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Published in:
Design Culture(s): Cumulus Conference Proceedings Roma 2021

Publication date:
2021

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

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Publication date:
2021

DC(S)
DESIGN CULTURE(S) | CUMULUS ROMA 2021
JUNE 08.09.10.11, SAPIENZA UNIVERSITY OF ROME

The potential of Theory of Change to visually model the underlying logic behind service design projects

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Abstract | Theory of Change emerged in the past decades as an approach to better plan, drive and evaluate community initiatives and philanthropic projects, and has since been used more widely to support a variety of innovation processes. Within design practice and design research, however, Theory of Change remains underused and underexplored. This paper intends to focus on two applications of Theory of Change, mostly in light of its potential to visually model and communicate the underlying logic in service design projects. Particularly, the paper will examine how these two different visual representations of Theory of Change had contrasting purposes and, therefore, experimented with varied ways of displaying the key assumptions, activities, outputs and outcomes of the two projects by, for example, operating on visual elements such as scale, texture, colour, transparency, layers, patterns, grids and modularity.

KEYWORDS | VISUAL MODELING, SOCIAL INNOVATION, THEORY OF CHANGE, VISUAL ANALYSIS

1. Introduction

Especially when dealing with social innovation processes, service design requires a strong degree of collective sense-making and strategizing for the vision of the designers to be realised (Simeone, 2019; Simeone, 2020; Morelli et al., 2020). Theory of Change emerged in the 1990s as an approach to better plan, drive and evaluate community initiatives and philanthropic projects (Stein & Valters, 2012) and has since been used more widely to support a variety of social innovation processes (Brest, 2010). Theory of Change is a holistic tool to understand processes, where one identifies the current situation (in terms of needs and opportunities), the intended future result (expected or hoped for outcomes), and what needs to happen to move from one situation to the other to reach one's goals (Rogers, 2014). In other words, a Theory of Change is concerned with how and why an initiative works (Weiss, 1995).

What distinguishes Theory of Change from other tools is (a) its joint focus on collaborative design and on the surfacing underlying organisational assumptions and (b) its use of figures (often labelled 'Theory of Change maps') as a means of socialising the vision behind the intervention. Given these attributes, design research has shown some interest for Theory of Change, mostly in relation to how it can support design projects in complex contexts of intervention (Alter, Whitham, Dawes, & Cooper, 2019), including social innovation (Tonkinwise, 2015). However, to date, the construct of the Theory of Change remains understudied in design research and under-applied in design practice (Jones, 2015). This paper intends to offer a contribution in this direction by examining two applications of Theory of Change: (1) a UK Government funded project to scope the possibility for the nationwide roll-out of smart meters and (2) a European Commission funded project oriented toward offering a supporting service for all those city actors interested in using design to develop urban and social innovation projects. These two projects produced very different maps – i.e. visual representations - of Theory of Change. The specific focus of the paper will be to study how these two representations helped articulate the underlying logic of the two projects. These visual representations had contrasting purposes and, therefore, experimented with varied ways of displaying the key assumptions, activities, outputs and outcomes of the two projects by, for example, operating on visual elements such as scale, texture, colour, transparency, layers, patterns, grids and modularity. As suggested by some experts in the use of Theory of Change (Davies, 2018), there is a great need to more closely examine how a deliberate use of varied visual elements can improve the expressive capacities of the tool.

The contribution offered by the paper is, therefore, twofold. First, the paper intends to study how Theory of Change can help identify the underlying logic behind service design projects. Second, the paper aims at more closely exploring how different visual representations of Theory of Change can provide a greater level of granularity in modelling and communicating such logic. In a broader perspective and in relation to theoretical and practical implications,

the paper will also examine how Theory of Change can support the work of design researchers, educators and practitioners.

2. Theoretical and methodological framework

2.1 Theory of Change in design research

In the past decades, design has greatly expanded its scope (Manzini, 2015). Its potential to address, frame and reframe complex and wicked problems has been widely recognized across fields as varied as design research (Buchanan, 1992), business studies (Martin, 2009) and innovation management (Dorst, 2015). Theory of Change can support design projects that deal with contexts of interventions that are more and more volatile, uncertain, complex and ambiguous (Jones, 2015; Bennet and Lemoine, 2014). Particularly, researchers have noted how the granular representations provided by Theory of Change can help understand the functioning of sociotechnical systems (Norman and Stappers, 2015; Jones, 2015). Indeed, Theory of Change can work especially well when design is considered as an activity that is not limited to the manipulation of materials but is extended to a conversation with a social context (Simeone et al., 2019). This implies a critical evaluation of the state of things and a creative process to imagine how to change them through an activity of problem-solving and (collaborative) sense-making (Manzini, 2019).

Within design research, Theory of Change has been used to look into various aspects, from user engagement processes (Alter et al., 2019), all the way up to theory of agency (Mom, 2007) and design practice (Wahlin and Kahn, 2015). However, some design scholars noted that Theory of Change remains underused in design (Tonkinwise, 2015). One particular area in which design scholarship could usefully contribute to the wider development of Theory of Change is the design of the products of the process: Theory of Change maps. Whilst scholars such as Davies (2018) have explored drawbacks in how Theory of Change maps represent programmes visually, an alternative visual vocabulary using design principles remains lacking in literature on Theory of Change.

2.2 Theory of Change as a way to map and communicate in service design projects

Theory of Change mapping involves identifying anticipated causal pathways through which an intervention leads to a set of outcomes, and the articulation of the assumptions (or underlying theories) of how the hoped-for change will come about (Darby, Liddel, Hills and Drabble, 2015). In other words, a Theory of Change explains how an intervention (a project, a programme, a policy, a strategy) is understood to contribute to a chain of results that produce the intended or actual impacts (Ling, 2012). Theory of Change ensures that co-production is central by bringing together key stakeholders and lets them collaborate through continuous conversations, eventually facilitated within workshops (Alter et al.,

2019). Theory of Change, therefore, allows who is managing, designing or facilitating the intervention to capture a wide range of voices, to observe dynamics and, in general, to operate successfully in those situations in which there is a degree of uncertainty and confusion on how to proceed and over the final outcome to be reached (Jackson, 2013). As such, the fine-grained mapping of all the key components of a project provided by the Theory of Change can be a powerful tool to identify the underlying logic and assumptions in complex interventions (Davies, 2018). Service design - with its focus on the functioning of complex ecosystems and on journeys dynamically co-created by various stakeholders (Meroni & Sangiorgi, 2011; Stickdorn et al., 2018) - provides an ideal ground for Theory of Change to be applied.

Theory of Change is not a purely intellectual exercise: Theories of Change maps "can only be useful if they are designed to serve a clear purpose, and once designed, the organization adheres to that purpose" (Hunter, 2006, p. 194). The main purpose of a Theory of Change is to make sense of the initiative that is being designed within a specific organisational setting and in contexts in which multiple stakeholders interact (Anderson, 2004; Weiss, 1995). In these situations, the underlying logic of an intervention is not always clearly articulated but at times, it emerges from the interaction of diverse stakeholders and their dynamics of sense-making, which might be pulling the project toward different directions (Mirabeau & Maguire, 2014). When applied to these contexts, Theory of Change can also be helpful to share and clearly communicate the underlying logic of an intervention to these varied stakeholders; Theory of Change can act as a form of storytelling, as "an art of weaving, of constructing, the product of intimate knowledge" (Gabriel, 2000, p. 1). Making sense of an initiative is a social phenomenon, so that much of the work to build a Theory of Change is crafting together a narrative from disparate perspectives. In order for this sense-making to achieve its purpose, the main result (the 'Theory of Change map') needs to be effective in communicating a coherent narrative (Davies, 2018).

Much of the success in the application of the Theory of Change depends on the very design of the Theory of Change map. To date, little has been written academically or otherwise on the design features of Theory of Change maps and the lexicon is largely underdeveloped. Boxes are filled with text descriptions of 'events', and arrows connect them, representing expected causal connections between these events (Davies, 2018). Maps are most often arranged from left to right under the categories 'context', 'activities', 'outputs', 'outcomes' and 'impacts'. The use of design elements is minimal. This leads to maps that are unable to effectively display the underlying logic in a clear narrative, even when these are understood by the consultant drawing the maps.

This paper intends to address this gap by examining how the visual dimension of Theory of Change can offer a particularly fruitful avenue to identify and communicate the underlying logic of complex interventions, including those large-scale service design projects that see interplay of varied stakeholders.

2.3 A case study approach

This study adopts a case study approach (Eisenhardt, 1989; Eisenhardt & Graebner, 2007), which has proven to be particularly fruitful while analysing a variety of phenomena within real-life contexts (Berg, 1968; Breslin & Buchanan, 2008), and scholars examined the relevance and the limitations of this approach (Dasgupta, 2015). Particularly, this paper follows a research approach that selects two cases - Smart Metering Early Learning Project and Designscapes - since they offered contrasting situations and approaches (Yin, 2009).

The authors of the paper directly participated in the design and implementation of these two projects, quite significantly relying upon the application of Theory of Change. This internal positioning gave the authors the opportunity to collect data and insights, mostly through direct and participant observation based on ethnographically-inspired methods (Czarniawska, 2012) but also carrying out surveys and interviews (about 250 participants, including other team members and representatives of partnering organizations). Within the context of this paper, this material has been selectively examined to distil insights on how Theory of Change was visualized and used to identify key logic pathways behind the two projects. The visual analysis of the two different applications of Theory of Change has been conducted using dimensions (e.g., scale, texture, colour, hierarchy, layers, patterns, spatial distribution) highlighted in visual design literature (Lupton and Cole Philips, 2008).

3. Representing Theory of Change

3.1 Case 1: Smart Metering Early Learning Project

The context

The roll-out of smart electricity and gas meters to households and small businesses in Great Britain by the Department for Energy and Climate Change (DECC) began in 2011 with the Foundation Stage. During the Foundation Stage, the Government and delivery partners aimed to learn from early activity about how consumer engagement can best be achieved, and feed lessons into planning for the next stage. This project summarised and analysed evidence from a range of sources, including three new DECC research projects, into how GB householders engage with smart metering, carried out with cooperation from energy suppliers; GB and international evidence on smart metering and energy feedback; and some evidence from non-energy domains such as public health, where applicable to understanding behaviour change processes (Darby et al., 2015). This project used Theory of Change as a way of structuring and undertaking the analysis. Theory-based evaluation systematically develops and tests theories related to links between policy delivery and outcomes, and is particularly useful for evaluating complex interventions involving many actors.

The visuals

The Theory of Change maps were created following analysis into evaluations of similar services, theories of behaviour change, interviews with key stakeholders and two Theory of Change workshops. Figure 1 below is an example of horizontal layout for a future service design related to smart meters. In this project, as a prospective programme, the most important aspect for the stakeholders to understand was the causal logic and the connections between different activities. In addition, the planned roll-out of the programme was highly complex, with many interdependencies between partner organisations, some of whom appeared unlikely to be fully motivated to join the programme. Given this, the map focused on the implementation and planning by exploring different scenarios and assumptions relating to varying engagement from the key stakeholders. The map below is a scenario requested by the client where smart meters would be rolled out alongside household level electricity micro-generation.

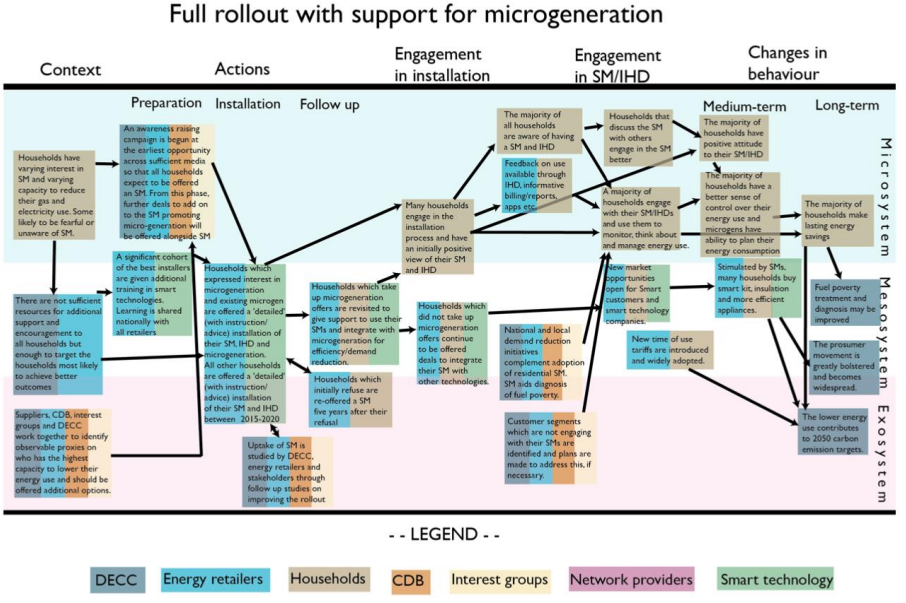

Fig. 1 Theory of Change map from the Smart Metering Early Learning Project

In this map, issues and context for the programme were arrayed to the left and connected to the actions. Actions are broken into preparation, initial action and follow-up action as suited to the programme. The colour-coded boxes help to show which part of the system needs to be engaged at each stage and where benefits would accrue. As a complex national-level programme, the rows are layered from micro to macro as a way of making sense of the programme activities and the interactions between the strategic level and household implementation.

3.2 Case 2: Designscapes

The context

Designscapes is an EU-funded project oriented toward fostering design-driven innovation in European cities and beyond. The project intends to leverage the capacity of cities to harbour ecosystems (Peltoniemi & Vuori, 2004), in which private companies, NGOs, city administrations and citizens can work together on innovation projects and processes. Designscapes intends to build on the generative potential of these environments by implementing a service that (1) selects a number of promising ideas and projects from various European cities, (2) provides them with some direct funding and (3) supports them with mentoring and coaching activities on how to use design approaches and methods. The idea is that Designscapes could accompany local stakeholders through a 'change journey', in which they fully realize the potential of design to support their innovation projects and processes. Service design was, therefore, a key approach used to model and implement this change journey and to understand how the service provided by Designscapes could support it.

The visuals

The figure below was the second Theory of Change map, the first being highly technical and not clearly distinguishing the key stages of the programme. Because the previous Theory of Change map did not present an easily understandable picture of its critical features, it remained unclear how the stages of the programme would work in practice and the critical points along the pathway. Figure 2 shows an alternative, streamlined way of constructing Theory of Change maps, with less detail whilst retaining the overall meaning. Mayne and Johnson suggest that in some cases simplification of a Theory of Change may be needed because "for many interventions, displaying all of the elements of their [Theory of Change] in a single diagram can be cumbersome, resulting in a too complex diagram of arrows and boxes" (Mayne and Johnson, 2015, p. 415).

Figure 2 focuses on the assumptions and risks between each causal link. The greatest amount of text concerns assumptions, which highlight the intrinsic frailty of a programme and the number of internal/external conditions that need to be attended to in order to achieve outcomes. The lack of detail in the 10 central boxes means the map has limited utility as a signpost for implementing the strategy. Instead, the sparse writing emphasises the intended pathways the project may progress along and the critical dependencies between each step.

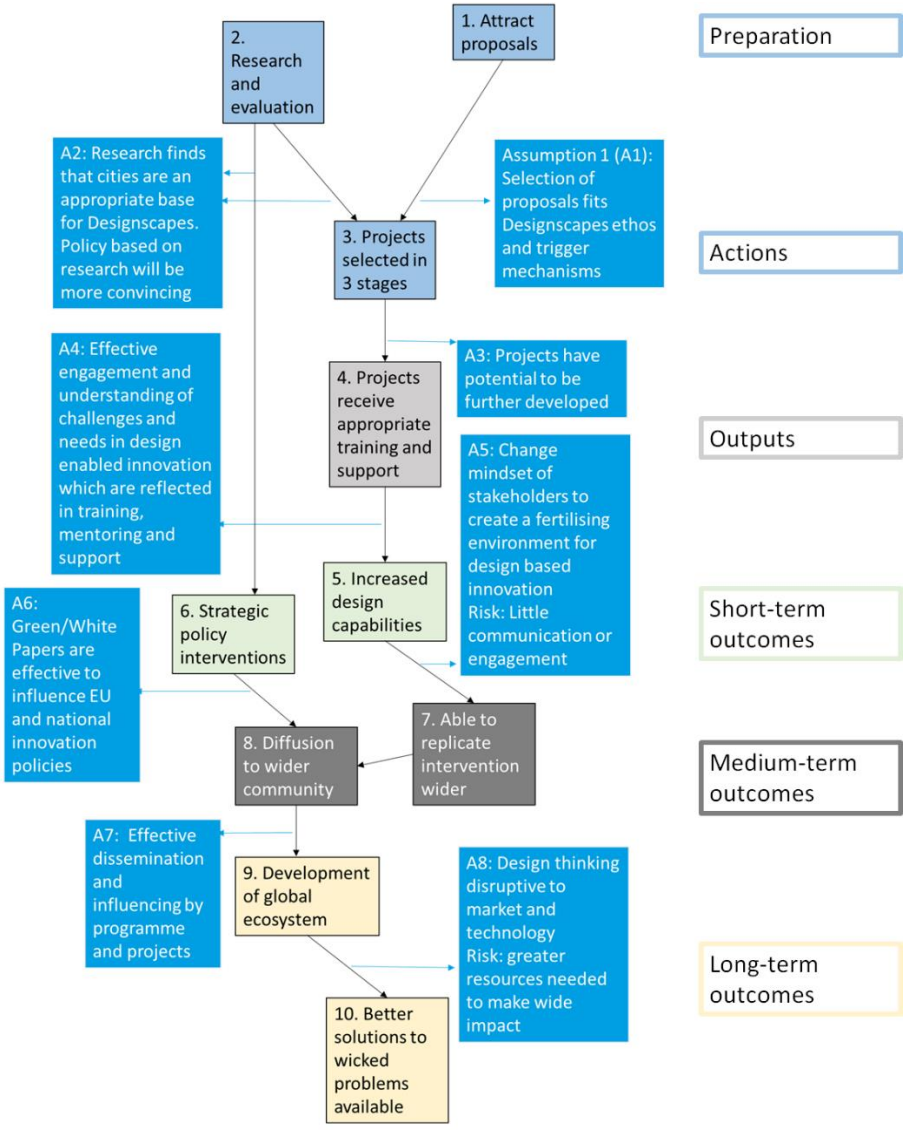

Fig. 2 Theory of Change map from Designscapes

4. Discussion

The two cases examined in this paper show that visual mapping may have substantially different instantiations and this in turn, can have different implications on how Theory of Change can be used to address action and generate meaningful change. Rather than being designed by a single person, these maps can also emerge from negotiation and collective sense-making processes that might involve different project stakeholders. Indeed, the tool can be used as a way to engage stakeholders in granular conversations about key aspects of a project: its broad vision, its goals and its strategy to meet these goals. The use of this tool does not require professional visualisation capabilities from those in charge of producing or contributing to a Theory of Change map; however, the following considerations could clarify the characteristics of different visual choices and highlight their potentials and shortcomings.

4.1 Visual analysis

Figure 1 was intended to (a) display the responsibilities of different partners, (b) emphasise the complexity of the system design and (c) raise awareness of the difficulties and considerations that would be involved. Conversely, Figure 2 was designed as a way of making the Designscapes programme more understandable to project insiders and highlight the key risks and links in the service design. Given this, table 1 examines some key visual aspects of the two different representations of the Theory of Change.

Table 1. Key visual aspects of the two different representations of the Theory of Change

Visual aspect	How it is implemented in the Smart Metering Early Learning Project (Fig. 1)	How it is implemented in Designscapes (Fig. 2)
Directionality	Theory of Change is here represented as ramified and multidirectional. Rather than proposing a single linear pathway, this Theory of Change - with its spatially distributed connections - proposes a sort of map that can be navigated in different ways	The Theory of Change is here implemented as a vertical and somewhat linear progression
Temporal dimension	Multiple concurrent causal links, with elements connected by multidirectional arrows, which also trace loops. Steps are not only progressive but they can also be simultaneous	Predefined sequence of steps, few of them in parallel
Spatial distribution	Theory of Change is plotted against a grid composed of three rows (levels) and five columns. However, the visual elements of the Theory of Change are also positioned in between rows and columns and categories. The grid is quite permeable. The high density of connections and	Even though, at times, concurrent steps are horizontally displayed (e.g. step 7 and step 8), a vertical linearity still remains the key

	ramifications among the elements of this Theory of Change is another striking aspect	aspect in terms of spatial distribution
Use of colour	A kaleidoscope of colours is used to signal different levels (microsytem, mesosystem and exosystem) and the interaction of various stakeholders for each activity	Colours are used to distinguish the assumptions from the steps and the steps among each other, roughly in line with the usual steps in a Theory of Change

4.2 Potential and shortcomings of these visual representations to identify and represent underlying logics of service design interventions

Table 2 summarizes the underlying logic behind the two projects.

Table 2. Underlying logic of both projects

Underlying logic of the Smart Metering Early Learning Project (Fig. 1)	Underlying logic of Designscapes (Fig. 2)
Key change mechanisms are pinpointed as a series of key actions, which are strictly connected to a multistakeholder engagement process and which lead to some hoped-for changes in behaviour. The whole underlying logic behind this intervention is articulated across three levels (microsystem, mesosystem, exosystem)	A stripped-to-the-core sequence of steps is envisioned to reach the goal of Designscapes. The logic of this sequence rests on some key assumptions, also visualized in the Theory of Change. The sequence is the final representation of the key change mechanisms behind the project

Figure 2 proposes a streamlined version of the Theory of Change. In this visual representation, Theory of Change is stripped to its very core. On the one hand, this representation illustrates the key mechanisms that can ignite and support change in the Designscapes project and in its attempt to support city innovation across Europe. On the other, this representation strongly simplifies the logic behind the Designscapes design intervention and, in its attempt to reduce complexity and aid communication, takes out detail that might have a significant impact.

The ramified and multidirectional quality of Figure 1 seems to capture better the complexity of a social intervention like the one behind the Smart Metering Early Learning Project. Rather than reducing complexity, this figure fully elaborates it. The downside, as directly experienced by some of the authors of this paper, is that this type of visual representations can be difficult to interpret and understand if one is not used to working with Theory of Change. The richer use of design elements is likely to be beneficial to those who are

motivated to understand the map yet the complexity may deter less engaged stakeholders from interpreting the details.

It is interesting to connect these two representations to some wider reflections on how to plan and implement broad social changes like the ones tackled by Designscapes and Smart Metering Early Learning. From a viewpoint crossing various design disciplines, Friend and Hickling argued that key mechanisms behind large and complex urban and social interventions cannot be simply defined at the beginning of a project and through a top-down process, but rather they should emerge from "a continuous process: a process of choosing strategically through time" (Friend and Hickling 2012, p. 1). Their point is that long-term plans are actualized by day-to-day decisions and both plans and decisions are affected by pressure of urgency, competition for resources, turbulence and complexity in the world, cognitive and emotional overload, uncertainty and confusion, interorganizational and organizational conflict and all this can lead to "vacillation and inconsistency in the making of day-to-day decisions" (Friend and Hickling 2012, p. 4). To navigate this complexity, progress can take the form of choosing strategically over time: "intervening, or negotiating with others, […] taking decisions, […] investigations but also clarification of values and cultivation of working relationships with other decision-makers" (Friend and Hickling 2012, p. 4). Against these theoretical reflections, the two visual representations of Theory of Change are positioned quite differently. Figure 2 (Designscapes) aims at reducing uncertainty and simplifying complexity. It targets a more focused scope and adopts a more decisive approach in identifying clear key change mechanisms. As such, it can also be better understood by the various stakeholders who take part in the project and that are rarely all well versed in the theoretical and practical aspects of Theory of Change. Conversely, Figure 1 aims at accommodating uncertainty, elaborating complexity. It aims at a broader and synoptic scope and adopts a more exploratory approach, in which key change mechanisms are not so immediately highlighted and potentially also depend on the different pathways that such ramified visual representation of Theory of Change allows for. As such, Figure 1 remains more difficult to understand and interpret and is not immediately actionable as Figure 2.

5. Representing Theory of Change

The paper highlighted how the way in which the Theory of Change is visually represented can help render differently the underlying logic of service design projects. Within the broad community of theorists and practitioners working with Theory of Change, there is a great need to better understand how the deliberate use of varied visual elements while representing Theory of Change can improve the potential of this approach to pinpoint, represent and communicate key change mechanisms (Davies, 2018). As such, this paper shows how various visual aspects in two different representations of Theory of Change can help not only to identify key change mechanisms but also to position the whole underlying logic of the intervention in relation to two polarities: (1) choosing linearity, certainty and comprehensiveness or (2) embracing multidirectionality and complexity. Being aware that

Theory of Change allows for such a level of granularity can, hopefully, also encourage design researchers and practitioners to more closely look into the potential of Theory of Change as a method to identify and communicate the underlying logic of their service designs.

We acknowledge that the use of a limited number of cases can constrain the generalizability of the research implications. In addition, we are aware that we need to dig deeper into existing theoretical frameworks and constructs elaborated in visual studies and semiotics to provide a more solid grounding to our research. In its current, early stage, this paper also does not properly analyse how Theory of Change can be integrated with some specific methods, tools or processes of service design or how the two maps we examined emerged from the interactions and the negotiations among different stakeholders. We see this study as our first attempt to explore visual representations at the intersection of service design and Theory of Change. This is an area that could potentially be of great interest within design research and beyond.

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Acknowledgements: The research leading to this contribution has received funding from the European Union's H2020 Programme under Grant Agreement No. 763784. This article reflects the authors' views. The European Commission is not liable for its content and the use that may be made of the information contained herein.