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Designing social infrastructures for complex service systems

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Abstract

Services delivered through the public and social sector play an important role in addressing complex societal problems. Services consist of interfaces between service consumer and deliverer, and infrastructures that support the service deliverer. Infrastructures such as protocols, scripts and blueprints are often intended to control the behaviour of service deliverers. This is a linear top-down view of service organisations. This paper presents a different perspective, using Stacey's theory of complex responsive processes: service organisations are ongoing iterated patterns of relationships between human beings. Infrastructures for complex service systems can therefore be considered 'social infrastructures'. Two case studies are presented that each describe the design of a successful social infrastructure, in the education and health sector respectively. To analyse the human-centred design practice of these case studies the author introduces the NADI-model, which identifies different levels of depth in needs and aspirations of stakeholders. The deepest level of this model consists of phenomenological 'themes'. The model is used to show how themes explain the success of the social infrastructure in the first case study. The second case study subsequently shows how, using Dorst's frame creation methodology, themes support designing social infrastructures for complex service systems.

Introduction

The world is increasingly confronted with complex societal challenges including climate change, poverty, crime, health issues and an ageing population. Services play an important role in addressing these issues, many of which are delivered through the public and social sector. For example, social services such as career advice programs might be implemented to deal with unemployment, while community health services might be implemented to address chronic health issues such as obesity. As many of these societal issues have an open, complex, dynamic and networked character (Dorst, 2015), the service systems that are implemented to address these issues tend to have a complex character as well. In this paper I will discuss the design of such complex service systems.

If we want to understand the design of complex service systems, we first need to understand what a service is. Within the service design field there is a consensus that a service emerges in a process of co-production between provider and client (Secomandi & Snelders, 2011). Without the customer, there is no service. The service comes about when the customer interacts with the material and immaterial elements provided by the service providers, such as the movie that was rented, the cleaner that was hired, the website that was consulted, the machine that was used to buy a ticket, etc. If the service does not come about until there is an actual interaction between service provider and service consumer, it is essentially intangible. But if a service is intangible, then how do we design it? To answer this question the service design literature distinguishes the interface of the service and the infrastructure of the service (ibid).

The service interface consists of those aspects of the service that are directly available to consumers, and the infrastructures are the resources that are indirectly available, also called front office and back office. In this paper I will focus on those parts of the interface that are available through human beings, the service deliverers (rather than through technology, such as a website or a rented product), and on those parts of the infrastructure that support or guide the service deliverers behaviour such as the physical/technical environment and the organisational structure. For example if we look at a teacher as a service deliverer, the interface is the social interaction between teacher and student, while the infrastructure consists of the classroom, teaching materials, smart board, the organisational structure of the school, the way the school teachers interact with each other and the principal, the school's educational philosophy etc.

Many scholars contend that since the service interface is intangible, design efforts should be focused on the service infrastructure. Edvardsson and Olsson (1996) for example argued that service design is about creating the right prerequisites for the service, including the resources of the service system – staff, organisational structure, physical/technical environment – that are within control of the organisation. The current popularity of the design of 'touchpoints' in the service design community is in line with this focus on the service infrastructure. However, Secomandi and Snelders (2011) argue that the focus on service infrastructure has neglected what is essentially the core of the service, the service interface, and claim that this should be the object of service design.

This paper will contribute to this discussion by using complexity theory to provide a new perspective on service systems, and introducing a human-centred design and innovation approach that enables designing for such complex service systems. To achieve this, the next section describes the complexity of service organisations and will particularly focus on the role of social interactions on both an infrastructure and interface level. I will then introduce a model for human-centred innovation that shows how different levels of depth in understanding stakeholder's needs and aspirations contribute to innovation. Next, the model will be applied to two case studies. In the first case study the model is used to analyse the design of an intervention for an educational service system, while in the second case study the model was applied by the author and her colleagues in the design of an intervention for a complex health issue.

The complexity of service organisations

This research is focused on those elements of a service infrastructure that are aimed at influencing the service deliverers' behaviour. Popular strategies and interventions for influencing behaviour from the (public) service design and management literature include for example scripts (Ramaswamy, 1996), service blueprints (Shostack, 1984), protocols, guidelines, and standard operation procedures.

These strategies are based on a linear view of the relationship between service infrastructure and interface which can be analysed using Snowden and Boone's (2007) Cynefin framework. The Cynefin Framework distinguishes five different types of contexts with regard to their complexity, with each context requiring leaders to act in contextually appropriate ways. Although this framework has been contested, it is useful in the context of service design to distinguish levels of complexity of service tasks and contexts, and the way they can be 'managed' through an infrastructure.

The linear view of the influence of service infrastructures on service interfaces can be considered a 'simple' perspective within this framework. Snowden and Boone (ibid, p70) define a simple context as one that is characterised by stability and clear cause-and-effect relationships that are easily discernible by everyone. In simple contexts managers need to act in a straightforward way: they

sense, categorize, and respond. For example, in the context of a service task one could think of a call centre where a customer rings the call centre, the call centre staff member assesses the situation, categorises it, and responds accordingly. All management needs to do here is set directives for dealing with the situation, a linear ‘command and control’ management style (see figure 1).

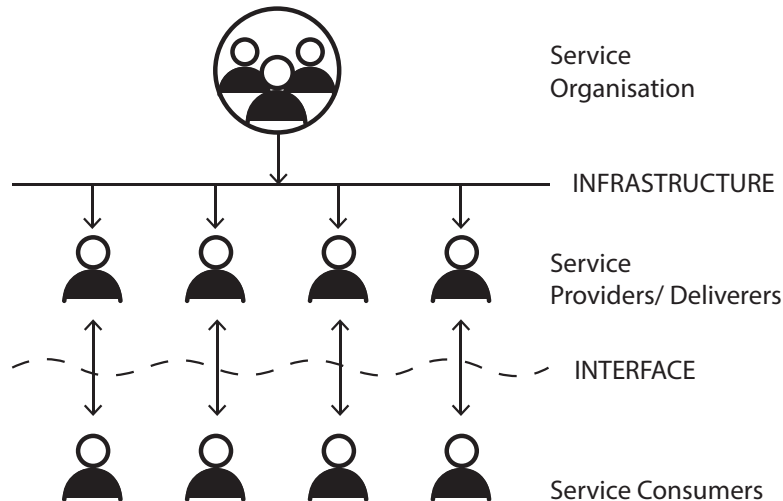


Figure 1: the interface between service deliverer and service consumer is intangible. The predominant perspective in the public and social service on the relationship between infrastructure and interfaces is linear.

Infrastructures such as protocols and scripts are set up to maximise control over people’s behaviour, by prescribing on a detailed level what service deliverers need to say and do in specific situations. This might be useful in the case of simple contexts where situations can be predicted and categorised by service deliverers, but for complex service contexts this perspective on the design of the infrastructure is not very useful.

Take for example the task of teaching in a primary school. Teachers need years of training to become a teacher, and are guided in their work by an infrastructure which consists of for example a certain educational philosophy, guidelines developed by the school, and a set curriculum. Nevertheless what happens in the classroom cannot be completely predicted or controlled. Even a very prepared teacher often has to improvise based on the behaviour of children on a particular day. And children’s behaviour is influenced by factors outside the school (and outside the control of the teacher and educational institution), including their parents, siblings and peers. Furthermore the teacher’s work is influenced by outside factors such as changing educational policies and procedures, new technology, societal developments etc. Controlling the teacher’s behaviour would be ineffective, because it cannot be predicted which specific teaching intervention is required in each specific instance of interaction between teacher and student.

A service like ‘primary school education’ can be characterised as a complex context. In a complex context we can understand the relationship between cause and effect only in retrospect (Snowden & Boone, 2007). For example, a teacher might only in retrospect be able to identify whether a certain intervention that they applied in class to engage a distracted child was effective. Other generally agreed principles of complex adaptive systems that are in line with Snowden and Boone’s work, and relevant to consider within the context of service design include self-organisation and emergence (See for example Hasan (2014) for an overview of these theories). Self-organisation is ‘the ability of interconnected autonomous agents of a complex [adaptive] system to evolve into an organised form without external force’, while emergence is ‘a bottom up process whereby a

groundswell of activity enables something to come into being, to become prominent' (ibid, p51). These principles will be further discussed in the following section.

Service organisations as complex responsive processes

As we are looking at service infrastructures and interfaces that are part of service *organisations*, it is also useful to consider complexity theory in the organisational context. The author of this paper was particularly influenced by the work of Ralph Stacey, who built his theory as a response to his frustrations about the differences between his personal experiences as a strategist in industry, and the theories about strategic management described in the traditional management literature. The dominant models in the management literature showed linear relationships between actions and strategic goals but Stacey experienced that strategic management seldom resulted in the expected outcome (Stacey, 2006). Building on Elias' theory of process sociology, and on theories of complex adaptive systems, he subsequently developed the theory of *complex responsive processes* to describe how organisations work in reality. This theory of complex responsive processes states that "organisations are not actually existing things called systems but, rather, are ongoing, iterated *patterns of relationships between people*" (Stacey, 2006, p39). The theory adopts principles from complex adaptive systems, while at the same time being fundamentally different:

- A complex adaptive system consists of very large numbers of interacting entities known as agents, such as a flock of birds, termites building large structures etc. In their interaction they adapt to each other, forming a system that adapts to its environment. They can be modelled using computer simulations in which each agent is represented by a set of rules. However, Stacey argues that unlike (digital) agents in complex adaptive systems, human agents that are part of organisations, are not simple rule-following beings but instead are "*conscious and self-conscious beings capable of spontaneity, imagination, fantasy and creative action*" (Stacey, 2006, p33).
- Stacey adopts a *process* view rather than a *systems* view. According to complex adaptive systems theory, systems can only be understood from outside that system, and it implies that the origin of novelty lies not in the system but in the individuals external to it (Stacey, 2006, p31). This undermines the capability of creative action of individuals within a 'system' or organisation.
- He furthermore adopts the principle of self-organisation as used in complex adaptive systems. However, as the term 'self-organisation' is often confused with empowerment and free-for-all, Stacey prefers to use the word '*local interaction*'. "Local interaction is what people do, whether they are allowed to or not. [...] Both good, say democracy, and very bad, say ruthless dictatorship, patterns across a population emerge in local interaction." (Stacey, 2012, p14).
- Stacey also adopts the principle of *emergence*, stating that organisational change will be emerging in the local interactions of many people, not through a central plan or program: long-term population wide patterns emerge without an overall plan or blueprint.

If we use the theory of complex responsive processes to look at complex service systems, we see a service organisation consisting of ongoing iterated patterns of relationship between people. It is not just the interface between service consumer and service deliverer that is social (intangible), those parts of the infrastructures of the system that consist of patterns of relationships between service organisation employees- both within and across organisations – are social as well. I will therefore refer to service organisations as *social complex service systems*.

If service organisations are seen as ongoing patterns of relationships between people, then it becomes relevant to explore the application of human-centred design principles to designing for such service organisations. The application of design to complex and social systems is not new.

Dorst (2015) showed how the framing practices of designers contribute to addressing open, complex, dynamic and networked problems; Banathy argued that purposeful systems design can guide societal evolution; And Nelson and Stolterman (2012) promote a 'design-driven approach to the world' and show how the systemic nature of design inquiry and design action is not only at the core of traditional design, but can be applied in any kind of complex context such as organizational design, social systems design, and educational systems design. In this paper I will contribute to these views by showing how a particular element of design, its human-centeredness, can provide useful means to design for complex social systems, and in particular complex service systems.

Human-centred design and innovation

Human-centred design (HCD) is a group of methods and principles aimed at supporting the design of useful, usable, pleasurable and meaningful products or services for people. The main principle of these methods is that they describe how to gain and apply knowledge about human beings and their interaction with the environment, to design products or services that meet their needs and aspirations. HCD can be aimed at various types of needs and aspirations. There are HCD methods and practices that focus on physical characteristics, as first outlined in the work of Dreyfuss (1955); HCD can be aimed at usability and cognitive needs, as discussed by scholars such as Suchman (1987) and Norman (1998); and more recently there has been a focus in design on emotional needs and user experience (see for example the work of Desmet (2005) and Sanders and Stappers (2012)). There is a large variety of HCD methods, each having their own specific purpose within a specific design context. Examples include user evaluations (Dreyfuss, 1968; Nielsen, 1993), participatory design (Ehn & Sjogren, 1991; Muller & Kuhn, 1993), generative design (Sanders & Stappers, 2012), scenario-based design (Rosson & Carroll, 2002; M. van der Bijl - Brouwer & van der Voort, 2013), contextual inquiry and ethnography (Beyer & Holtzblatt, 1998), and many others.

Human-centeredness is one of the key characteristics of design that has been widely adopted outside the traditional design field through design thinking and design innovation (Brown, 2005; Dong, 2013; Martin, 2009; Verganti, 2008). At the same time HCD has been critiqued for only bringing about incremental types of innovation, rather than radical innovation that is often preferred in a strategic business or organizational context (Norman & Verganti, 2014). Instead many have argued that 'deep customer insights' or a 'deep user understanding' is what is required to be able to innovate in more radical ways (Martin, 2009; Verganti, 2008). Even though I contend that such deep user insights essentially still put human-beings at the centre - and can thus be considered HCD methods and practices in themselves - it is relevant to note that these insights are apparently different from the insights gathered through more traditional HCD methods.

Innovation is relevant to consider in the context of complex service systems, as innovation is not just about designing products and services, but also about designing an organisation or system that is able to disseminate solutions. Innovation takes design to a systems level. If 'deep user insights' are seen as fundamental to an innovation process, then it becomes relevant to explore how these types of insights could contribute to the design of social complex service systems. We then first need to develop a better understanding of what deep user insights are. For this purpose we developed a model that can be used to identify different levels of depth in needs and aspirations in a design and innovation process, which will be described in the next section.

The NADI-model

We developed a four-layer model of human Needs and Aspirations for application in a Design and Innovation process (using the acronym 'NADI') (Mieke van der Bijl - Brouwer & Dorst, 2014). We included the term aspiration to not just focus on direct needs, but also include longer-term hopes, desires and ambitions. The levels were identified by analysing the types of needs and aspirations

that different HCD methods produce. We found that we can distinguish the following four levels of needs and aspirations: solutions, scenarios, goals, and themes (figure 2).

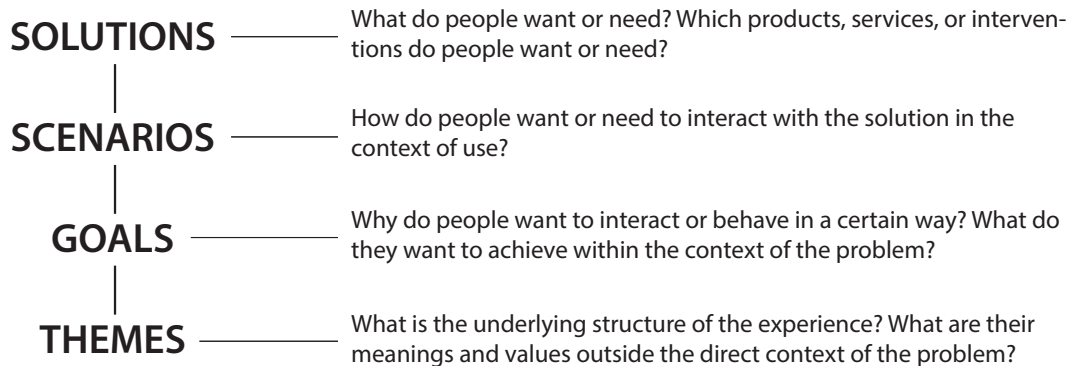


Figure 2: the NADI-model: four layers of human Needs and Aspirations for a Design and Innovation process

On the most concrete level (top level in figure 2), the solution level, we find the insights that are related to *what* people need or want. The level refers to the desired characteristics of solutions such as products and services. For the design of a convertible car one might think of characteristics such as car seat heating or a soft or hard top. One level deeper, the scenario level describes *how* people want to interact with a solution in a specific context of use. We named this level ‘scenario’ to highlight the influence of the context of use on interactions between people and products or services. Again using the example of a convertible car, someone might enjoy cruising around the city and getting attention from people. The deepest levels of insights are the goals and themes levels, which describe *why* people want or need certain solutions and scenarios. The difference between goals and themes is that goals describe what people want to achieve within the context of a certain design problem, while the themes describe the underlying needs and aspirations that can be analysed independently of that context. In the car example, imagine a single woman who has been driving a family car for twenty years, but whose children are now old enough to drive their own car. Her goal could be to have a car all to herself, while the underlying themes are related to ‘independence’ and ‘identity’. The themes independence and identity can be explored outside the context of a car.

The term ‘theme’ is derived from phenomenology (van Manen, 1990) and based on the work of Dorst (2015) on how insights into themes support the creation of frames, the ability of designers to create new approaches to problems. Dorst found that the explorations that designers engage in to be able to reframe problems are a subtle process of analysis that is very close to methods used in the creation of phenomenological descriptions of ‘lived experience’. Just like phenomenologists, designers analyse the situation by discerning the underlying ‘themes’ in the life and world of the stakeholders. Themes described in phenomenology are typically both deeply personal and universal. For example, in their exploration of the phenomenon ‘care’ by nurses and parents in the context of children’s medical treatment in hospitals, Høiseth and Keitsch (2015) described phenomenological themes such as ‘feeling helpless’ and ‘being in an ambivalent struggle’, and used these themes to inform the design of a nebulizer.

We developed the NADI- model because in our work we have experienced that different levels of depth in the NADI-model have a different purpose in the design process. The scenario-level is for example extremely useful in participatory and co-design processes, as scenarios can form a common language that supports communication between designers and different types of

stakeholders (M. van der Bijl - Brouwer & van der Voort, 2013). As mentioned above, there is strong agreement in the innovation field that 'deep customer insights' are required for more radical types of innovation. The next section of this paper shows that deep insights at the themes level indeed support innovation. The first case study shows how the model can be used to explain the success of an intervention designed for a complex problem in an educational context. The second case study describes a project in a complex health service context in which we actively used themes to design interventions using Dorst's frame creation approach (Dorst, 2015).

Case studies: designing social infrastructures for complex service systems

Case study 1: a time-quality dilemma for elementary school teachers

The first example is a retrospective case study, conducted by the author of this paper, about a project executed by MindLab (a Danish cross-governmental innovation unit) for the municipality of Odense. The case study is part of a larger group of case studies to study the innovation practices of agencies working in the public and social sector, that address complex societal problems. To conduct the case studies we interviewed members from the design team as well as their clients in the public or social sector, and we analysed design documentation provided by the teams.

MindLab was asked by the municipality to help design interventions for primary school teachers who needed to adjust their teaching practice in line with a reform that was introduced by the education ministry. The reform required teachers to deliver the same quality of education with less preparation time (see also Nygaard and Reynolds (2015)). The MindLab team used provocative prototypes, inspired by practices from other industries, and various co-design sessions with teachers and the municipality to explore different types of interventions. An initial design proposal was a box with 'ingredients' for lessons (inspired by an 'Årstiderne-box', a meal-kit which contains ingredients and recipes to prepare a meal). In a next iteration MindLab invited teachers to help design and prototype the ideal content of this box. However, teachers did not accept this idea because they thought the box was too static. Rather than copying a complete lesson, they were looking for inspiration when developing their own lesson. This eventually led to the design of a more successful proposal, a 'speed sharing' event (based on the metaphor of speed dating). This is an event, facilitated by the municipality and/or schools, in which teachers share ideas about lessons around a specific theme, for example physical education. Teachers were very enthusiastic about speed sharing and this intervention is now being implemented and disseminated.

The success of speed sharing can be understood through the theme 'pride in practice'. When you have independently developed an expert practice (such as teachers), you do not want an anonymous agency to tell you how to improve your practice (compare giving a meal-kit to a chef!). If people take pride in their practice they want to share their knowledge and learn from peers rather than passively receiving tips in a lesson box. This structure of the theme 'pride in practice' applies to every expert practice and can therefore be explored outside the context of the original problem of teaching, thus providing a deeper understanding of the problem. Figure 3 shows how the speed sharing event can be explained using the NADI-model.

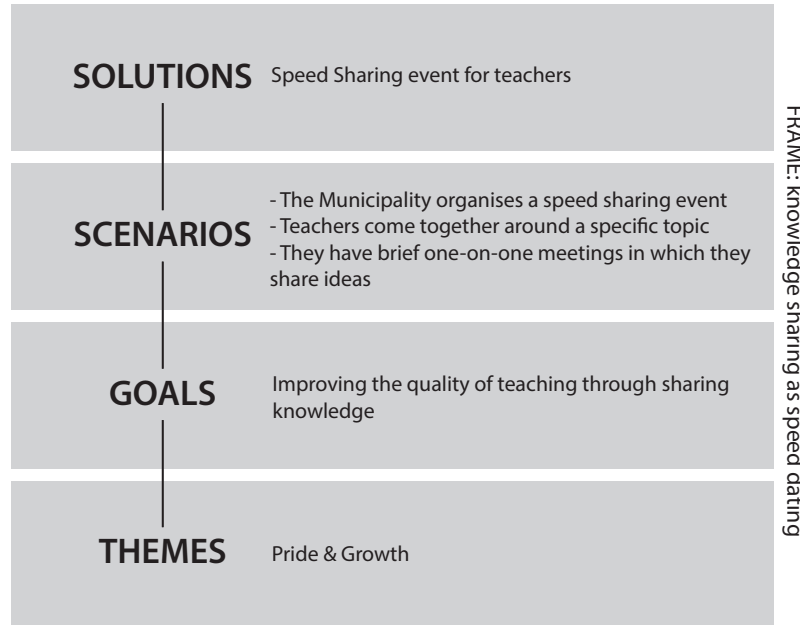


Figure 3: NADI-model for case study 1

Case study 2: supporting people with severe mental illness

The second case-study is a project conducted by a design and research team led by the author of this paper for an Australian not for profit organisation. The organisation was established and funded through a federal government initiative, aimed at solving the systemic problems of supporting people with severe and persistent mental health problems who acutely need help. We applied the frame creation methodology developed by Dorst (2015), which can be used to address open, complex, networked and dynamic problems. The main principle of the approach is that addressing these problems requires a ‘reframe’ of the problem, a new perspective on the problem. The case study illustrates the core steps of the method.

We used various methods to identify the needs and interests of the various stakeholders of this case, including interviews, cultural probes and various participatory design sessions. In line with the frame creation approach we used principles of hermeneutic phenomenology to analyse themes and develop frames and solution proposals. The NADI-model was used to communicate frames and solutions to stakeholders. The project was executed over the course of six months.

The project was aimed at the problems that arise from the fact that many service providers are currently involved when people with a severe mental health problem acutely need help when they are very unwell, for example when they are psychotic, severely anxious, and/ or suicidal. The current collective service response is very traumatising for these people, while there are also many conflicts between different service providers. Before engaging our team, the partner agency had brought various stakeholders together, and the kind of solutions they were thinking of included new protocols and standard operating procedures. However, in the past interventions like that had not led to satisfying outcomes.

When we explored the needs and aspirations of these stakeholders we found a number of reoccurring themes across stakeholders. In this paper I will use the reoccurring theme ‘drive to make a difference’ to illustrate how an analysis of themes can lead to the development of solutions. All interviewees and workshop participants who work in the sector mentioned their drive to make

a difference. For example, an ambulance paramedic mentioned that *'there's no better feeling than saving someone's life'*.

In Frame Creation we subsequently use methods borrowed from hermeneutic phenomenology to develop an understanding of theme outside the context of the problem. This includes various exercises, including reflecting on the theme through personal experiences, literature about the theme, and exploring pieces of art or music that reflect the meaning of the theme (see for examples Dorst, Kaldor, Klippan, and Watson (2016)) Through these exercises we try to find the 'pattern' of a theme. For example, we asked ourselves the question 'when do you experience drive?' and 'what does it feel like?' Through this analysis we found that to sustain the drive to make a difference, there is a need for feedback. When you are driven to do something good, you feel a sense of achievement when you can see what the results of your efforts are. For example, when cooking for friends it feels good when these friends show that they are enjoying the meal. This feeling might in turn motivate you to continue organising dinner parties for your friends. Without the feedback, the drive cannot be sustained.

The need for feedback to sustain the drive is exactly what was missing in the problem context of an acute mental illness response. Police officers for example indicated a sense of futility and frustration: *'If we do not hear from the person again, there is an assumption that one of three things happened to them: 1) they got better, 2) they moved away, 3) they died. We are essentially feeding our efforts into a 'cone of silence' that does not speak back.'* Likewise, ambulance paramedics mentioned similar experiences as there is no quick fix to mental health problems: *'It's not like stopping the bleeding or starting the heart'*.

Feedback is also an essential element of another theme: learning or 'growth'. You only learn if you know what the effects of your actions are (figure 4). In the cooking example you can only become better at cooking when you can taste the food or when your friends tell you (honestly) what they think of the meal you prepared for them. Feedback on actions is therefore essential. A police officer confirmed this and indicated it would be useful to know what works and what wouldn't. A part of the systemic problem of supporting people with severe and persistent health problems is therefore this broken cycle of drive and growth.

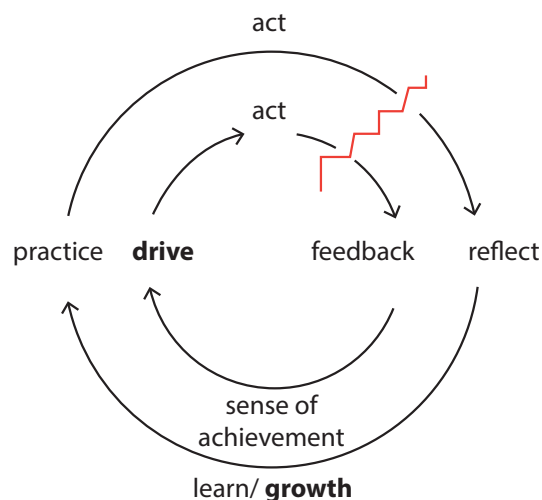


Figure 4: the broken cycle of the themes drive and growth

To frame the problem we looked at how the elements of the themes are dealt with in domains outside the problem context. Exploring these metaphors can lead to new frames (Dorst 2015). A frame that turned out to be particularly fruitful for the themes of 'drive' and 'growth' was looking at generating a shared response to mental illness as if it were a sports team. We found that the current

shared response is like a sports team in which each player is on the field at a different moment, and each player has a different coach. This makes it very hard to collectively coach the people on the ground, and sustain their drive and growth.

Through this frame we developed the solution of a ‘coaching team’. The coaching team is explained through the NADI-model in figure 5. A coaching team [solution] is a group of team leaders of each of the participating organisations (ambulance, police etc.). The envisioned scenario of this coaching team is that they frequently come together to reflect on what is happening on the ‘field’. To be able to get an appropriate view on this field we designed a new role: the ‘observer’. This is someone who interviews people with a severe mental illness who have recently been through an episode, and maps their experience through for example a journey map. This journey map is then fed into the coaching team, which allows them to reflect on their collective actions. They can then develop an adjusted coaching approach, providing both constructive feedback on the negative stories, as well as positive feedback on the good stories. The goal of this scenario is to stimulate motivation and provide reflective practice for learning for the service providers in acute mental illness situations. The underlying themes are drive and growth.

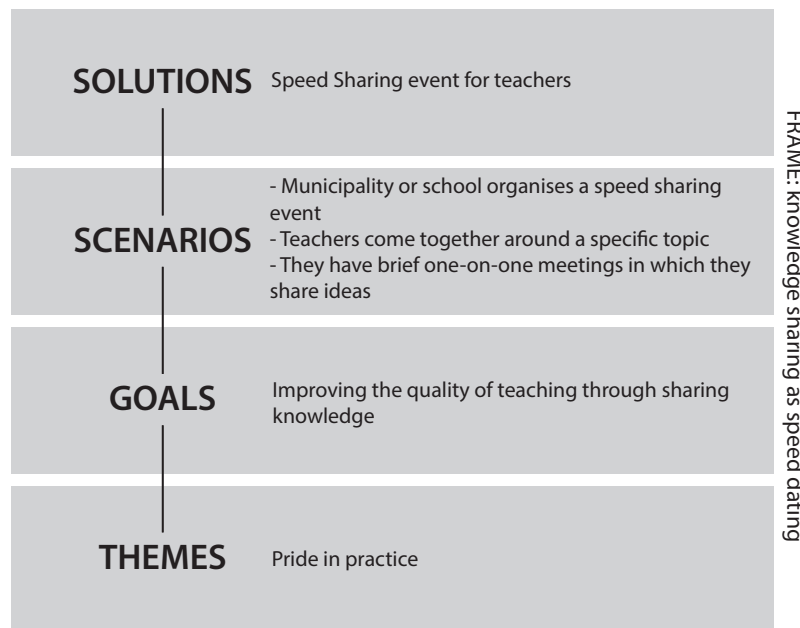


Figure 5: NADI-model for case study 2

Discussion: designing social infrastructures

Social infrastructures

The two case studies reflect Stacey’s theory of complex responsive processes. The initial perspective in both case studies was top-down and linear. The lesson box in case study 1 and the protocols and standard operating procedures in case study 2, both try to a certain extent to control the behaviour of the service deliverers. The successful interventions in the two case studies, the speed sharing event and the coaching team, are more in line with complex responsive processes. If we look at these interventions in the context of their respective service as if they were complex responsive processes, *ongoing iterated patterns of relationships between people*, we see:

- A 'process' rather than a 'system', with conscious and creative human agents rather than rule-following agents. Change comes from within through creative action of the human agents, the service deliverers, themselves.
- The interventions also reflect the characteristic of emergence: they do not prescribe or control the behaviour of the service deliverers, but allow for emergent action to happen. The coaching team supports the emergence of new collaborative practices to respond to people with a severe mental illness who are in acute need for help, while the speed sharing event supports the emergence of new teaching practices.

These perspectives on the case studies are illustrated in figure 6 and 7. Ongoing iterated patterns of relationship between people can be seen at both the interface and infrastructure level in both cases. I will therefore refer to these kinds of infrastructures as 'social infrastructures'.

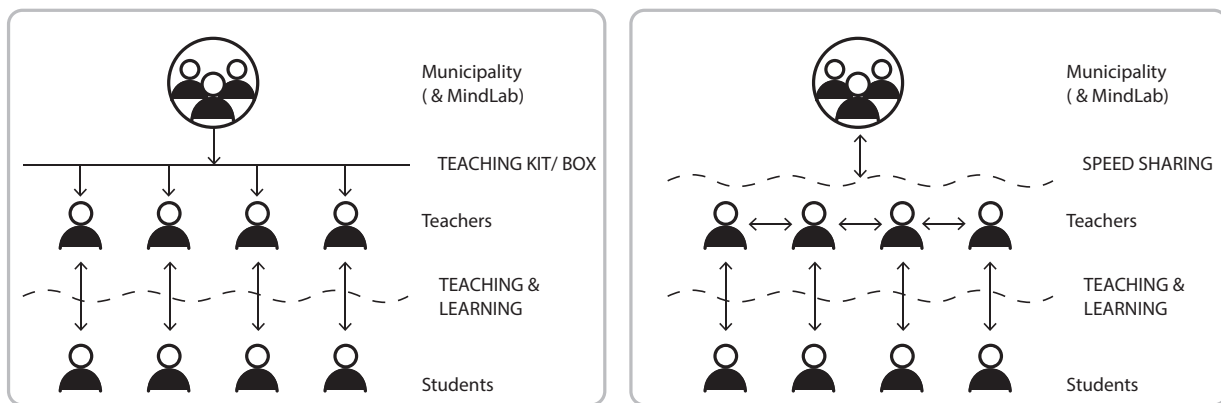


Figure 6: a linear infrastructure, lesson box (left), versus a social infrastructure, speed sharing (right) in case study 1

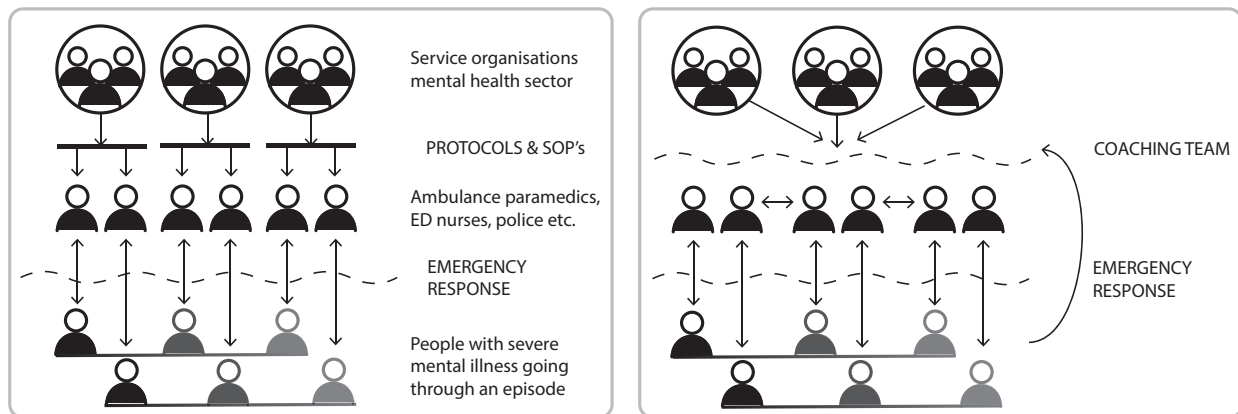


Figure 7: a linear infrastructure, protocols and standard operating procedures (left), versus a social infrastructure, a coaching team (right), in case study 2

Designing social infrastructures

To design social infrastructures we need to put the human beings that enact the social infrastructure, the service deliverers and their colleagues, at the centre. Edvardsson and Olsson (1996) for example state that the service company's staff are the service company's key resource. 'we must understand how individuals and groups of staff can be encouraged to work in the best

manner. We must take their special needs, demands and wishes into account, not just those of the customers.' (ibid, p51). This is in line with Stacey's comments that we need to draw from the fields of psychology, sociology and philosophy to understand human relating (Stacey, 2012, p15). However, if we want to move from an understanding of human beings and human relating to creating solutions, we need other, design-based, practices. Dorst and Tomkin (2011) showed how themes form a bridge between problem and solution in such a design-based practice. This was illustrated in case study two.

This case study showed that themes can be incredibly useful in the design of social infrastructures. As opposed to other levels of needs and aspirations in the NADI-model, a theme can be explored outside the context of the problem, and through that supports creating frames based on metaphors from non-related contexts. Themes are particularly useful in a complex and networked context as themes are relatively stable and are shared amongst different stakeholders (Dorst, 2015). Case study two showed how the theme 'drive to make a difference' was shared amongst service deliverers, and through that provided a pathway to the creation of an intervention that met the needs and aspirations of these different stakeholders.

Although case study two showed the success of the application of themes through applying the frame creation methodology, case study one showed that also without this method it is possible to design a successful social infrastructure. The MindLab team used their high-level design expertise to generate provocative prototypes. They then explored these prototypes in iterative co-design sessions that eventually led to the design of the successful speed sharing event. Although they did not explicitly use themes in their design practice, the practice does reflect Dorst's (2015) findings that the explorations that designers engage in to be able to reframe problems are a subtle process of analysis that is very *close to* the analysis of themes through hermeneutic phenomenology. The MindLab team was clearly expert in a continuous framing and reframing of the problem, by using inspiration from other industries, and carefully involving the teachers in this iterative process. This suggests that expert designers might not need an explicit application of themes in their design practice. There are benefits however to a methodology that is more explicit in its steps compared to an (implicit) expert design practice, particularly in a project involving many different stakeholders. A well-articulated methodology, such as Dorst's frame creation methodology, allows the engagement of 'non-designers' such as people working in the social or public sector in the framing process. We have furthermore experienced that themes and the NADI-model highly contribute to the communication of solution proposals to the different stakeholders.

Reoccurring themes between service design projects

As themes are relatively stable and shared by different stakeholders, we have experienced that we can also find common themes across different case studies with similar types of stakeholders. For example, the theme 'drive to make a difference' is relevant in almost any kind of design problem that includes service deliverers. Future research is therefore aimed at identifying those common themes, and a deeper analysis of these themes through hermeneutic phenomenology.

Conclusion

In this paper I discussed the design of social complex service systems in the public and social sector. Using Stacey's theory of complex responsive processes, I showed that service organisations, which include the service infrastructure and the service interface, could be seen as ongoing iterated patterns of relationships between human beings. Social infrastructures are infrastructures that, in line with this view, empower human beings working in the service organisation to creatively and continuously support each other and themselves. The two case studies showed how a human-centred design approach contributes to the design of such social service infrastructures. The NADI-

model was used to illustrate how themes, the deepest level of needs and aspirations of stakeholders, are particularly useful in the design of social infrastructures.

Services play an important role in addressing the complex societal problems of our time. It is therefore essential that we integrate a deep understanding of service deliverers and the relationships with their colleagues in systemic design, to foster their drive, pride and passion to make a difference.

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