

# Problematizing Evidence-Based Design: A Case Study of Designing for Services in the Finnish Government

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**Abstract:** The increasing complexity of design problems and degree of innovation required of design solutions today has led many authors to claim that decision making in design should be based on strong scientific evidence. However, current models of evidence-based practice are too simplistic for design since they tend to focus only on evidence strength. We investigate the role of evidence in service design through analysing a case study of creating a service design solution to improve immigration services in the Finnish public sector. By using a conceptual framework that emphasises the impact of different kinds of evidence on knowledge as justified true belief, we illustrate some of the different roles that evidence can play within the design process. The insights from the study indicate that relevant evidence is more useful than strong evidence during the early phases of the design process.

**Keywords:** evidence-based design, service design, design for public sector, epistemology

## 1. Introduction

Increasingly design is being used to address issues framed as requiring systemic change such as transitioning to a more sustainable and healthy society (Boyer, Cook, & Steinberg, 2011; Norman & Stappers, 2016). According to this perspective, the technical nature and complexity of these issues requires that decision-making in design should be based on strong scientific evidence (Norman, 2010). However, despite the power of this simple notion, the process of using evidence within design practice as well as the concept the evidence itself is not entirely clear within the design literature. Consequently we claim that better understanding of the role of evidence in design practice is needed. In this paper we address this claim by investigating evidence and its role in a designing for services project within the Finnish public sector. An insight from the case study suggests that, in the early stage of this service design project, evidence justifying the *relevance* the design concept to its particular



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context played an important role, not only evidence of the *strength* of the proposed solution. This insight problematizes current models of evidence-based practice that claim that only strong evidence can provide good reasons for design decisions.

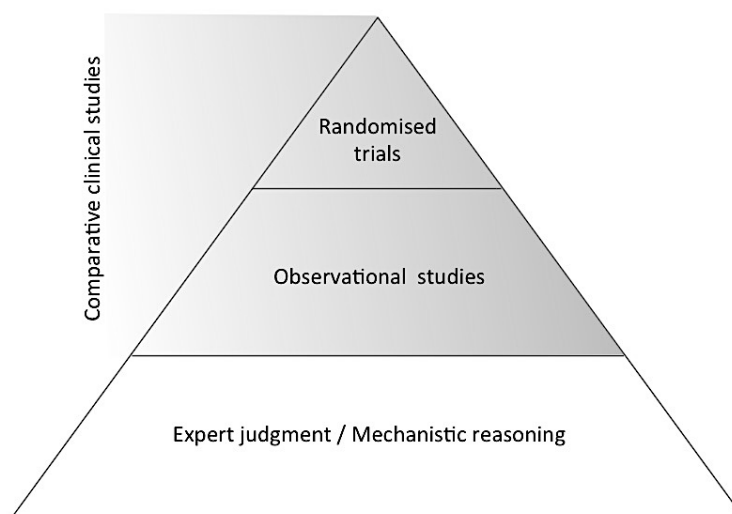
## 2. Evidence-Based Practice and Design

Many different fields have proponents of evidence-based practice, for example medicine (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996; Straus, Richardson, Glasziou, & Haynes, 2005), policy (Cartwright, 2009, 2012; Pawson, 2002), education (Pring & Thomas, 2004), and information management (Booth & Brice, 2004). And more and more articles are being published in the design domain that claim to follow or advocate for evidence-based practice approaches. The term evidence-based design has been coined; apparently to distinguish one type of design approach from another, and the term has been used in several different design fields, for example office architecture (Sailer, Budgen, Lonsdale, Turner, & Penn, 2008), urban design (Nisha & Nelson, 2012) healthcare environment design (Codinhoto, 2013; Lawson, 2010, 2013; Ulrich et al., 2008) and surgical information system design (Jalote-Parmar & Badke-Schaub, 2008). However, it seems that the term evidence-based design is not yet a mature concept since it has been used to refer to relatively dissimilar things. For example, Daly (2012) maintains evidence-based design is an existential category that describes how some designers experience their professional design practice. Howard and Somerville (2014) report that they used evidence-based design as a theoretical framework for a project for repurposing library facilities in an Australian university. Miller and Rudnick, (2012; 2014) use the term evidence-based design to describe a process model for working with evidence in the design of programmes for assisting ex-combatants to reintegrate into society. That evidence-based design is used to describe an existential category, a theoretical framework, and a method, indicates that better understanding of the concept is still needed.

Evidence-based practice approaches share the position that decisions should be based on the current best evidence (Straus et al., 2005, pp. 280-281). In principle it makes sense that when faced with having to make trade-offs between different options such as choosing between two heart disease drugs with different side effects, or choosing between two different grades of steel with different mechanical properties, then practitioners should use the most up to date evidence to support their decision making. However, what is most notable in the evidence-based practice approach is the specific model that justifies the kind of evidence that a practitioner is entitled to use to make a decision.

Various models of evidence hierarchy have been developed including Nesta's (Breckon & Nesta, 2016, p. 33) Standards of Evidence framework for evidence-based policy, and the work in healthcare decision making by the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Working Group. However, the theory

of evidence-based practice has also been subject to various criticisms (Cartwright, 2009; Clarke, Gillies, Illari, Russo, & Williamson, 2014; Tonelli, 2011). In general, evidence-based practice approaches draw on the hierarchical model of evidence (Figure 1) developed by the evidence-based medicine (EBM) movement (Howick, 2011; Straus et al., 2005). The simplified version of the hierarchical model of evidence starts at the lowest level, with (1) expertise and mechanistic reasoning, then rises through (2) observational studies, to reach the 'gold standard' of evidence in (3) randomized controlled trials (RCTs). Furthermore, systematic reviews of many RCTs or observational studies are considered stronger than single studies, and comparative studies being stronger than individual case studies. The categories of evidence are based on their freedom from confounding factors, and according to the EBM model, only evidence from RCTs can provide a practitioner with strong reasons for a decision, in contrast observational evidence and professional expertise can only ever provide weak reasons for a decision. The degree to which a clinician is justified in believing that a particular drug will treat their patient's illness depends on the kind of evidence they can access and understand. Accordingly, the EBM hierarchical model of evidence was developed primarily to guide clinicians to interpret and evaluate the validity, impact, and applicability of results of studies published in medical journals (Straus et al., 2005, pp. 3-4).



*Figure 1: Simplified EBM hierarchical model of evidence (Howick, 2011)*

However, while clinical and designerly practices share aspects that may warrant both professions being deemed 'sciences of the artificial', as Herbert Simon (1996) put it, there are important differences too. For example, designers are often engaged to invent things or to create new products and services, while clinicians do not often invent the drugs or treatments they prescribe. Of course the process of invention may also utilise evidence, since a designer does not create a new product from blank slate, and similarly a biomedical

scientist or chemical engineer does not invent a new drug without knowledge of prior art. But the kinds of evidence that a designer is entitled to use in inventing something new, should not necessarily be governed to the model of evidence developed by the evidence-based medicine movement to guide clinicians to appraise results published in medical journals. While we agree that designing should be based on the current best evidence, we believe that further interrogation of the role that different evidence kinds play in design practice is needed. In the next section we draw on Codinhoto's (2013) work to clarify the philosophical understanding of evidence and to examine the relationship between evidence and knowledge.

### 3. Evidence and Knowledge

In section two we introduced the idea that evidence affects the degree to which a practitioner is justified in believing that the conjectured success of a course of action may be true. This close connection between evidence and justification is central to the analysis of knowledge in epistemology, for as Kelly (2014) states "evidence is the kind of thing which can make a difference to what one is justified in believing" (, para. 6). The objective of the analysis of knowledge in epistemology is to state the conditions that are individually necessary and jointly sufficient for propositional knowledge. While the attempt to analyse knowledge has received a considerable amount of attention from epistemologists, no analysis has been widely accepted (Ichikawa & Steup, 2014). That being the case, according to the prevailing tripartite analysis, S knows that  $p$  iff

1.  $p$  is true;
2. S believes that  $p$ ;
3. S is justified in believing that  $p$ .

According to Steup (2014) knowledge requires these three conditions since,

"False propositions cannot be known. Therefore, knowledge requires truth. A proposition S doesn't even believe can't be a proposition that S knows. Therefore, knowledge requires belief. Finally, S's being correct in believing that  $p$  might merely be a matter of luck. Therefore, knowledge requires... justification. Thus... S knows that  $p$  if and only if  $p$  is true and S is justified in believing that  $p$ ." (para. 3)

The analysis of knowledge as having the conditions of justified true belief (JTB) is the subject of significant debate in epistemology, and has been critiqued by Gettier to be insufficient, however, JTB does represent the current state-of-the-art, and so for the purposes of this article we will take JTB to be acceptable.

Of the three conditions of knowledge, the truth condition is largely uncontroversial. For example, it is false that Donald Schön is the author of *The Sciences of the Artificial*, and since it is false it is not something that anybody knows. Similarly, the belief condition, while slightly more controversial than the truth condition, is certainly accepted by orthodox epistemologists (Ichikawa & Steup, 2014). However there is considerable disagreement concerning the justification condition, since justification concerns the proper sources of

knowledge or the appropriate way that knowledge is formed. For example, since empiricists, rationalists, and phenomenologists all maintain differing ontological positions, then they all adopt differing views concerning the proper process to acquire knowledge, for example, whether through observation, intuition/deduction, or interpretation.

Following Codinhoto (2013, p. 82), we can say that there are three ways that evidence can make a difference to knowledge as justified true belief. First evidence makes a difference to knowledge when it is relevant to the formation or context in which justification is required. Second, evidence can influence the strength of the explanatory relationship between evidence and the truth of a hypothesis. Third, evidence can affect our confidence in our beliefs according to the reliability and rigour of the research process through which the evidence is gathered. So we can say that evidence makes a difference to justification in terms of relevance, truth in terms of strength, and belief in terms of confidence.

In our discussion of evidence-based medicine in section two we introduced the idea that evidence comes in different kinds. And from the preceding epistemological analysis we can now see that evidence is the sort of thing which can make a difference to knowledge, and so we must now broaden our understanding of evidence to include not only empirical evidence of the kind suggested by medical science, but other kinds of evidence such as proofs that support argumentation. This broadening of the understanding of evidence is important since current design research claims that, for example, designers commonly use argumentative proofs such as reasoning from analogy (Ball & Christensen, 2009) or synecdoche (Sevaldson, 2011) in their design work. Consequently, we need a new model of evidence in design that can cover both empirical evidence and argumentative evidence, and their interaction with knowledge.

The first category of evidence to include in the new model is empirical evidence. Following Achinstein (2001), we can discern three types of empirical evidence: potential, veridical, and epistemic situational. Potential evidence gives direction to truth but on its own is not conclusive. For example, high blood pressure is a common symptom to many illnesses but on its own it is not conclusive in defining whether the person is ill or not or what illness they have. Veridical evidence is evidence that is certainly true since it gives objectively good reasons for believing what it is evidence for and that bears an explanatory connection to what it justifies with high probability. Veridical evidence is the sort of evidence that is the goal of scientific investigation. The epistemic-situational kind of evidence is evidence that provides someone with good reason to believe something, relative to what anyone could be expected to know given a particular context. Epistemic-situational evidence is “fallibilist” since it justifies one in believing a hypothesis, given everything one knows, even if the hypothesis is false (Achinstein, 2001, p. 21).

The second category of evidence to include in the new model is the kind of evidence that supports reasoned argumentation. Codinhoto (2013, pp. 68-69), following Rieke and Sillars (1984, pp. 91-96), proposes that examples, illustrations, and expert testimony are instances of *anecdotal empiricist evidence* that are used within reasoned argumentation. We agree

with the kinds of evidence that Codinhoto's (2013) includes here, however, we believe that this category of *anecdotal empiricist evidence* needs to be further expanded to include argumentative evidence that concerns the dialectical and rhetorical proofs characteristic of contemporary design practice as found for example within the research programmes of the argumentative model of design (Buchanan, 2001, 2015; Feast, 2012, 2015) or frame innovation and reflective practice (Dorst, 2015; Schön, 1983). Codinhoto (2013, pp. 80-82) combines the different kinds of evidence with the different conditions of knowledge, to construct a model for assessing evidence in a knowledge system. We present an adapted version of Codinhoto's model in Figure 2.

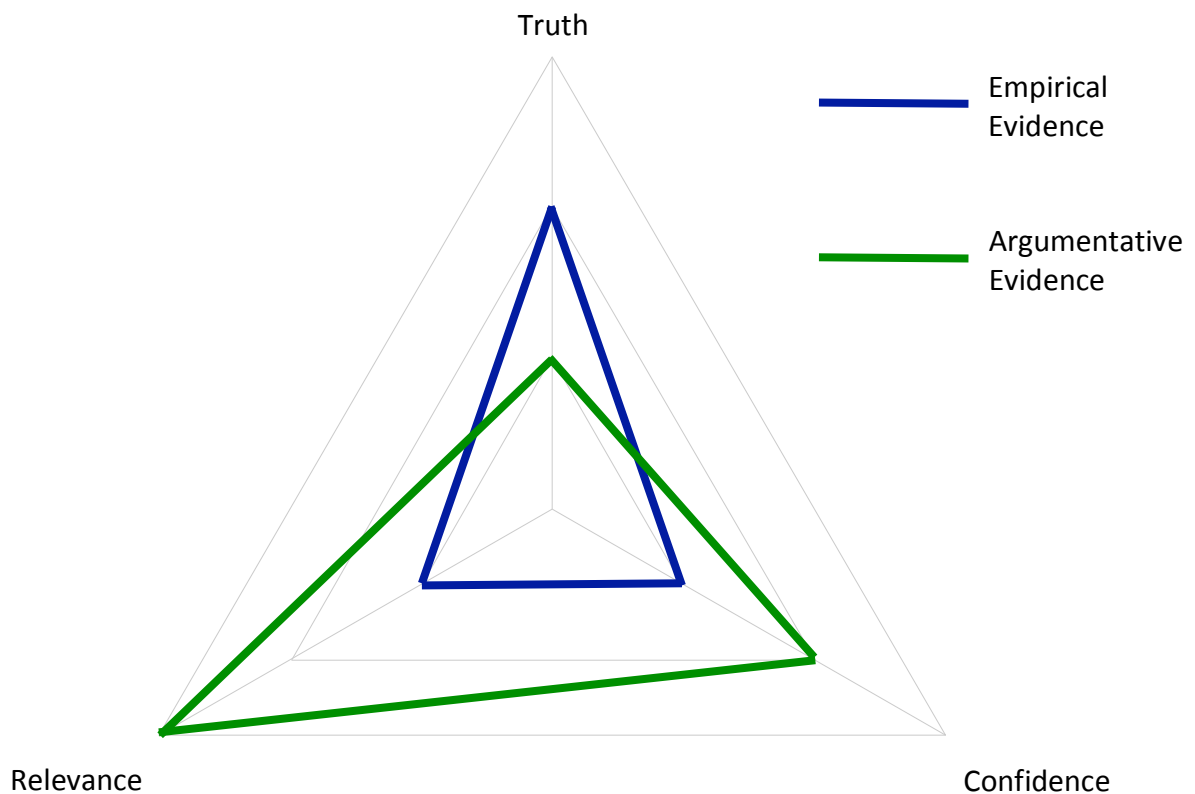


Figure 2: Model of an evidence-knowledge system, adapted from Codinhoto (2013), values are indicative only.

As we noted in the introduction, evidence-based design is not yet a fully mature concept and what evidence is and what role it plays is not yet clear. The model of evidence-knowledge system presented in figure 2 aims to address the relationship between evidence and knowledge in a more sophisticated way than is currently presented in the design literature. To illustrate the how the model can be applied to appraise the role of evidence in design, we apply this model to a case study of service design in the public sector. The case study concerns the development of a web based tool to visualise immigrant customer service

journeys in Finland. As will be explained in greater detail later in the discussion section of this paper we found that:

- The focus of evidence used in the early stage of this development primarily concerns justifying the relevance of the design concept to the context. Furthermore, we found that the kind of evidence used was the argumentative kind rather than empirical.
- Argumentative evidence was used to support confidence in the belief that the co-design process was reliable.
- Empirical evidence that validates the truth of the tool was not yet used to a significant degree at this stage of the design process.

In the next section we clarify the background to the case, explain the conceptual framework that informs the design process, identify the methods used to collect data, and describe the tools used to generate the drivers of the design solution. This particular case was selected because experienced designers working within the field of their expertise facilitated the work and since the project represents the current state of the art of service design approaches. After describing the case we discuss the role of evidence in the design process, we present conclusions and indicate the possible avenues for further research.

#### **4. Case Study: Service Design in the Finnish Public Sector**

Collaboration between designers and public sector organisations is growing in Finland. In 2012 the Helsinki World Design Capital, the City of Helsinki employed three designers as part of an initiative to improve the maintenance and management of various public services. Since this initiative, the number of projects that have utilised designers in public sector innovation has grown, however, the use of service design in Finnish public sector is still quite new. Furthermore, even though service design is quickly becoming a popular buzzword used by many companies and public organisations, there is still significant confusion of what service design means and what it actually entails. This case study reports on a project aiming to bring service design into collaboration with government that grew out of these early initiatives. The project started from a series of small-scale interviews and workshops investigating customer service journeys of immigrants coming to Finland. However, with the recent European Migrant Crisis of 2015, the sudden increase of refugees coming to Finland has highlighted the need to redesign the current immigration system. Consequently, the initial project was quickly scaled up to cope with the new pressure on the system. This pressure led to the initiation of the larger TEM Customer Web Visualisation Tool (TEMWISIT) joint project between the newly created Centre of Expertise on Immigrant Integration, Ministry of Employment and the Economy, and the Aalto University Department of Design. This project is characterised by significant uncertainty due to using the new approach of service design in government, the wickedness of the problem due to the current controversy surrounding immigration, and the fragmentation of services across the various different immigration service providers.

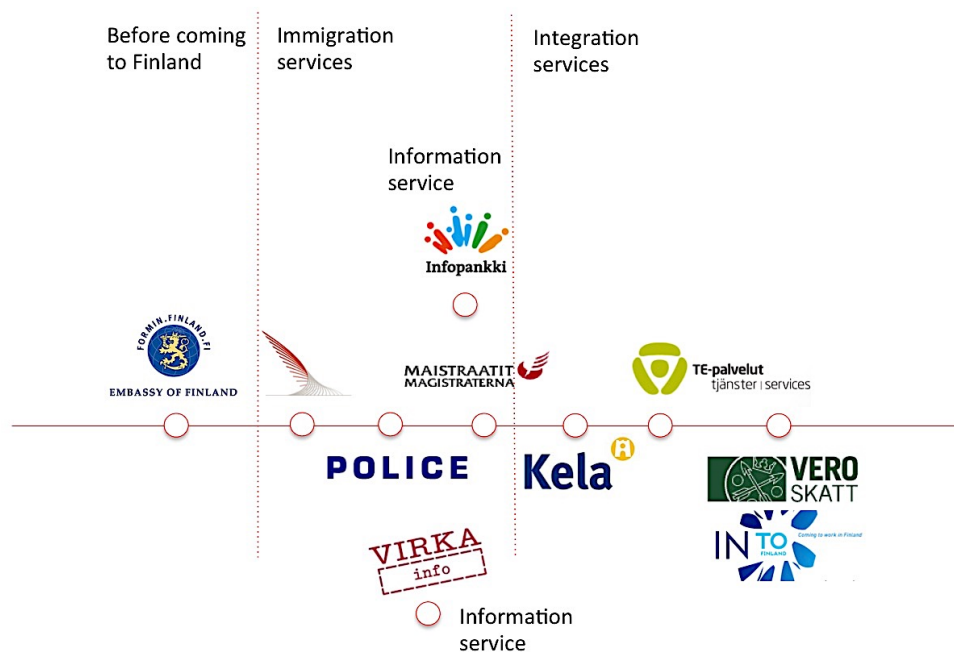


Figure 3: Finnish Immigration and Integration Service Providers

Historically, Nordic countries established their governmental immigrant systems according to immigration trends in the 1990s and in strong relation to welfare state system (Yousfi, Vilkkama, & Vaattovaara, 2010); however, due to the current situation these systems are incapable to respond to increasing immigrant crises that brought more people than expected in a short period of time. The Finnish immigrant system is organised in silos that lead the procedures and make the decisions. The current models of public services are characterised by asymmetrical power relationships between the customer and service provider who has knowledge and administrative resources and therefore control of services. This way the service provider remains in a superior position towards customer who acts as a receiver of service provider actions; in this arrangement service actions flow from the organisation towards the customer and not the other way (Deserti & Rizzo, 2014). Currently an immigrant who enters to Finland has to deal with the complex system of entry services delivered via five different ministries and its service bodies alongside the other independent institutions as illustrated in Figure 3.

Each institution operates with different legislations, policies, and actions. Individual immigrant journeys span across different ministerial responsibilities, organisational boundaries, and channels, which often cause inefficiencies and break downs in communication, coordination, and information sharing (Hyvärinen & Sustar, 2014). In this situation, people in vulnerable positions such as immigrants cannot choose between different services. The TEMWISIT project focuses on the design of a web based tool to be used by various public-sector immigration service providers to visualise the different service journeys that immigrants experience (1) before coming to Finland, (2) through the immigration stage, and (3) then through integration.



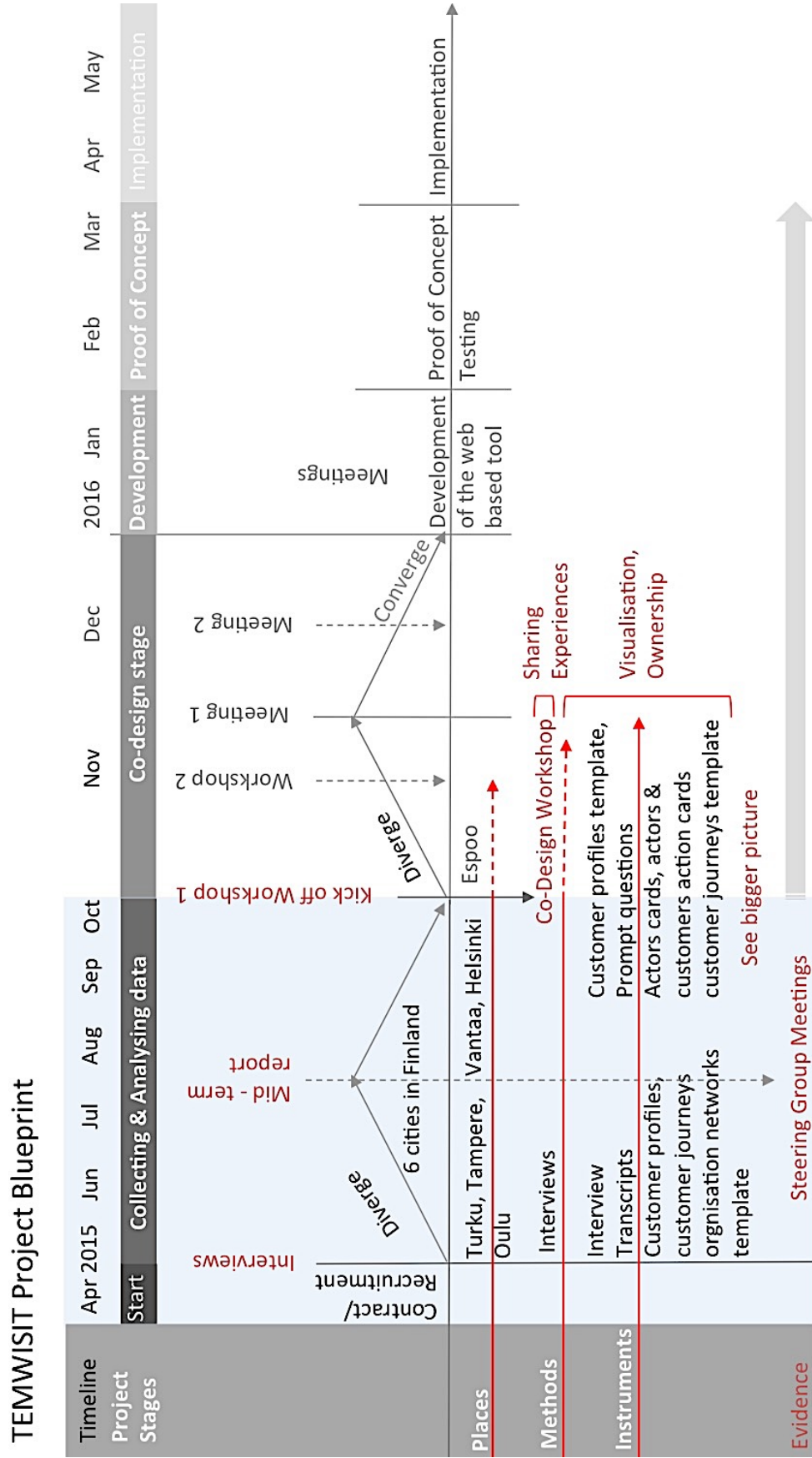


Figure 4: TEMWISIT Project Blueprint

#### *4.1 Conceptual Framework*

The TEMWISIT project is situated within the human centred design conceptual framework rather than drawing on existing evidence-based design models. The designers' approach draws on principles from participatory design (Simonsen & Robertson, 2012), empathic design (Koskinen, Battarbee, & Mattelmäki, 2003), and co-design (Sanders & Stappers, 2008), to support policymakers to develop shared understanding, integrate users' real-life experiences, trigger new ideas, and visualise future design solutions (Salgado, et al. 2016). The key principles that drive this approach are the political belief that the people affected by design must be able to influence the design process, and the pragmatic belief that involving users in the design process will decrease the chance that something important will be overlooked (Rittel, 1984). By using techniques such as co-design workshops, mock-ups, prototypes, scenarios, and design games, the designers can develop solutions that are grounded in a specific context by supporting the stakeholders to cross institutional and disciplinary boundaries and learn from each other (Manzini & Rizzo, 2011).

Work on the project commenced in April 2015 and it will be completed in March 2016. The project has the following five stages (Figure 4):

1. Interviews with key stakeholders in the six biggest cities in Finland: Helsinki, Tampere, Vantaa, Espoo, Oulu and Turku
2. Co-design workshops, first to develop customer profiles, customer journeys, and identify the broad values and features of the tool; then second, to identify use contexts and user needs to refine specific web based tool features, functions, and characteristics. In addition, this stage incorporates several meetings with the stakeholders to identify the most valuable design opportunities.
3. An iterative development stage to develop the minimum viable web based tool solution.
4. Proof of concept stage that will test the web based tool interactive prototype in real life situations with immigrant services providers' organisations, end-users and domain experts.
5. Implementation of the final product by an outside IT Company.

Since the project is currently on going, this paper focuses on the methods and tools used in stage 1 and 2 (Figure 4).

#### *4.2 Methods and Tools*

By the end of October 2015 the researcher had completed 39 semi-structured interviews with respondents from the various immigration service providers, including those who provide information to the immigrant customer, the front-end employees who serve immigrant customer at the encounter, the back-end employees who are making decisions, and managerial level employees.

The interviews lasted between one hour and one and half hours and were conducted at the participants' offices. The participants were sent an information sheet, consent form, and interview schedule in advance. Before the interview the researcher explained project's aim, the interview procedure, use of recorded data, so each participant could give informed consent to participate. To date, interviews have been conducted with service providers including the registration office, regional development office responsible for immigrant language courses among others, employees working at the citizens information points, police, employment office, city central administration, social services, taxation office, Finnish national healthcare service, and the Finnish consulates abroad. The interviews questions were structured concerning five themes: (1) General information concerning the respondent's occupation, job description and their relation to immigrants; (2) Immigrant Customers; (3) The respondent's understanding of their customers' service journey and touch points; (4) the nature of the inter-organisational collaboration between different immigrant service providers; and (5) other issues concerning the respondent's wishes, aspirations for the future immigrant services, and so on.

A purposive sample of 20 participants was recruited for the first co-design workshop, including end users as well as various immigration service providers. The workshop participants included a managerial advocate (n=1), immigration project coordinators (n=8), service information providers (n=2), decision makers (n=4), and end-user immigrants (n=5) who are or were using immigration and integration services. The workshop took 3 hours and the participants were divided into 5 groups, with a facilitator supporting each group. In addition, one person documented the workshop process and artefacts that the participants created. The purpose of the first workshop was to spread the word about the project and build project ownership at the different participating organisations. The workshop tasks and tools were built on insights gathered from the interview stage. The first co-design workshop generated insights about the range of customer profiles, their actions in the complex customer service journey, and potential values and features of the web based tool. The second workshop will concentrate more directly on identifying the context of the web based tool use, values of the context and solutions, and concretising the web based tool's features, functions, and characteristics.

During the interviews and workshops various tools were used to support the co-design process. In addition to the interview questions, participants completed three tasks. The first task was to select the most common immigrant customer profile using coloured circles presenting identified different customer profiles. Participants had a possibility to group them based on the number of the certain types of cases that they have to deal with or any other way. The selected profile by the interviewee was then used in the second task to visualise the customer service journey of this customer profile. The aim of this task was to investigate the participant's knowledge of the scope of the customer service journey (Figure 5). The third task was for the participants to visualise the connections that their organisation had with the policymakers, service providers, and immigrant associations. This visualisation was used to discuss future improvements of the immigrant service system in Finland.

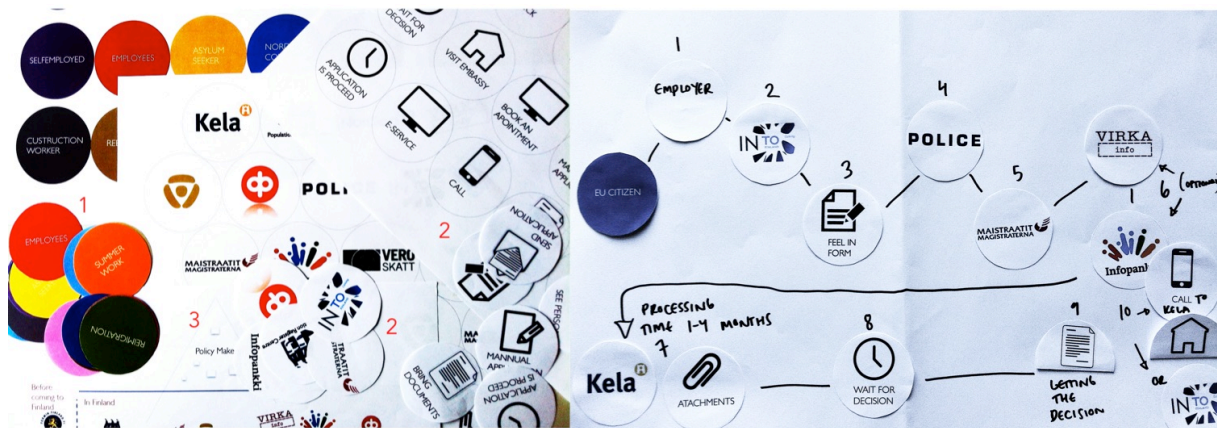


Figure 5: Different visual material that participants used to work on their tasks (left) and one completed customer service journey (right).

Similar methods and tasks were used during the co-design workshop as at the interview. Like the interview respondents, the workshop participants completed the three tasks concerning customer profiles, customer journeys, and tool values and features, however these tasks were conducted in a group format to stimulate discussion and surface assumptions. During the first task, customer profiles cards were used to identify different types of immigrants coming to Finland, the participants were then asked to answer the prompt “What would those customer profiles appreciate in the service delivery?” and “What kind of worries and dreams those customer profiles have?”. These prompts were intended to bring out a more human side of the end users for the participants. At the end of this task participants were asked to select the most complex case, which was then used in the second task (Figure 6).



Figure 6: Participants selecting different customer profiles cards (left); creation of customer profile (right).

In the second task, the participants were given a customer service journey template, actor cards, actors and end users actions cards, and were asked to identify and discuss the challenging points on the customer journey (Figure 7). The participants were prompted to

answer “What happens at the specific action?” and “What is wrong at this specific action?”. Then the participants were asked to mark in action cards where the help provided by the web based tool would be needed the most. The third task involved facilitated discussion concerning specific aspects such as “What benefit/value the solution could give?” and “What kind of solution/features/functions could make this happen?”. Finally, the participants marked the tool’s most important values and solutions. The workshop concluded with a discussion of the most important findings of the session.

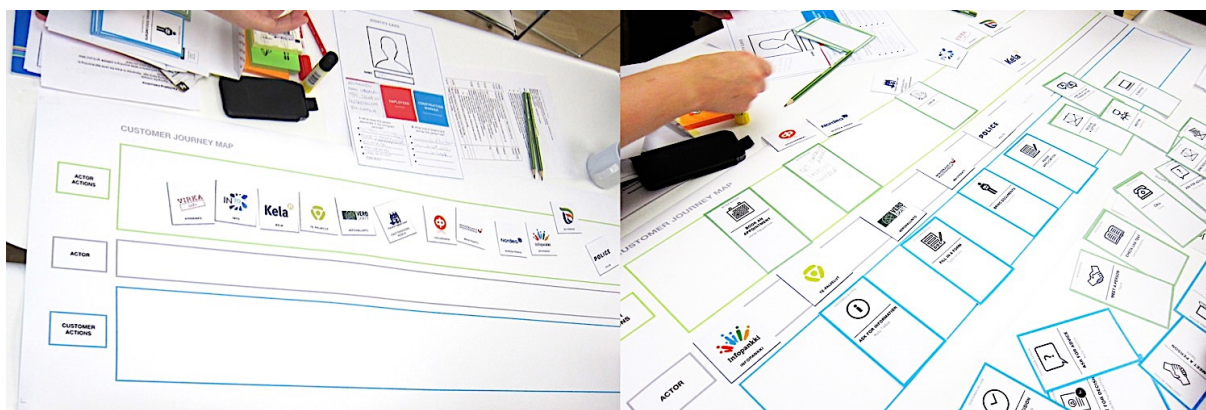


Figure 7: Customer service journey (left) and users actions cards (right) for mapping out end users and service providers' current actions.

The methods were used to make words and discussions more concrete, and to serve as a basis for conversation around certain problems or issues. The actor cards and the action cards were used to make the entire customer journey more systematic and provide an opportunity for everyone to identify and discuss problematic points on that journey (Figure 7 right). These methods also help to familiarise potential users with tool’s possible content and their interaction with it.

## 5. Discussion

In this section we describe the analysis of the case focussing on how evidence was used in the service design process to develop the web based tool. Our analysis identified four episodes through which evidence supported the design work: (1) bringing stakeholders together, (2) creating ownership, (3) supporting sharing experiences, and (4) understanding the current system.

With regard to the first episode, we disclosed that the co-design approach in public services has the power to bring people together through group meetings and workshops. From the beginning the group was established to bring together managing representatives of all immigrant service provider organisations. This group’s aim was to direct the project and to support all other project activities, such as recruiting stakeholders and front and back employees to attend the interviews, and employing appropriate representatives and



personnel for the co-design workshops and development meetings. Although all the participants were essential to the existing service, some of them only met each other face-to-face for the first time at these meetings and workshops. Moreover, the co-design workshops not only generated design concepts, but in addition the participants used this opportunity to network and discuss their work issues. One steering group member commented on this issue with the following words [...]“this project has added-value in bringing different stakeholders together.” Furthermore, the workshops were a pleasant opportunity for front workers to meet with immigrants. Bringing stakeholders together allowed them to share argumentative evidence about their particular contexts, which builds knowledge that supports the *relevance* of the tool to the users’ and stakeholders’ needs.

Second, the co-design approach builds ownership of the design concept within the stakeholder’s group, which is very important to sustain through the implementation stage since a separate vendor will deliver it. The co-design approach provides the opportunity for people to let out their frustrations and emotions related to the existing immigration service system without any judgment, identify people’s hindrances as an opportunity to create better solutions, and contribute ideas about what is valuable and important. By maintaining participation throughout the entire co-design process people feel deep connection with the project since they were engaged in it, a managerial advocate stated that they felt proud of what they achieved together with designers, and consequently they develop a sense of agency. Because the participants believe in the design process, they feel more ownership, which supports the group to feel design process is reliable. This exchange of *testimony* within the group indicates that this form of evidence use makes a difference to the group’s *confidence* in the design process.

Third, the co-design process supported participants to express and share their experiences through conversation with people with different backgrounds and roles, for example, civil servants and end users. Throughout the interviews civil servants has opportunity first, to reflect on their work history and share with researcher their positive and less positive experiences. Furthermore, the co-design approach is capable to establish a safe and comfortable environment that supports the participants to express and share their experiences. To support this comfortable environment, the interviews were done at the civil servants’ office and the workshops were held in an informal space with a lounge. In addition, visualizations, such as customer profiles and action cards, were used in the interviews and workshops to act as mediators to support participants to express and share their experiences. These visualisations were also used redirecting the focus of the conversation when potential for conflict arose, by stimulating participants to reflect and discuss a specific issue. Like the first episode, sharing experiences provides argumentative evidence that supports the *relevance* of the design to the needs of the users and their particular context.

The fourth mode of evidence and knowledge integration of the co-design approach is to make the system more concrete and tangible so the participants can grasp the bigger picture of the system more easily. This is important since the current immigration system spans

across several service providers. Visualising the service networks and customer service journeys and by including actor and end users actions allows participants to manipulate the separate parts in a simple and controllable way. Furthermore, by using customer profiles and actors' action cards, these people could tell their personal stories about how the system is used currently with more detail, and so more easily identify what obstacles need to be addressed to make improvements. In addition, understanding the bigger picture supports some of the participants to envision the future, since it enables the people to reflect on their current situation and to express what could be done differently by showing various relationships of parts to wholes, for example, proximity, hierarchy, complexity, quantity, missing parts, sequence of stages over time, and actions. This episode uses argumentative evidence in a synecdochical manner to support the *relevance* of the tool to the context.

To summarise, through our analysis of the case study using the modified version of the conceptual framework developed by Codinhoto (2013), we found, (1) with regard to the JTB criteria that relevance was most important, then confidence, and then strength, and (2) argumentative types evidence in the form of testimony, examples, and rhetorical proofs were utilised. Truth was not yet as important at this stage, however, it is anticipated that truth will be more critical during the future validation of concept stage of the project.

We maintain that the insights generated throughout the analysis of the case are plausible since the project is dealing with the early stages of the design process and so we should expect that the focus of the design work be on the justifying the problem definition rather than validating a particular solution. Furthermore, the insights generated by the using the conceptual framework in our analysis of a service design project are similar to those generated by Codinhoto (2013, p. 203) in the early stage of a healthcare design project. This form of data triangulation lends support to the reliability of conceptual framework.

## **6. Conclusion**

In this paper we have addressed the need for better understanding of the nature and use of evidence in design practice by analysing a service design project. If we were to analyse the case study using a hierarchical model of evidence strength, such as that promoted by the evidence-based medicine movement, then we must conclude that the work of the designers did not provide strong reasons for any of their design decisions, since the designers did not base their decisions on empirical evidence from comparative observational studies or RTCs. Instead, we found that at the early stage of this project, the designers used argumentative evidence that aimed to support the relevance of the design proposals to the issue context. This conclusion problematizes the concept of evidence-based design and questions its usefulness in professional design practice.

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