore, the map can help to get an overview of actors that, directly or indirectly, influence the systemic solution (Morelli & Tollestrup, 2007). And finally, an actor network map can contribute to a more comprehensive understanding of a complex system because of its visualisation (Stickdorn & Schneider, 2018 p. 58; Sevaldson, 2008).

The question is whether an actor network map will live up to its potential in the early stages of system innovation. Therefore, this paper will aim to answer this question. Despite the

many potentials of using the tool, there are specific capabilities required to navigate the tool just like with any design tool. For example, one must be capable of visualising the actor network map without having all the information required to be able to communicate the result (Morelli, de Götzen & Simeone, 2020). And even if the designer withholds all capabilities required, creating an actor network map requires extensive knowledge about all actors operating within the system. It has been proven that the failure of understanding systems has led to mistakes in various projects before (Bourne & Walker, 2005). Moreover, the actor network map will look different depending on what actor is invited to create it. By deciding who to invite in and who to leave out, a designer also decides which perspective is interesting enough to include (Stickdorn & Schneider, 2018, p. 126).

3. The Mental Health Initiative

The Rockwool Foundation published and uses the system innovation framework described previously as an approach for designing practical interventions within the Danish welfare society. One of the systemic challenges the Foundation is hoping to design an intervention for, is the rising number of young people with mental health issues (Jeppensen et al., 2020). In psychiatry, mental health is reduced to chemical processes in the brain and, as a result, solutions for mental illness are limited to medication (Seligman & Csikszentmihalyi, 2014). Many young people benefit from this treatment (as well as from other approaches such as positive psychology), but when the mental health issues are still rising, this solution is neither socially nor economically sustainable (Regeringens udvalg om psykiatri, 2013; Sommer, 2017).

The work for this paper was performed as part of a master thesis at the Rockwool Foundation. We were invited to run our own project as part of the Mental Health initiative within the foundation for four months. More specifically, we were exploring the Danish primary school system to identify opportunities for intervention. We were offered the freedom to design our own process with expert advice from the foundation.

3.1 Method

To examine how an actor network map can help to explore the system innovation framework, we created one with a former headmaster of multiple Danish primary schools. We invited her into a 90-minute online session, where we would create an actor network map live using Miro. Reflecting upon the knowledge about the intended shifts in power, purpose, relationships, and resources from the Rockwool Framework, we aimed to create an actor network map enriched with notes about purpose, power, relations, and resources.

There was not an existing map that suited our exact purpose without requiring any reconstructions. We instead focused on finding something that could function as a starting point for creating our actor network map. An off-centred actor network map (figure 2) seemed the most relevant because we were not looking to put one actor or arena in the centre per se. Figure 2 was the starting point for our format. We came up with a visual

format to explore the actors involved with the system, their purpose, power status, relationships, and resources. Besides this, we also considered a format clustering the actors into the arenas they operate in. We consider the arenas to be a sphere of interest or activity.

4. The co-creation sessions

Creating the actor network map ended up taking two sessions of 90 minutes and two iterations in between from our side (see figures 5 - 9). We recorded both sessions through Microsoft Teams. The first session started with listing actors and their roles, without putting them into arenas. The headmaster introduced them to us, and we documented them in Miro. As the session progressed, we started putting them into bubbles. As the headmaster explained the roles and enacted purposes of each actor, we made notes on post-its and put them with the actor. We tried to colour-code the notes according to the four keys (relations, resources, power, and purpose), but it was too complex to do during the session, so we colour coded the notes afterwards. The first session had a strong focus on hierarchy between actors, particularly in the political arena and the school arena. The headmaster identified power status and hierarchies, focusing on top management inside the school and on a political level. It was clear the headmaster knew more about the actors operating inside the school and political arenas because she had been a participant herself. After the first session, we rewatched the interview to iterate on the composition of the actor network map (see fig 6 and 7).

When we entered the second session, the headmaster seemed confused because we removed the hierarchy from her point of view. We discussed what the size of the bubbles should represent, namely power or importance to the project. . In the end, we all agreed the young people should be in the largest because the project was about ensuring better mental health for young people. Once we agreed on that, we continued the discussion on other arenas (such as local communities and online), where the headmaster's knowledge was more speculative.

After the second session, we finalised the visual representation of the actor network map. We re-watched the recording again while we experimented with the composition, and decided to go with the one in figure 9. The composition connects arenas and/or actors that meet each other personally, because we considered it important to visualise who is (dis)connected. The map consisted of many notes about actors and lines to show relationships, which we decided to isolate and put on separate pages in a booklet to keep the map comprehensive. For this reason, not all insights from the sessions can be comprehend by outsiders by reading the final visualisation of the map only.

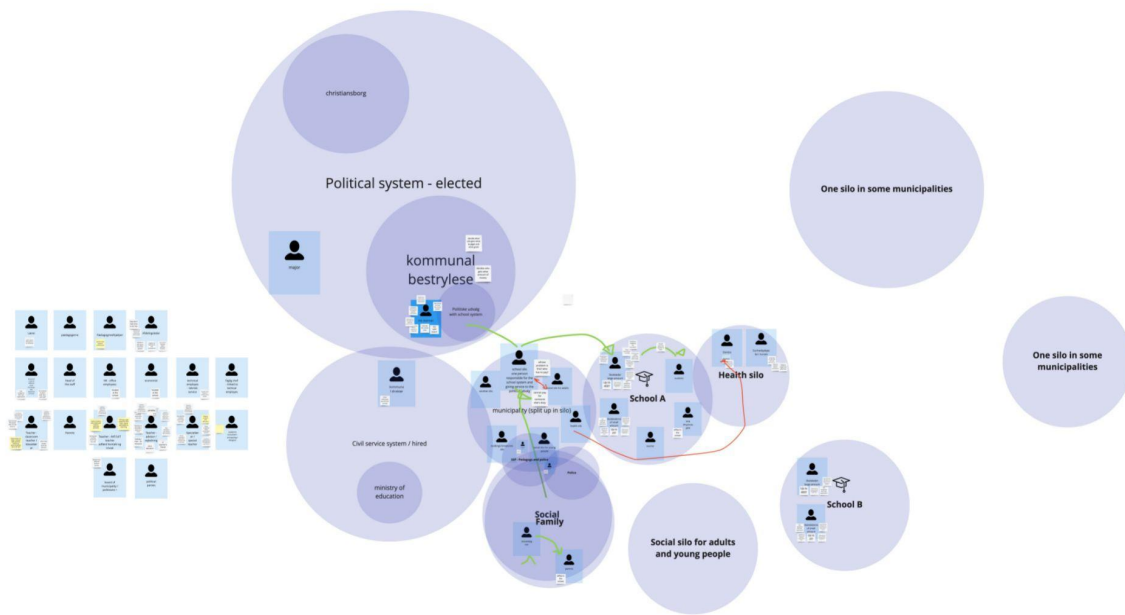


Figure 5. Iteration I: right after the first session

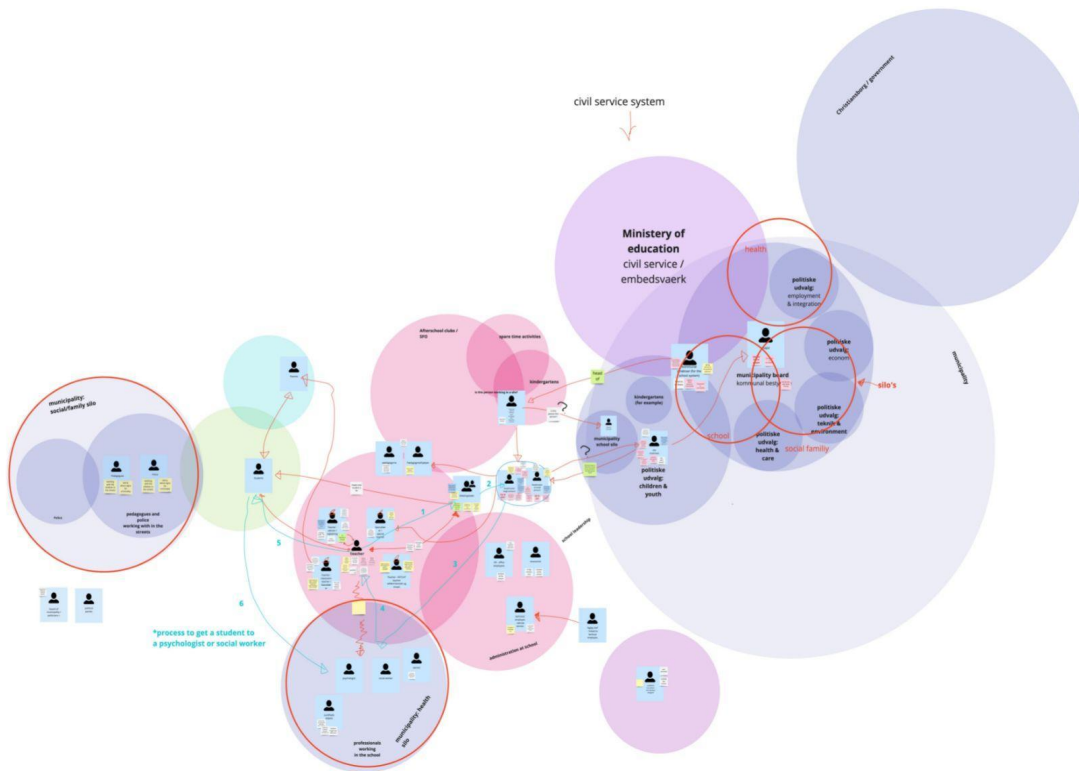


Figure 6. Iteration II: between sessions, showing lines with relations and actors to go through to seek mental health treatment

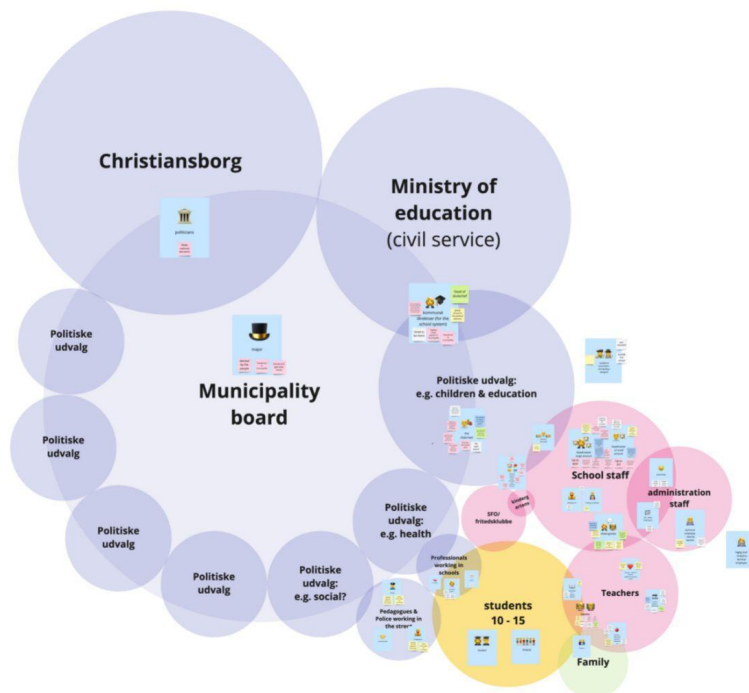


Figure 7. Iteration III: between sessions, where we experimented with the size of the bubbles representing hierarchy

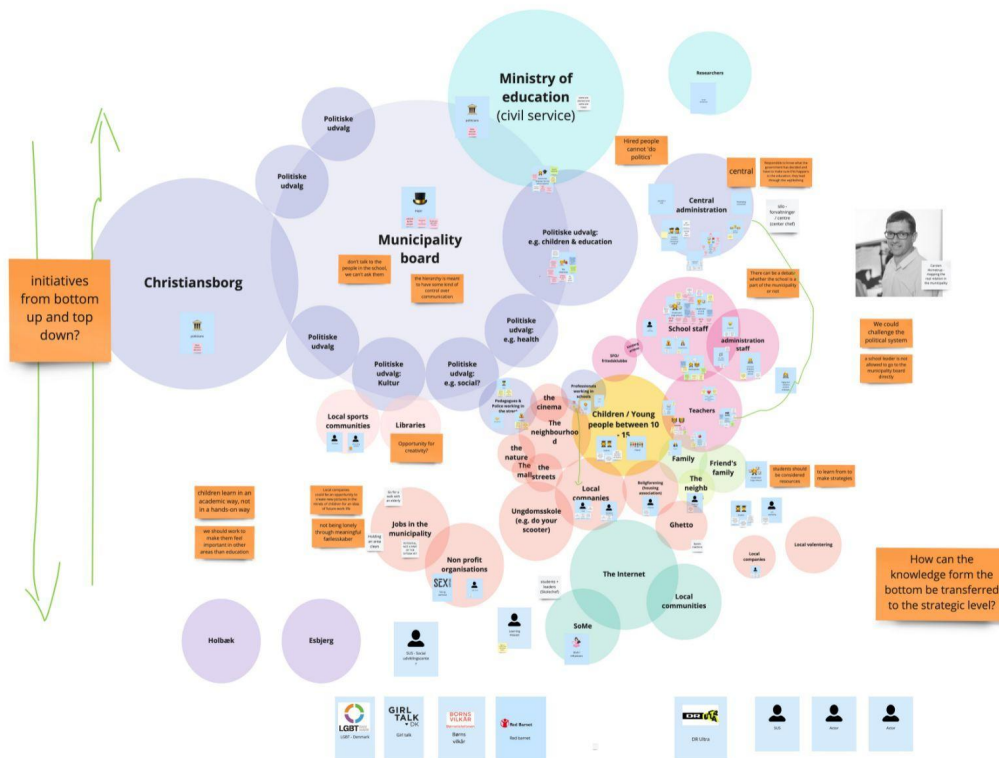


Figure 8. Iteration IV: right after session two

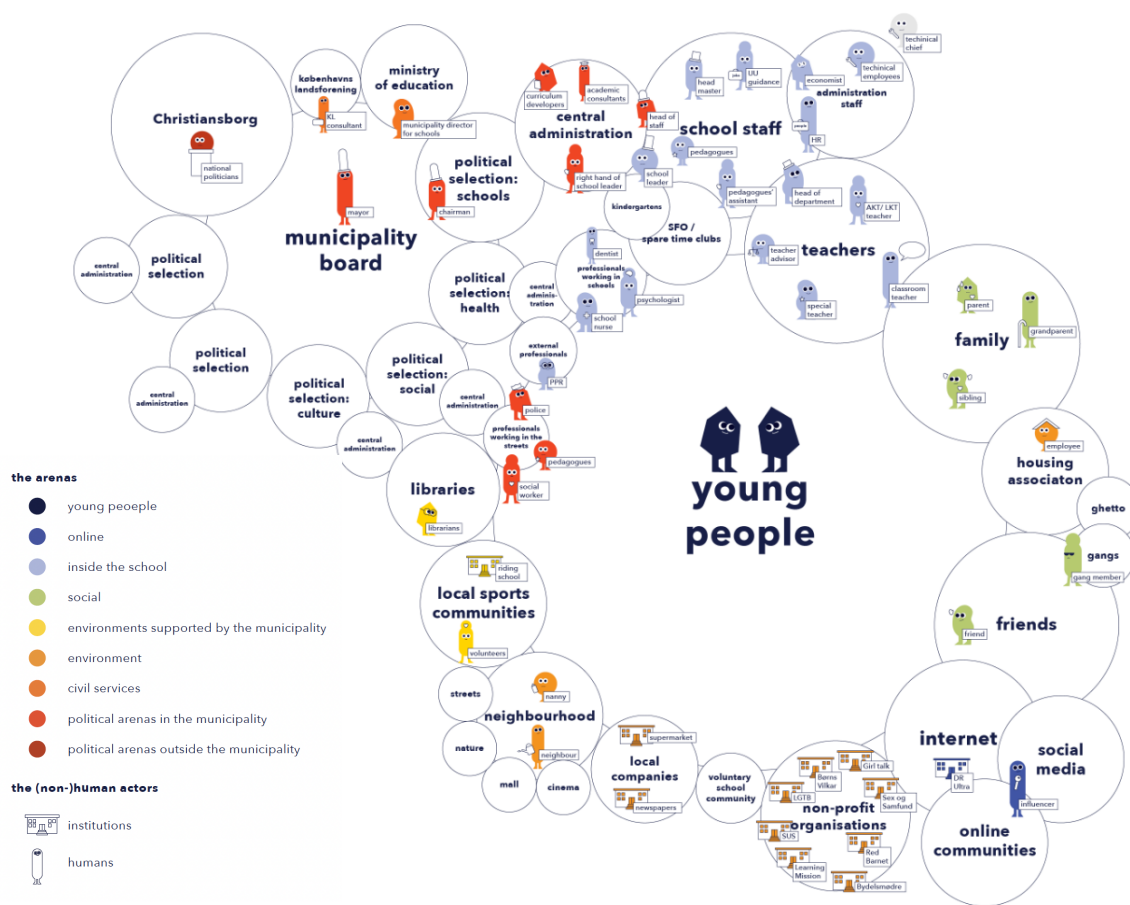


Figure 9. Iteration V: the actor network map in use

4.1 System Innovation Insights

In this paragraph we outline what insights we gained about the system's current state by creating the actor network map with one of the actors of the system. We will discuss how the map contributed to creating insights about how system innovation is initiated, about the four keys to unlock systems and on the three levels of system innovation, following the Rockwool foundation framework presented earlier in this paper.

System innovation initiation

By generating an actor network map the systemic challenges became more defined as we noticed the system consisted of many interlinked subsystems. For example, building the map allowed us to discuss the purpose of institutions, and how they are sometimes not organised to meet the needs of society. More specifically the mapping activity made explicit that the public school system is organised in silos, which makes it difficult for parties to collaborate.

The actor network map did not define a systemic opportunity, although various ideas were discussed during the session. However, the map provided us with arenas to investigate further and actors to include in the design process to get closer to a systemic opportunity.

Macro

During the session we discussed the ideologies within the Danish school system, mostly as explanations of why the system is structured as it is. One example was when the headmaster stated: *“The roles of each actor hold the same title across schools, however everyone is allowed to define the overall purpose of their role, and that is very Danish.”* This statement made us curious if the ideologies of the Danish school system could be flexible and more open for change than at first thought. Taking a glance at the final map we realized that many actors are involved in the wellbeing of children. Besides, the government is greatly involved in the development of the school system, which indicates that it is a national priority. Although the ideologies of the system might not be stated explicitly in the map, it shows many professionals in public institutions are responsible to make a child thrive (for example, an AKT teacher and the psychologists from PPR). One can learn from this that we as a society believe that one person can be responsible to make a child thrive, and we do not see it as a joint responsibility.

Meso

In the wake of creating the actor network map, we are aware what actors enact within the regime and the dominating rules that influence them. By building an actor network map, we could see the combination of institutions, technologies, markets, and organisations. Moreover, we discovered how these relate to each other: which ones are connected, and which ones are far away from each other. For instance, we discovered psychological help (PPR in Danish) to be far from the school arena and time consuming for teachers and parents to reach if students needed support. Another learning we got using this tool was that it is hard to capture the meso level in one way. Systems are not necessarily unified, and we discovered some aspects of the meso level, but surely not all of them.

Micro

The focus of this actor network map was to visualise the public school system. In that respect, we have not learnt a great deal about entrepreneurs or communities taking a radically different approach. There would have been ways to add these entrepreneurs, by for example placing them in a disconnected area of the map. However, other activities (such as desk research) might result in a better overview of people operating on the micro level.

Purpose

We were introduced to the purpose each actor is given by the system. For example, a classroom teacher is responsible for communication with parents. In addition to this, we also learned how teachers can possess more than a single role and purpose. For instance, one teacher can both be a classroom teacher, a special teacher, and a teacher advisor at the same time. Not only did we learn about the purpose of individual actors, but also about the

purpose of each arena. The government (Christiansborg) shapes the overall purpose of the school system, whereas municipalities get to decide how to enact that purpose. Later in the process we also did an interview with a teacher who at the same time worked as a politician. This sparked a discussion about how people in this system can manage multiple roles across arenas too.



Figure 10. One actor in the school system enriched with notes about power (pink), purpose (yellow) and general notes (white).

Power

We discussed the decision right of each actor, which we put on notes with the corresponding actor (figure 10). This displayed a clear overview of where the formal power of the school system is located, and how the power influences other actors within this system. The formal power relations are crucial because you need awareness of them to innovate a system. We decided not to include too many notes about informal power, as we considered that knowledge too speculative from one person. We also noticed that the decision makers in the system are far from the arenas where the young people are. The visualisation of the map therefore shows the power is not distributed equally over the map but concentrated in the upper left corner (the political arena).

Resources

Furthermore, we became aware of what human resources are available in the Danish school system. We learned what arenas they come from and how to access them when needed. For example, teachers must show progress with numbers to get certain resources. This results in a lot of documentation and measuring of individual students and classrooms. Besides, we also obtained knowledge about decision makers who can divide specific resources.

Relationships

The map provides us with a first overview of all actors and their relationships to one another. The map shows who are disconnected, moreover if these distanced actors could benefit from connecting (= systemic opportunity). You can not necessarily see all relationships in the map, however one can see what bubbles are connected and that represents whether they meet each other personally in life. Nonetheless, it was challenging to visualize the relationships between actors who did not meet each other in everyday life but could meet occasionally. Furthermore, it was interesting to discover what actors connected different arenas to each other. For example, how the classroom teacher connects the school arena to the family arena by talking to the parents. Following this learning, we considered new potential connections across arenas and how they could benefit the system. What would happen if a new role could connect school and municipality, and what kind of role would it be?

5. Discussion and limitations

Using the actor network map tool has been insightful for our project in many ways. We retrieved insights about the system innovation framework which we have continuously used afterwards. Not all insights we got can be found in the final visualisation, therefore one might argue the meso level is most evident while having a first glance at the map. It was simply impossible to capture everything in one map, which is a clear limitation of building an actor network map like we did. Nonetheless, the tool clearly opened for discussion about many aspects of the system. Perhaps the most significant value of the map was that we could see all systems surrounding young people, which constantly reminds us that the challenge to change all subsystems is incredibly complex.

The map also contributed to the system innovation process because it shows who is involved in the system, thus who we could engage with to perform system innovation. We used the map to decide whom to engage with in our consecutive co-design process, and the colour coding ensured we engaged with actors from multiple arenas. We had little knowledge about the complexity of the public school system, and the map helped us to navigate the many roles people can have and how they relate to other actors in the map. Changing a system requires continuous collaboration between different actors, and the map has been our anchor to decide who to engage with next throughout the whole project. Moreover, the visualisation continuously reminded us of who we did not engage with and made us think about how our activities would affect their role in the system.

Despite the value we retrieved from both building the map and using it afterwards, we are aware this map is not 100% accurate and never will be. There are various ways to visualise an actor network map, and the content will change depending on who you engage with. Our map has a strong focus on schools, but it could have looked totally different if we built it with parents. The focus of the map could also be changed simply by visualising it differently. For example, we could create a heat map to show where the power is. Thus, the map cannot

be considered an objective visualisation of the system, but rather a version that focuses on schools. Besides, some actors and arenas were added later in the project when they revealed themselves to us. It was fruitful to consider the map a continuous work because we could keep an open attitude to new perspectives, actors, and arenas.

It is crucial to be able to analyse quickly whilst creating an actor network map with such complexity. Although we prepared the session and were well-informed about the tool, building the map live to allow the expert to participate was challenging. The many iterations on the composition show one must learn through trial and error and create a composition that is useful rather than fully accurate. It is of the utmost importance to be comfortable failing while creating an actor map of a public system. Lastly, as designers are likely to navigate in systems, they are not familiar with beforehand, we encourage collaboration with actors who have extensive knowledge about the system.

6. Conclusion

This paper aimed to discuss how actor-network mapping informs the early stages of system innovation through a case study about mental well-being in the Danish school system. Using the tool provided explicit information about the purpose, power, resources, and relationships of each actor within this system. Moreover, both using the tool as well as the result strengthened the systemic challenge because we could see how many actors are involved. Creating an actor network map with an expert also enriched our knowledge about the three levels in the system, the macro and the meso mostly. Lastly, we obtained a holistic visual representation of the school system, which worked as a conversation starter and our guiding star in the following phases of the project.

Because the actor network map has been a crucial element in our project, we recommend using the tool in the early system innovations. The map indicated various arenas where we could continue our research and strengthened the necessity to perform system innovation. For instance, we identified the school to be an arena with very few decision makers, and with a great number of actors who experienced the consequences of the existing system structures. Hence, we decided to explore this arena further by doing co-design activities with teachers and children as the following step, since we believed they could help us to identify specific opportunities pulling for innovation. During the co-design activities that followed, the complexity of the map boosted awareness of the many people involved in shaping the system, and that a system can look different depending on the person describing it. The visual representation functioned as a constant reminder to embrace the complexity about the school system, also while zooming in on certain areas.

Despite the extensive knowledge we have gained by using the tool, we learnt that co-creating an actor-network map of the school system is challenging if one has limited knowledge beforehand. Thus, user participation is extremely valuable while using the tool, and we would recommend co-creating the map to enable continuous discussion about

composition and information that goes into it. Finally, it is essential the designer is able to analyse quickly and be comfortable failing while building.

Summing up, the actor-network map proved itself to be an important starting point in our search for system innovation as we learned a lot about the current system structures and where they lacked. For this reason, we will argue an actor-network map to be an excellent tool for designers to apply to inform the early stages of system innovation.

7. References

- Bauwens, M., & Lievens, J. (2013). *De wereld redden*. Houtekiet.
- van der Bijl-Brouwer, M., & Malcolm, B. (2020). Systemic Design Principles in Social Innovation: A Study of Expert Practices and Design Rationales. *She Ji: The Journal of Design, Economics, and Innovation*, 6(3), 386-407.
- Bourne, L., & Walker, D. H. (2005). Visualising and mapping stakeholder influence. *Management Decision*, 43(5), 649-660. doi:10.1108/00251740510597680
- Buchanan, R. (2019). Systems Thinking and Design Thinking: The Search for Principles in the World We Are Making. *She Ji*, 5(2), 85–104. <https://doi.org/10.1016/j.sheji.2019.04.001>.
- Cottam, H. (2018). *Radical help*. London: Virago Press.
- Cottam, H. (2021). Relational Welfare. Retrieved April 08, 2021, from <https://www.hilarycottam.com/practice/relational-welfare/>
- Elzen, B, Geels, F W, Green, K, (2004). System Innovation and the Transition to Sustainability: Theory, Evidence and Policy (Edward Elgar, Cheltenham, Glos)
- Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study. *Research Policy*, 31(8-9), 1257-1274. doi:[https://doi.org/10.1016/S0048-7333\(02\)00062-8](https://doi.org/10.1016/S0048-7333(02)00062-8)
- Giordano, F. B., Morelli, N., De Götzen, A., & Hunziker, J. (2018). The stakeholder map: a conversation tool for designing people-led public services. In A. Meroni, A. M. O. Medina, & B. Villari (Eds.), *ServDes.2018*. Conference : Service Design Proof of Concept Linköping University Electronic Press. Linköping Electronic Conference Proceedings No. 150 <http://www.servdes.org/wp/wp-content/uploads/2018/07/48.pdf>
- IBM. (n.d.). [Stakeholder Map]. Retrieved May 13, 2021, from <https://www.ibm.com/design/thinking/page/toolkit/activity/stakeholder-map>
- Jeppensen, P., Obel, C., Lund, L., Bang Madsen, K., Nielsen, L., & Nordentoft, M. (2020). (rep.). *Mental Sundhed og Sygdom hos Børn og Unge i Alderen 10-24 År Forekomst , Udvikling og Forebyggelsesmuligheder*. Vidensraad. Retrieved November 23, 2021, from http://www.vidensraad.dk/sites/default/files/boern_unge_mentale_digi_01.pdf.
- Leadbeater, C. & Winhall, J. (2020). 'Building Better Systems – A Green Paper on System Innovation. The ROCKWOOL Foundation'. Retrieved on November 23rd, from: <https://www.systeminnovation.org/green-paper>
- Manzini, E., Jégou, F., & Meroni, A. (2009). Design oriented scenarios: Generating new shared vision of sustainable product service systems. In M. Crul, J. C. Dielh, & C. Ryan The Stakeholder map: a conversation tool for designing people-led public services Linköping University Electronic Press 16 (Eds.), *Design for sustainability: A global guide* (pp. 15-32). Retrieved April 20, 2021, from http://www.d4s-sbs.org/d4s_modules%20total%20s.pdf

- Manzini, E. (2015). *Design, when everybody designs: An introduction to design for social innovation* (1389515125 1014421433 R. Coad, Trans.). Cambridge, MA: MIT Press.
- Meadow, D. H. (2008) *Thinking in Systems: A Primer*. Chelsea Green Publishing.
- Morelli, N., De Götzen, A., Simeone, L. (2020).: *Service Design Capabilities*. Springer Nature, Cham (2021)
- Morelli, N., & Tollestrup, C. (2007). New Representation Techniques for Designing in a Systemic Perspective. In *Design Inquiries, Nordes 07 Conference*. Retrieved from https://www.researchgate.net/publication/242094870_NEW_REPRESENTATION_TECHNIQUES_FOR_DESIGNING_IN_A_SYSTEMIC_PERSPECTIVE
- Regeringens udvalg om psykiatri (2013). En moderne, åben og inkluderende indsats for mennesker med psykiske lidelser. Retrieved on November 24, 2021 from <https://bedrepsykiatri.dk/wp-content/uploads/2019/09/2013-Hovedrapport.pdf>
- Service design capabilities*. Service Design Lab. (n.d.). Retrieved March 27, 2022, from <https://servicedesignlab.aau.dk/service-design-capabilities/>
- Seligman M.E.P., Csikszentmihalyi M. (2014) *Positive Psychology: An Introduction*. In: *Flow and the Foundations of Positive Psychology*. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-9088-8_18
- Sevaldson, B. (2011)GIGA-Mapping: Visualisation for complexity and systems thinking in design, NORDES 2011, School of Art & Design, Aalto University, Helsinki, Finland
- Sommer, M. (2017). (publication). *Mental Health Among Youth in Denmark* (pp. 6–7). Nordic Welfare Centre. Retrieved on November 24, 2021 from https://nordicwelfare.org/wp-content/uploads/2017/10/danmark_webb-1.pdf
- Stickdorn, M., Hormess, M., Lawrence, A., & Schneider, J. (2018). *This is service design doing, applying service design and design thinking in the real world ; a practitioners' handbook*. Sebastopol, CA: O'Reilly Media.
- Star SL, Griesemer JR. Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*. 1989;19(3):387-420. <https://doi:10.1177/030631289019003001>
- Tassinari, V., Baerten, N., & Staszowski, E. (2013). From welfare state to partner state: The case of Welcome to Saint-Gilles. In 1297686782 955472423 E. Manzini (Author), *PUBLIC AND COLLABORATIVE* Ezio Manzini and Eduardo Staszowski, Editors. *EXPLORING THE INTERSECTION OF DESIGN, SOCIAL INNOVATION AND PUBLIC POLICY* (pp. 89-104). Desis Network. Retrieved April 08, 2021, from https://www.desisnetwork.org/wp-content/uploads/2017/04/DESIS_PUBLIColab-Book.pdf.

About the Authors:

Lucy Johanna Stuyfzand is interested in transforming society through design, implementation of technology, and social innovation. She is currently employed as Future Experience Designer at KPMG Denmark where she investigates how businesses can be transformed through rising technologies (e.g., machine learning).

Julie Bregenov Jönsson is a service designer in the Rockwool Foundation, and is interested in how co-design activities with various groups of actors from a system can contribute to system innovation. Currently she is involved in NExtWORK, an intervention designed for young unemployed adults.

Amalia de Götzen coordinates the master Service Systems Design at AAU and got a PhD in Computer Science from the University of Verona. Her research focuses on Digital Social Innovation with particular interest in tools and methods bridging the analogue and digital world of services.