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Co-designing with relationships in mind

Introducing relational material mapping

Abstract

We need to move from object-oriented thinking towards relational thinking for many reasons. As public services become more complex, their design has increasingly focused on the relationships between people. The role of the traditional service staff has been shifting from a 'provider', to a 'facilitator', towards 'enabler' of relationships between service users, their peers, family and/or members of the civil service. Many agree that the future of public services relies on relational services, relational welfare and a relational state. However, we do not share a vocabulary to describe good relationships, nor do we have materials to design for services that support meaningful relationships. We visually perceive the world as fragmented parts rather than seeing their in-between relationships. As our perception is integrated with our cognition, when mapping complex systems we emphasize the nodes rather than the connections between the nodes. Categorizing and colour-coding diverse types of systemic relations are useful to understand complex social systems, but not sufficient to shape them. We propose a multi-sensory systemic design tool that aids public servants, designers and service users in understanding social relationships through the use of physical and sensorial material properties. Testing this tool revealed that people are enabled, within a short timeframe, to create a shared relational vocabulary. This vocabulary can be used as a new design material to co-design novel relational concepts for enhanced relational services.

Keywords: design for public services, co-design, systems-oriented design, service design, systems thinking, relational welfare, relational services, material thinking.

Introduction

Public and social services are becoming more relational and less transactional (Cooke & Muir, 2012; Muir & Parker, 2014). To support the design process of relational public services, we introduce a multi-sensory systemic design tool (Figure 1) that allows people to create a shared relational language and build awareness on the importance of inter-personal and inter-organizational relationships when designing for systemic public services.

The governance model of many public services is shifting from a model largely designed around the delivery of services *for* people towards one designed to enable a better co-production of services *with* people (Mulgan, 2012, p. 20). 'Networked governance' (Bason, 2012; Hartley, 2005) and a 'relational state' (Cooke & Muir, 2012; Mendoza & Vernis, 2008; Muir & Parker, 2014) organize actors from the private and public sectors, together with civil society, around social needs whereby they are collectively responsible for delivering on those needs. Governments are transitioning from being passive deliverers of transactional services to enablers of relationships (Muir & Parker, 2014). 'Relational welfare' (Cottam, 2011) fosters social capital and measures human potential and relationships rather than institutional reform and efficiency (p. 144). It also values services that enable development, resilience and emotional support through relationships that can capitalize on peer-to-peer capabilities, rather than professionalism through the specialization and scripting of public service roles.

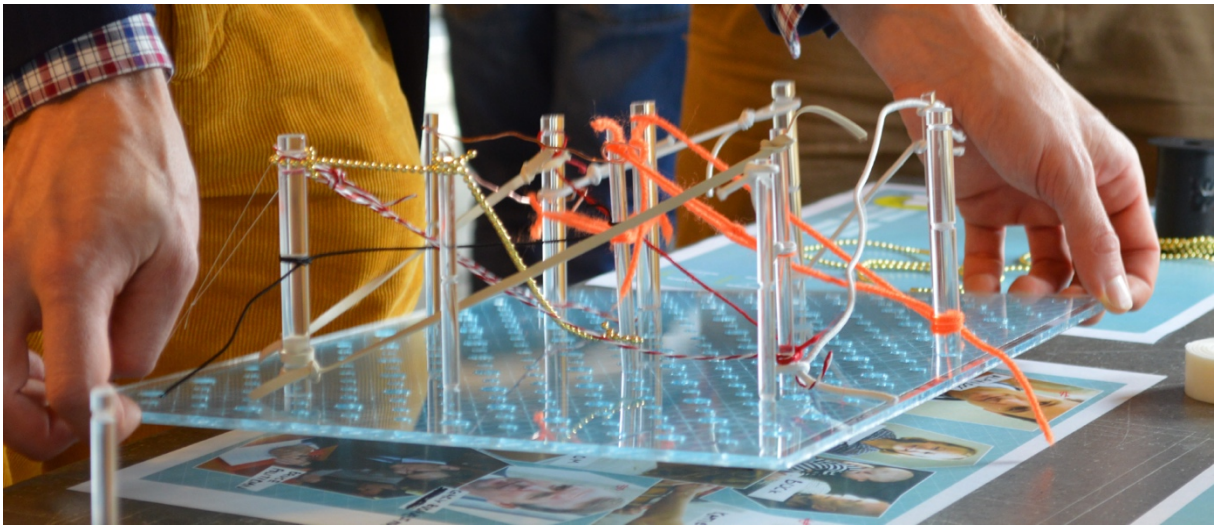


Figure 1: A multi-sensory relational tool that supports the design process of complex public services by creating a shared understanding about the role of relationships through physical material qualities.

Cipolla and Manzini (2009) distinguish 'relational services' from 'standard services' in the context of social innovation. Relational services enhance interpersonal encounters (p. 47) between individuals while maximizing their potential through a system of 'enabling solutions' (Manzini, 2007). Enabling solutions cannot be designed directly, thus environmental interventions may support individuals to come together, bringing their competencies and skills towards relational encounters. This is in line with the concept of 'design for service' (Kimbell, 2011; Meroni & Sangiorgi, 2011; Wetter-Edman et al., 2014), which is the 'design [of] conditions for certain forms of interactions and relationships to happen' (Meroni & Sangiorgi, 2011, p. 10). Designing for services (Kimbell, 2011) may involve 'an exploratory, constructivist approach to design, proposing and creating new kinds of value relation [emphasis added] within a socio-material configuration involving diverse actors, including people, technologies and artefacts' (p. 42). A constructivist approach in relational services allows every participant to construct its own interpretation of relationships in a unique, personal and unscripted way.

The UK's Institute for Public Policy Research (IPPR) highlights the importance of a 'relational government' that organizes public services on a two-by-two matrix, from simple to complex and from transactional to relational (Mulgan, 2012 p.20 in Cooke & Muir (Ed) 2012). As we softly categorize public services on a spectrum (Figure 2), those who rely on human and interpersonal social skills – like healthcare, education, ageing, and immigration – depend on the relational capacity of service providers and relational support from peers and family.

In order to support people's relational capacity, we will explore the way in which social relationships are perceived and represented – tapping into theories of visual thinking, cognition and visual (and material) representation. We will then introduce the multi-sensory systemic design tool, its design, intentions and use settings. The tool can be used in collaborative settings where cross-disciplinary teams come together to explore the relational dimension of public services.

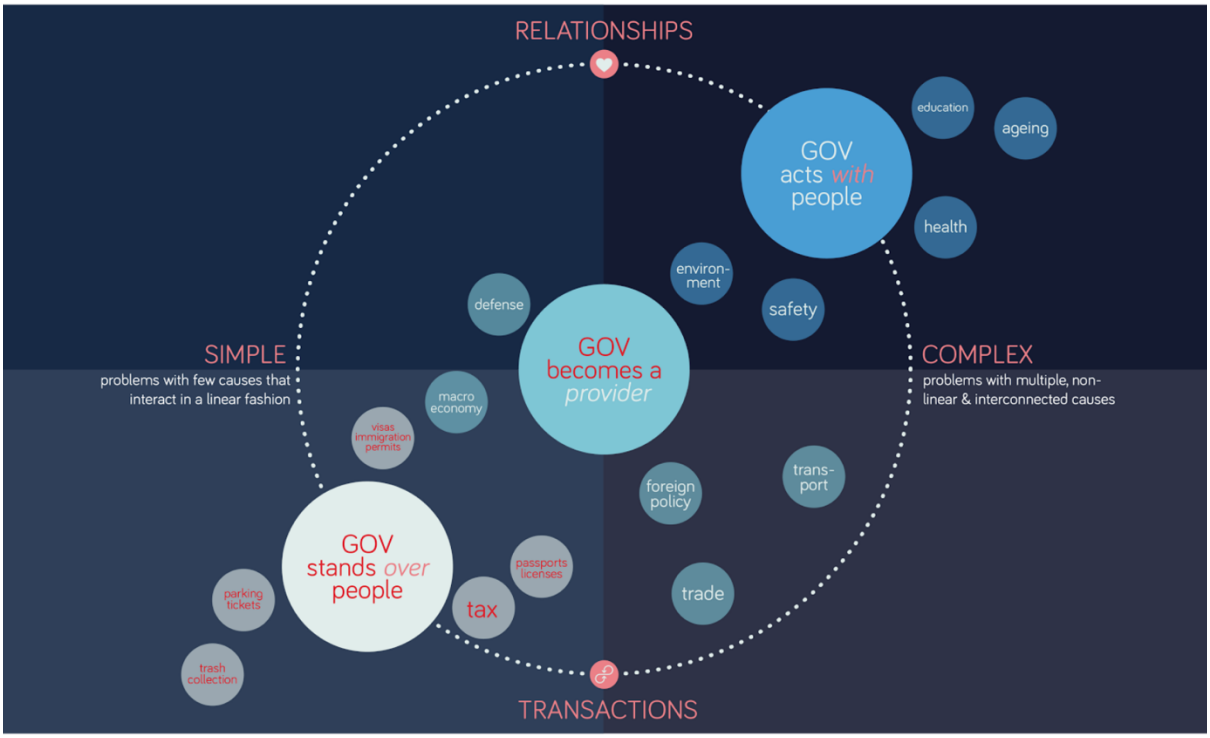


Figure 2: Spectrum to organize public services from simple to complex and from transactional to relational (Adapted from Mulgan, 2012, p. 20 in Cooke & Muir (Ed.) 2012).

Visual perception

The Viable Systems Map (Beer, 1985) and Rich Pictures (Checkland, 2000) are powerful visual representations of complex organizational structures. Visual thinking and visual perception are cognitively linked (Arnheim, 1969, 1980); thus, the way we visually represent is influenced by our cognition. Very often, 'our dominant mode of communicating — words — fall short when used without the corroboration of other means of representing complex, dynamic entities' (Nelson & Stolterman, 2012). Some believe that perception is through 'structured wholes or Gestalten, rather than sensations' (Wagemans et al., 2012, p. 1173). This is one of the primary ideas of Gestalt theory, that 'wholes are *more than* the sums of their parts' (p. 1173) and that 'we perceive the world as ordered, clear-cut and meaningful' (Verstegen, 2005, p. 2). Only functional relations like reciprocal dependency and hierarchy have been considered to play an important role in determining which wholes and parts influence the way we perceive (Wagemans et al., 2012, p. 1175). Our perception – in full pictures or wholes – limits the possibilities of representing the relational dimension of our human potential.

Visual representation

Visual representation is a method for understanding, engaging and even dancing with complexity, e.g. by using tools such as rich research design space and giga-mapping. By modelling, sketching, mapping and diagramming, we construct simplified views of the world. Systems-oriented design (Sevaldson, 2013a) uses giga-mapping for its generative and creative potentials (Sevaldson, 2011). Giga-mapping is not only about understanding complexity but also about designing as a way of interpreting systems and working with them. Perception and cognition are an integrated process (Arnheim, 1969; Sevaldson, 2005), and 'visualisation and the following analysis [synthesis] are the results of perception and cognition where the diagram[1] plays a central role in the analysis' (adapted from Sevaldson, 2005, p. 140). Systemic designers are beginning to shift their attention from nodes to relations (Glanville,

2014; Sevaldson, 2013b). However, this shift is currently limited by the 2D formats we use. To illustrate the limits of visual representations of complex dynamic systems, two examples are compared: Jay W. Forrester (1973) and Tunheim (2013).

Almost fifty years ago, the founder of Systems Dynamics, Jay Forrester, started developing visual models to illustrate the inter-relations between population and economic growth that would occur over time (1971–2021). This systems dynamic model (Figure 3) uses different visual techniques, like boxes, to represent the different systems. Each 'box' has an inflow and an outflow depending on the 'circles' that control the rate of each flow. In his model, flows, which are one kind of relation, behave mechanically and allow the approximate prediction of future systems behaviours.

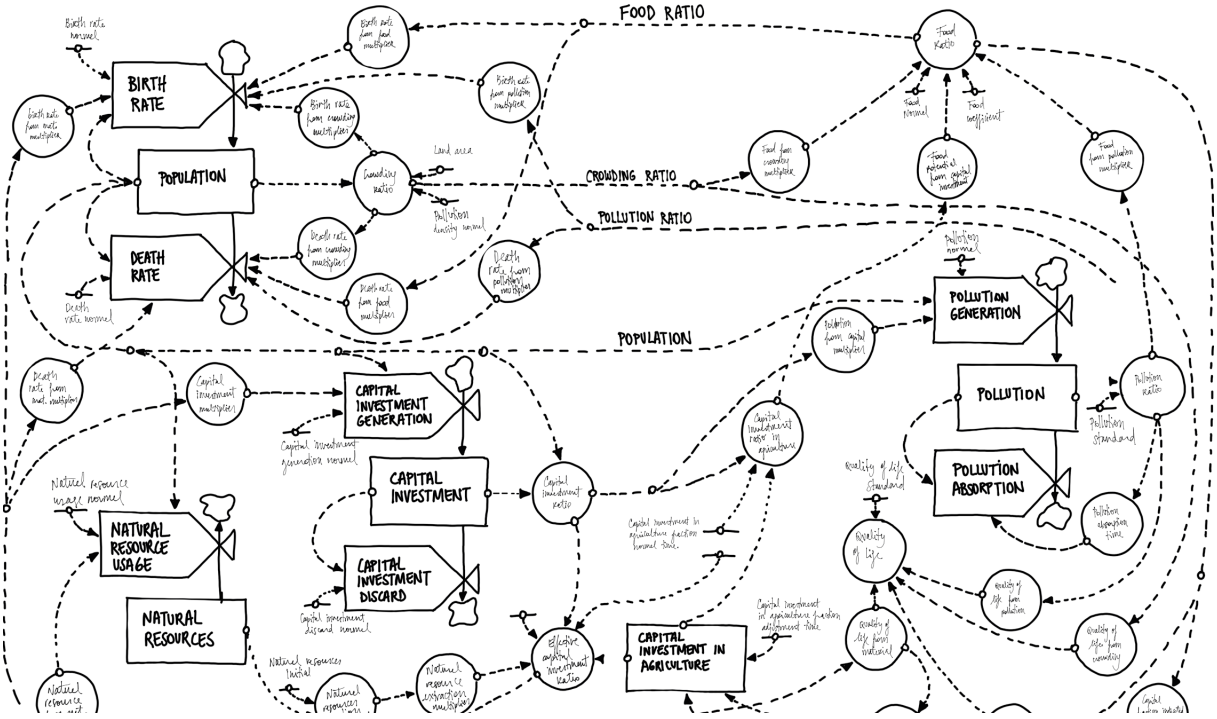


Figure 3: An adaptation of Forrester's model of the world's dynamics. This map models the dynamics between population and economic growth (from 1971 to 2021) by relating population, natural resources, pollution, capital investment, food and quality of life (Jay W. Forrester, 1973, p. 144).

In complex socio-technical systems such as health care, social relationships may significantly influence a person's well-being. By giga-mapping, design student Natalia Tunheim explores the relationships (knowledge, feelings, money) between a young dementia patient and its social ecosystem (Figure 4, Tunheim, 2013). Relations (arrows) are emphasized over the nodes (box), and relationships are represented with a numeric scale indicating the intensity of the relationship in-between the actors.

As Forrester's systems dynamic modelling and Tunheim's social relationship map have completely different purposes, a comparison is inadequate. However, in Tunheim's representation, a greater role is given to relationships than in Forrester's model. Moreover, in systems dynamics, the purpose of modelling relations is to control the flows and to simulate the behaviour of systems in future scenarios. By contrast, visualizing social relations by emphasizing the 'in-between' seeks to explore the potential of relational interventions. Our visual representation techniques, such as Tunheim's (Figure 4, page 5), may fall short in attempting to represent relationships in collaborative settings where all participants interpret

the world differently. We believe a material language may support a multi-stakeholder collaboration process.

Figure 4: A section of a *Giga-Map* in which relations in the system are emphasized over nodes (Tunheim, 2013)

Material language

Material theorists find it difficult to classify material libraries as 'matter can be experienced through sensory perception, technical description, scientific theory, or a philosophical approach – so many possibilities which intrinsically overlap elements of different definitions' (Margolis, 2011, pp. 148–152). As perception and thinking are closely interconnected (Arnheim, 1969), tactile techniques can strengthen cognition by making relationships more concrete and palpable.

For designers, materiality shapes thoughts and associations. Materials have the potential to fine-tune people's emotional responses to products (e.g. objects or spaces). Designers develop by training and practicing a special sensibility towards material properties; however, most people have a basic understanding of materials and the ability to extract meaning from everyday sensorial encounters with objects. Relationships are also experienced daily, but they are intangible and more difficult to describe – especially with words – as they become more complex. Designing for relational services is merely an immaterial process that deals with the 'structure of invisible power, political and social relations' (Pui Ying Lo, 2015).

> Phenomena exists in the world.
> Materials makes thoughts tangible.
> Materials manifest the world (Viray, 2011, p.8).

Relational sense-making may be explored through tangible materials and by supporting the creation of a shared language and cognition. In workshop settings, participants may employ physical materials to explore the intangible relationships that potentially occur in relational services and design for better service experiences. Everyday materials, such as wire, yarn and elastics, may reduce the threshold to experiment with complex processes and allow a wider audience to participate in co-creative practices. We now introduce the setting in which everyday materials can be introduced to explore relationships and relational services.

Workshop setting

The context for introducing the multi-sensory systemic design tool was a cross-disciplinary and collaborative workshop (Figure 5). Eighteen participants convened at the Systemic Design 2014 Symposium in Oslo, which included designers, public and social servants, academics and researchers interested in public sector innovation. Both facilitators were designers and, to some extent, they modelled the way in which public servants could begin designing and co-delivering together with citizens. The workshop had an open and exploratory goal whereby the participants were referred to as 'co-experimenters' and encouraged to adjust and adapt the tool as needed. The desired outcomes included new relational skills and the development of new techniques to interact with complex social systems, eventually shaping them.

Figure 5: The participants were divided into three groups of approx. six. All groups were collaborative, curious and experimental.

Tangible tools have been explored in service design workshop settings (Clatworthy, Van Oorshot, & Lindquister, 2014) to support strategic business processes, with the conclusion that 'service designers can utilize their design backgrounds to make the move from paper to physical models, and that service design can benefit from physical representations' (p. 278). The design facilitators in this case designed the physical models and arranged the space before the participants arrived. The space was already divided to accommodate three sub-groups sharing one common material library. Each group worked on a specific public sector challenge pre-defined by the facilitators.

A multi-sensory relational tool for designing complex services

Public and social sector contexts

Power structures, cultural norms, social standards and conflicting interests influence the dynamics of government institutions, healthcare environments and social service delivery settings among other places. These factors are part of everyday life, but they are not easy topics to address. Creating a tool to experiment, build a shared relational literacy and eventually shape the soft and intangible relationships of the environment mentioned above formed part of the task. Three challenges from the complexity spectrum diagram (Figure 2) were chosen to test the tool: ageing, youth mental health and caregiving (Figure 6). Each case was analyzed from a systemic and service perspective. The systemic level consisted of icons representing the different institutions and organizations involved. The service level comprised

photos of real people directly involved in the service value exchange. Each icon and photograph had a blank nametag underneath so that participants could decide who or what each element represented.

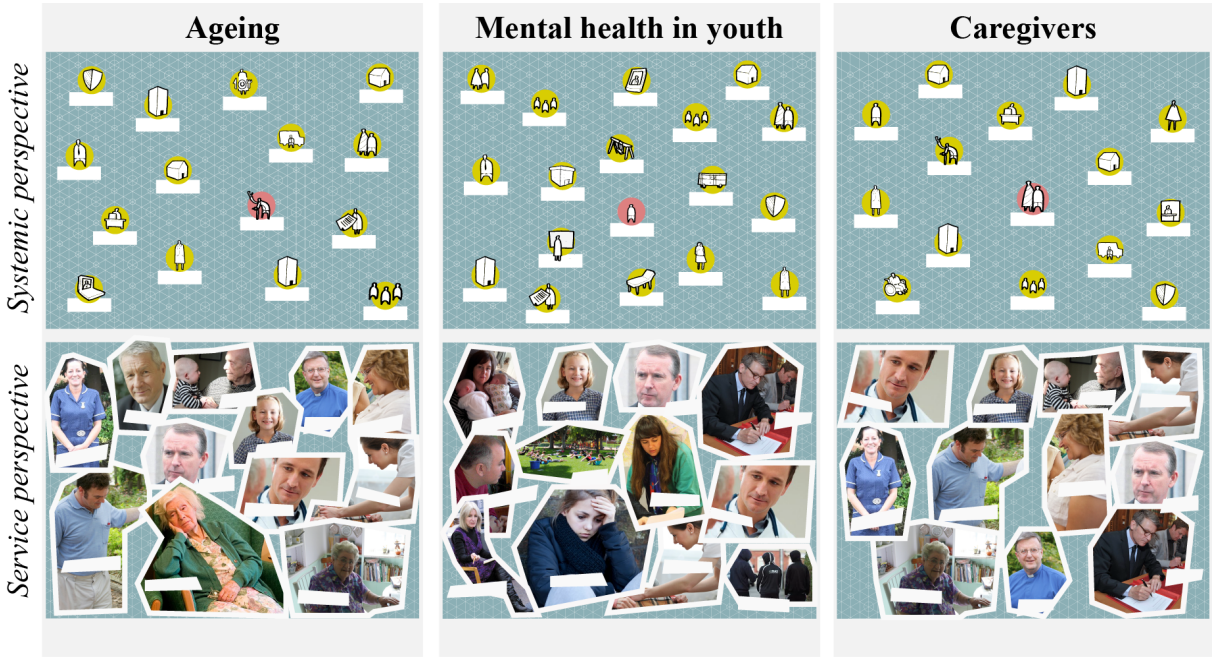


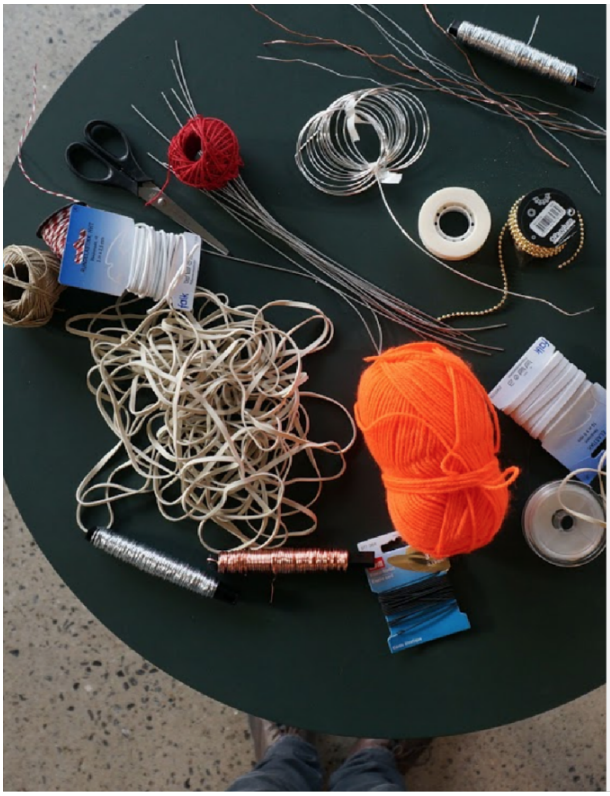
Figure 6: An overview of the three domains selected to apply the multi-sensory relational tool. These domains are analyzed from the systemic and service perspectives.

Perception and representation

Sevaldson, founder of the Systems Oriented Design approach, proposes a library of systemic relations (Sevaldson, 2013b) that distinguishes between long-range relations, including emotional relations. A colour code is established for each relational category, e.g. structural and hierarchical relations are green; representational relations are blue; and social relations are yellow (Sevaldson, 2013b). Inspired by this library, we decided to explore other means of representing and shaping complex and systemic relations. The multi-sensory systemic design tool uses an array of colours, like Sevaldson's library, but adds textures, smell, sounds and shapes. The tool employs materials – such as yarn, stainless steel and rubber elastics, among others – as the shared foundation when co-designing, with relationships in mind, for public systems and services.

Before sub-dividing the group into three and getting started with the specific public sector challenges, we performed a material exploration in plenary. The materials were selected for their use in everyday life, uniqueness and clear emotional properties. The participants began creating associations between the physical properties, their symbolic meaning and the social interactions commonly present in the service or organizational settings mentioned above. The classification presented emerged (Figure 7).

The design intention behind the multi-sensory systemic design tool gives space to emphasize relations over nodes in a stakeholder or institutional mapping. The tool consists of a flat surface where poles, which represent nodes, are inserted. Beneath the surface – and specifically under each pole – icons of institutions or photographs of stakeholders can be placed. The poles can be connected through strings of different materials. To de-emphasize the nodes over the relations, they are represented using transparent acrylic poles. The surface, where the poles are positioned, is also made of transparent acrylic.



Material	Association
Hemp	*Natural, nostalgic, nature.*
Colored hemp	*Cheap, artificial, stiff, colorful.*
Nylon	*Transparent, thin, cold, alive.*
2-colored hemp	*Weak & strong, 2 dimensions.*
Orange yarn	*Warm & fuzzy, danger, squishy.*
White elastic	*Simple, thick, stable, neutral.*
White elastic lace	*Flexible, hard to knot.*
Black elastic	*Stretchy, engineered, structured.*
Rubber elastic	*Cheap, high-speed, multi-purpose.*
Stainless steel	*Strong, a whole made of many.*
Copper wire	*Conductive, stable, warm.*
Metal wire.	*Cold, coily.*
Gold (plastic)	*Non-functional, winning, festive.*

Figure 7: An overview of all the different materials used in the participatory co-design setting together with the associations the group initially gave them while tactically exploring them.

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The properties of the relations between actors or institutions can differ by using different materials as strings (or connections). The relations can also be 'powered' or 'reciprocal' depending on the height difference between both poles. Each pole has three marks – bottom, middle and top – representing the relational flow (Figure 8, next page). Attaching the material connection at a higher mark indicates a higher relational intensity. A *powered* relation is when one actor or institution is more relationally active than the other and when one pole has the connection attached at a greater height than the other. A *reciprocal* relation indicates that either actors or institutions contribute equitably to the relationship and that both connections are placed on the same height on the poles.

Results

A novel relational language

The multi-sensory systemic design tool has the ability to generate a shared vocabulary about relationships that are directly connected to a specific public sector context (Table 1). One group created a singular vocabulary to talk about both the system and service levels simultaneously. Another group made a key distinction between the systemic and service levels. They differentiated the manner in which the relational *system* works today and then defined future relational *services*. As one of the participants of that group said: 'We have this

paper [showing the relational vocabulary template] where we wrote down all the characteristics. But what we wrote is "how the system is". So perhaps using red, we could write at the top "how services could be" […] and show a *relational shift*'.

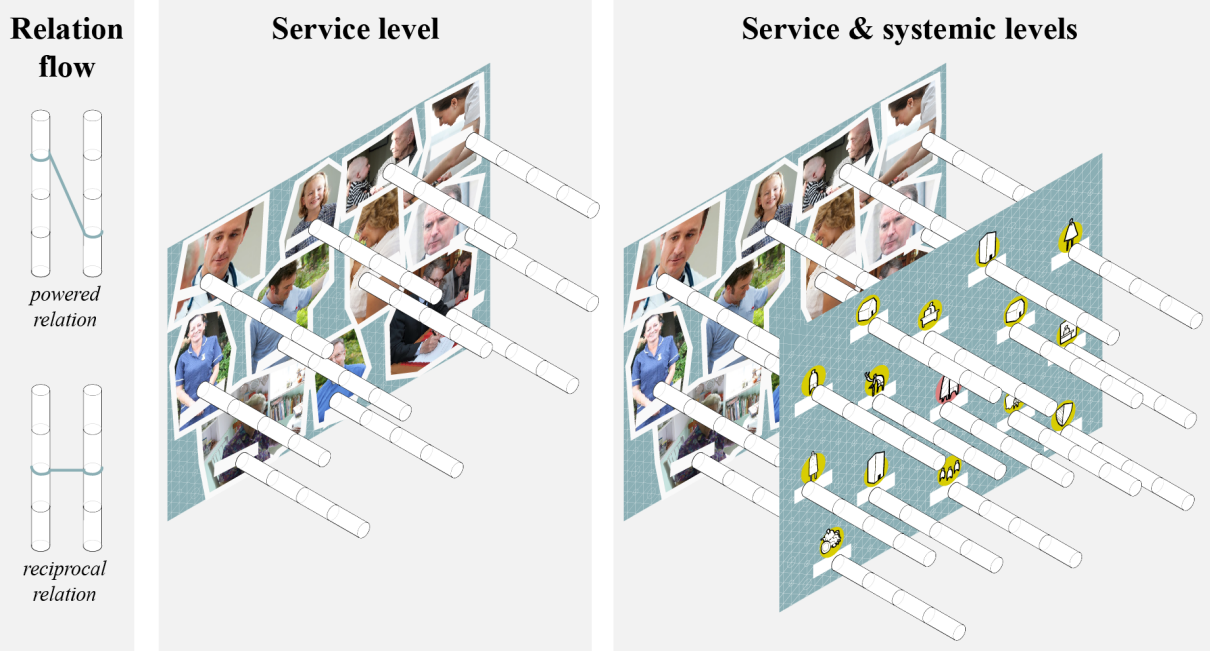

Figure 8: The flow and possibilities of working on different levels (systemic or service level). Some groups worked on one level at a time while other groups worked on both simultaneously. The flow indicates the direction of the relationship, which can be *powered*, where one actor is more relationally active than the other, or it can be *reciprocal*, where both actors contribute equally to the relationship.

This new approach enriches the catalogue of tools and techniques of Systems Oriented Design. Material and visual formats can support a creative dialogue, thus enriching our sensorial and constructivist ways of learning. The openness of the format and the flexible rules led the groups to utilize the kits in several different ways. Some groups mounted them on top of each other to understand how the service and systemic levels relate to each other. Another group merged the two perspectives in one kit, as presented in Figure 8. For now, we continue to explore the potential of material thinking as 'a speculative platform for designers to reorient their way of thinking through adaptive and responsive engagement; to embrace design as an unending, dialogic process' (Freitas, 2008, p. 10).

By examining the process of giving meaning to materials, different groups attached diverse associations to the same materials (Table 1). For example, in defining metal wire, the participants from the ageing group reflected: 'these relationships are professional relationships; they are all transactional and very functional relationships with each other'. In exploring the orange yarn, they talked about: 'de-abstracting: that means making it more human, more personal […] What does equity mean to you? What about this one [holding the 2-colored hemp]? Since it is interlinked'. While holding the coloured hemp, this group then had an interesting observation that led to a type of relation that can break existing relations: 'What happens when there is a relationship but you don't want a relationship? Maybe use *break*? You could break, or you could *heal* it' (Workshop participant). These examples also describe how groups moved from the wide bundle of material interpretations to precisely sharing their understanding through prototyping relationships in action.

Table 1: How the different contexts (mental health and ageing) influence the type of interpretations they give to the different materials in terms of relationships.

Material	**Mental health** associations	**Ageing** associations	
	System and service levels	*System as it is today*	*Service as how it could be*
Hemp	*Predictable.*	*Left blank.*	*Based on history.*
Colored hemp	*Punishment, crisis.*	*Superficial.*	*Heal.*
Nylon	*Clear, honest, difficult to hold.*	*Strong, invisible.*	*Make transparent.*
2-colored hemp	*Two dimensions, intertwined.*	*Complicated, occasional.*	*Equal, equality.*
Orange yarn	*Obvious, easy to understand.*	*Caring and close.*	*More personal.*
White elastic	*Looks strong, but is weak.*	*Left blank.*	*Brings people closer.*
White elastic lace	*Strong, easy to apply, flexible.*	*Pressure.*	*Left blank.*
Black elastic	*Weak.*	*Tension, harmful, bad influence.*	*Break.*
Rubber elastic	*Strong tension, represents values.*	*Left blank.*	*Flexible, stretches to a point.*
Stainless steel	*Resilient, stainless.*	*Institutional, cold, rigid.*	*Increase effectiveness.*
Copper wire	*Strong, maleable, secure.*	*Influencial and close.*	*Increase communication.*
Metal wire	*Left blank.*	*Functional, transactional.*	*Stronger.*
Gold (plastic)	*Precious, fragile, not easy.*	*Left blank.*	*Sequencial, episodic, expensive.*
Silver wire	*Consistent, money, hard to shape.*	*Left blank.*	*Precious, afraid to lose, loyal.*

Context-sensitive vocabulary

The relational language co-created by the participants is a new relational capacity they share to design with people in mind (Figure 9, left side). The synthesis of the material exploration into a 2D format (Figure 9, right side) loses the multi-sensorial properties. A value lies in the material exploration that gets lost when translating it into our dominant mapping 2D communication techniques. This value does not live in the 3D material mapping but within the participants and their shared vocabulary, sensitivity and associations towards relations.

As this tool was tested with a limited group of people in a multi-cultural workshop setting, the results are hardly generalizable because they relate to the worldviews of the workshop participants. In Figure 7 there is a different relational vocabulary than in Table 1, therefore the vocabulary is not scalable as an end result, as it is context dependent and culturally sensitive.

Relational public service concepts

If public services are shifting from a model of designing *for* people to designing *with* people (Mulgan, 2012), we need to make the design process accessible and inclusive to many. As philosopher Martin Buber reflects, humanity started when ‘man meets man’ (Cipolla & Manzini, 2009, p. 45), so it is important to design with the ‘other’ in mind. The shared relational taxonomy can be used to co-design new relational public services. By constructing stories, the participants could reflect-upon-action (Schön, 1983) and make sense of their material mapping scenarios. They narrated the transformed relationships between actors and institutions, as observed in the following quote:

> We started by naming the characters to have an idea of the relationships between them. We created a family of a mum who wants to take care of her two old parents. One of them is sick

> with Parkinson's, so he needs special treatment. Around that, we started building caregiving systems. […] There are many different types of relations: family-love relations, old love that has died or is not in good shape, double-colour/political double agenda, money relations, hearing and dialogue relations. […] Sue, the mom, is a very central person. She is being pulled in many directions. So we have designed the start of a more desirable situation.
>
> (Workshop participant)

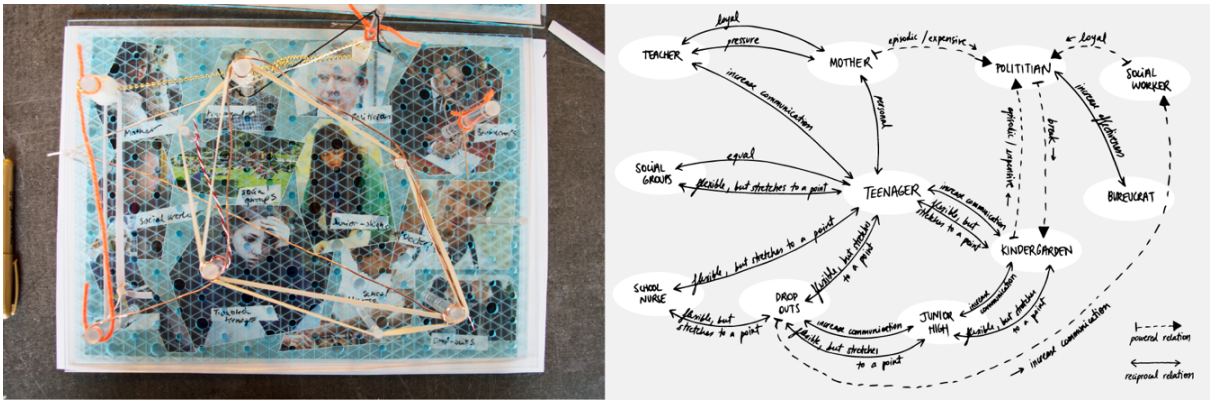

Figure 9: Comparing 3D material mapping with 2D visual mapping: On the left, we see the material relational mapping. On the right, we see an attempt to map out using pen and paper, the result of the material relational mapping.

Discussion

The workshop setting played an important role in lowering the participation threshold and facilitating engagement. The environment was playful, unfinished and an interesting layout of tables, material libraries and computers to document the process. The tool was not presented as in-the-making to encourage participants to take an active role in shaping the outcome. The environment allowed for creativity, spontaneity and experimentation. These types of settings have been called 'authorizing environments' (Bason, 2013; Christiansen, 2014) and 'public innovation places' (Selloni, Staszowski, Bason, Schneider, & Findeiss, 2013), both recognizing the importance of the physical and social space needed for public sector innovation.

As with most facilitation tools, the transition from a workshop experience of intense collaborative *flow* (Csikszentmihalyi, 2000) is challenged with the transition of back to 'normal'. The tool relies on the facilitator to enable participants to share their thoughts and reflections, which are then documented and translated so that every participant is on the same page. In one way, this tool takes the participants further away from their business-as-usual by enabling rich conversation on relations, but this makes it more difficult to transition them back and be concrete. In future research, we could design other tools to turn relational vocabularies into actionable service prototypes.

We are working on an improved version of the tool that could allow the understanding of relationships over time – like journey maps – and not only as a static constellation of reciprocal or powered interactions. We are now working across different sectors to address migration as a relational opportunity for collaborating between public and private sectors, sharing the responsibility together with citizens (Mendoza & Vernis, 2008). We see issues around migration as an opportunity to foster new relationships of trust and reciprocity in individuals through relational services (Cipolla & Manzini, 2009). The multi-sensory tool – which appeals mostly to our visual and tactile senses – might lower the threshold to talk about intangible relationships in environments where language is a barrier. It might also support the

co-design processes of service deliverers (e.g. staff at refugee centres) when designing with migrants and other public or private system stakeholders.

Conclusion

The value of this paper lies in its connection between systems thinking theory and design practice while attempting to improve public and social services. A multi-sensory relational approach for mapping and understanding social relationships, when applied in a collaborative workshop setting, may help participants shape an important component of new public service design relationships. It creates a shared vocabulary for switching from object-oriented thinking to relational thinking. As one of the participants reflected: 'It's interesting that when we don't have tools like this, our instinct is to create solutions that are about *things* and not *relations*. And here we can rethink whether we even need a product. Maybe it's all about transforming these relationships'.

The tool attempts to bridge our material sensitivity, which guides object-oriented thinking towards richer interactions with the relations we have with people in our environment. Variations of the multi-sensory systemic design tool have been applied internationally at Mayo Clinic's Center for Innovation, Alberta's Government CoLab and Semcon (a high-end engineering environment in Sweden). This contributes theoretically to the work of many innovation researchers from different fields such as public policy (Cooke & Muir, 2012; Muir & Parker, 2014), service design (Cipolla & Manzini, 2009) and social design (Cottam, 2011). We hope that it will inspire designers and public servants to design with relationships in mind as a new design *material* and 'bring people closer together like an *elastic*' (Workshop participant).

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[1] Diagrams may include any form of visual representation such as mindmaps, sketches, journey maps, storyboards, etc.