

BRIDGING THE GAP BETWEEN HUMAN AND TECHNOLOGY: USING EMPATHIC DESIGN STRATEGICALLY TO PROVIDE CITIZEN-FRIENDLY SERVICES

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Abstract: *Finnish cities are undergoing rapid transformations due to technological advancements and shifts in demographic structures. The increasing diversity necessitates a more inclusive approach to digital governance in response to widening societal disparities. This paper proposes a model for developing citizen-friendly services by integrating empathic design with design management, employing benchmarking and systematic literature review methods. Initially, a preliminary benchmarking of five major Finnish cities—Helsinki, Espoo, Turku, Tampere, and Oulu—was conducted to map the prevailing challenges in the strategic application of design principles. A systematic literature review then follows to identify specific challenges in city governance through the lens of design management. Consequently, this study proposes a model that elucidates the connections between the identified challenges and various levels of design management. The proposed model facilitates the strategic decision-making process by incorporating empathic considerations and ensuring the effective allocation of resources to address multiple levels of managerial challenges.*

Keywords: *empathic design, strategic service design, design management, four levels of design management, digital governance.*

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INTRODUCTION

The rapid digitisation, changes in demographic structures, and technological advancements necessitate the evolution of public services to cater to the diverse needs of city stakeholders (Anttiroiko et al., 2014; Madhala et al., 2023). Digitised solutions, being more accessible to a broad array of stakeholders, are increasingly favoured by city administrations as a means to address these challenges (Valkama & Oulasvirta, 2021). However, the relentless pace of technological development complicates the provision of social services (Broekel, 2019), and technology-driven social programmes often fall short of delivering suitable services (Greenhalgh et al., 2018). Moreover, factors such as digital literacy and the availability of compatible devices pose significant barriers to achieving equitable and efficient city governance (Hassankhani et al., 2021; Oliveira et al., 2020). The mere advancement of technology in social services does not ensure its relevance or utility to society (Emslie & Watts, 2017; Greenhalgh et al., 2018). In essence, there is a discernible deficiency in the strategic comprehension of the interplay between human factors and technology within the realm of city governance (Carvalho, 2015; Meijer & Bolívar, 2016; Yigitcanlar et al., 2018).

Service design practices and methods have significantly contributed to city governance over recent decades. For instance, service design has moulded urban spaces and services in the digital age (Loukaitou-Sideris, 2012), established cities' brand identities (Yang & Wang, 2018), seamlessly integrated complex systems (Visnjic et al., 2016), and improved the sustainability and inclusivity of service innovation (Ahern et al., 2014). Furthermore, service design methods play a pivotal role in facilitating strategic organisational transformation within municipalities (Kurtmollaiev et al., 2018) and in fostering user-centred innovation to tackle the multifaceted challenges of urban development (Yu & Sangiorgi, 2018). Since the late 1990s, design researchers have also started to investigate users' emotional responses and highlight the significance of Empathic Design (Mattelmäki et al., 2014). Empathic design not only ignites innovative product ideas (Leonard & Rayport, 1997; Postma et al., 2012) but also encourages engagement with various stakeholders for the development of public services (Lee et al., 2014). In this way, designers' empathy and empathic methodologies advocate for human-oriented service development (Kouprie & Visser, 2009).

However, the application of service design methods in public services, particularly with an empathic approach, is still evolving due to a paucity of practical investigation (Strokosch & Osborne, 2023) and the ever-increasing complexity of stakeholder structures (Wallin & Horelli, 2010). Furthermore, employing conventional empathic service design approaches to empathise with specific stakeholders exposes designers to the risk of neglecting diverse communities and over-empathising with certain groups (Vink & Oertzen, 2018). Therefore, it is imperative to understand the overarching strategies for public service challenges through the lens of design management and empathy. This endeavour is also in alignment with Sustainable Development Goal (SDG) 11 - Sustainable cities and communities - make cities and human settlements inclusive, safe, resilient and sustainable in the sense that design management philosophy and empathic design make cities more inclusive, safe, resilient and sustainable (Biloria, 2021; Mieg, 2012; Sandman et al., 2018; Vogt et al., 2020).

PURPOSE AND SCOPE OF RESEARCH

In addressing the complexities of digital governance, Finland stands as the pre-eminent nation within Europe in terms of the populace's digital proficiency (Thornton, 2022) and ranks eighth globally regarding the capability and preparedness for digital transformation among both private and public entities (Hämäläinen, 2020; IMD, 2023). The foundation of digital competency in Finland is laid by the data-gathering infrastructure established by leading cities, notably Helsinki and Espoo (Ylipulli & Luusua, 2020). Consequently, the robust digital infrastructure in Finland provides researchers with the means to explore current issues at the intersection of humanity and technology. Furthermore, Finnish municipalities are at the forefront of fostering democratic engagement with stakeholders (citizens) in the design of services (Mensonen & Hällström, 2020). Within the public service design framework, participatory platforms are employed to facilitate interaction with citizens (Anttiroiko, 2016), embodying inclusive governance for smart cities (Ylipulli & Luusua, 2020) and endorsing a collaborative approach throughout the service design journey (Jäppinen, 2015). In summary, the service design paradigm and its resultant effects in Finnish cities offer a profound understanding of the strategic application of design principles in engaging with citizens.

Even though the use of technological solutions and integration of design practices have increased nationwide, the share of resources varies widely depending on the city since, for instance, tax income for municipalities is generated per capita or industry. Practices developed to serve design professionals in bigger cities, such as Helsinki and Espoo, typically need to be adapted to work in the context of a smaller city. Quite often, designers working with service delivery and design in smaller municipalities are required to function multi-professionally and act in several roles simultaneously (Palumbo, 2016). In Finland, cities have established flexible design practices that can be scaled to suit city governance depending on its characteristics (Anttiroiko, 2016).

Flexible design implementation is crucial for delivering empathic services to citizens (Schliwa, 2019) and facilitates the identification of the gap between humans and technology in society (Oliveira & Campolargo, 2015; Oliveira et al., 2020). Philosophically, design management is also grounded in understanding emotions and providing user-centred value with empathic considerations (Andresa & Juanitab, 2019; Borja de Mozota, 2003). In this context, the present study investigates the diverse design practices in Finland to unearth human and technological challenges for contemporary city governance.

Defining the Focus

In addition to professional disparities, at least three tiers of management (operational, tactical, and strategic) influence service design processes and vary according to the size of the urban area (Best, 2006). This paper utilises the Four Levels of Design Management: Designence (4LDM), as delineated by de Mozota and Wolff (2019, p.16), to pinpoint the pivotal areas where designers can exert the most significant influence. Borja de Mozota (2006) posits that designers would profit from an understanding of management as a discipline to garner recognition and support from their superiors. The application of design management can transform an urban setting into a more citizen-centric organisation (Hyysalo et al., 2023), augment the city's competitiveness (Meijer & Bolívar, 2016), and thereby facilitate value

creation for organisations (Borja de Mozota, 2006). Design management is quintessential in executing contemporary urban governance to synchronise citizens and technologies (Barns, 2018; Bian & Su, 2022; Mueller et al., 2018). The concept of 4LDM (Mozota & Wolff, 2019, p.16) further echoes design maturity, denoting an organisation's capacity to harness design.

Design maturity pertains to the proficiency of individuals and organisations in employing design philosophy and methodologies (Hambeukers, 2019). Given that design maturity evolves through ladder stages (Dansk Design Center, 2015) akin to 4LDM, the elevated levels in 4LDM signify the sophisticated and matured tasks incumbent upon cities. Design maturity is paramount for empathic design as it facilitates the discernment of authentic needs for human-centred empathic governance (Biloria, 2020; Meijer & Bolívar, 2016; Tanaka et al., 2018). Consequently, this study amalgamates the concept of empathy with design maturity and the four levels of design management to create a systematic literature review.

Here, we investigate the design-related challenges that obstruct or interfere with people from interacting with technology-based services. We propose two main types of challenges that hinder designing novel technology-based services in Finland: 1) human-related challenges and 2) technology-related challenges. In this study, human challenges refer to attitudes, skills and abilities, resources (not enough people, time), and training in service development (Hecklau et al., 2017). Technological challenges address technological limitations, resources (i.e., outdated technology and economy), and data flows in delivering services (Kitchin, 2014).

We recognised these categories in our preliminary study, where we compared the city strategies of five Finnish cities from a design perspective (Hyökki et al., 2023). That study revealed a gap between technology and human users. Here, we state that the gap and the varying resources and sizes between Finnish cities create a need for inclusive and empathic (service) design platforms for public service developers and citizens.

We approach these questions by reflecting on them through two perspectives of design: empathic design and design management. The Empathic design allows practitioners to execute more inclusive and holistic service development by considering citizens' complex situations (Biloria, 2021; Sandman et al., 2018). Additionally, the present study identifies the challenges through the lens of Empathic design. In the Empathic design process, it is important to explore challenges with the question 'What could be?' which is a more open-ended and forward-looking perspective (Biloria, 2021; Sandman et al., 2018). Therefore, the analysis of the literature includes the Empathic design perspective on both the outcomes and processes involved in tackling design challenges. Similarly, design management practices contribute to urban governance by shaping outcomes in accordance with public interests (Carmona, 2016) and enhancing user-oriented technology development (Meijer & Bolívar, 2016). Categorising the hierarchy from a design management perspective can suggest how researchers construct various levels of empathic design activities, which is the main goal of the present research. Thus, the present study explores challenges in city governance with empathic design and design management perspectives.

RESEARCH METHOD

This study consists of two parts: a preliminary benchmarking and a systematic literature review. In order to support our hypothesis of technology-related and human-related challenges,

we conducted a preliminary investigation, or benchmark, of selected city strategies. The goal of this short investigation was to compare the service design practices of particular Finnish cities. This was conducted by analysing websites, blogs, and to understand further the design process, degrees of design contribution, common drivers, and problems, each city's strategy document was also examined.

The preliminary benchmark outcome (title: *Bridging The Gap Between Reality and Utopia: How to provide empathetic services to citizens*) was accepted at the C&T 2023 conference at Lahti, Finland, under the workshop theme, *Designing the City: Challenges and Opportunities in Digital Public Service Design*. It enlightened us with crucial information for our systematic literature review and confirmed that the suggested categories of challenges truly exist. Following the benchmark, researchers conducted the systematic literature review by collecting and screening articles with empathic city governance related keywords from three research databases: Web of Science, ProQuest, and SCOPUS. The process of analysing the data for the systematic literature review consists of three steps: 1) coding of the articles, 2) categorising and tagging the codes (quotes), and 3) recognising the relationships, which meant visual analysis in the Miro board.

Finnish cities are generally considered technologically competent (Ahvenniemi & Huovila, 2021). In this paper, five major cities in Finland were inspected and compared in terms of their service strategies. They varied in design maturity levels and in demographics (e.g. size of the city, population), which was an important selection criterion. These details concerning each city were also taken into account in the comparison process.

Preliminary Study (Benchmark)

Three researchers conducted the benchmark between April and May 2023 and submitted the findings to the C&T 2023 conference in Lahti, Finland. The benchmark results for service design practices and insights are summarised in Table 1.

The rapid comparison between the selected five cities highlights several complicated global problems, or wicked problems, such as climate/sustainability, rapid digitalisation, and equality. Almost every city also mentions Sustainable Development Goals (SDGs) in their strategies. Differences arise when inspecting how cities integrate service design on a strategic level. It seems that Turku, Tampere, and Oulu are recognising the importance of service design. Helsinki and Espoo are already ahead of the other three cities by having clearly integrated service design in the strategy. (City of Helsinki, 2021; City of Espoo, 2021; City of Tampere, 2021; City of Oulu, 2022; City of Turku, 2022).

The benchmarked cities' strategies prioritise the human perspective, seeking to offer easily accessible services and assistance to individuals across all life phases. In many cities, services are perceived mainly as personal experiences (e.g. Tampere and Turku). Every benchmarked city aspires for its services to be user-friendly, interactive and even proactive. Turku and Espoo also consistently use their service data to improve their services. However, the cities seem to function at many levels of management, including operational, tactical, and strategic, depending on their size and structure (Best, 2006; City of Helsinki, 2021; City of Espoo, 2021; City of Tampere, 2021; City of Oulu, 2022; City of Turku, 2022). Helsinki performs the most thorough examination of the influential factors. All cities share many similar drivers: the SDGs, internationality, sustainability, ageing populations, and equal life expectancy. However, the

scale and type of challenges differ. The ageing workforce, for example, has a greater impact on Helsinki than it seems to have in other smaller benchmarked cities. A city's size does matter. The tendency seems to be toward empathy and individual experience, and in practice, cooperation and co-creation seem to be well-accepted approaches to the development of services (Cities of Helsinki, 2021; Espoo, 2021; Tampere, 2021; Oulu, 2022; Turku, 2022).

Table 1. Benchmarking Results for Five Finnish Cities [Source: Bridging The Gap Between Reality and Utopia: How to provide empathetic services to citizens].

City	Service Design in the city strategy	Common Drivers	Human-related Challenges	Technology-related Challenges
Helsinki	yes	SDGs, sustainable urban development, functionality, internationality, equality	Ageing workforce, socioeconomic differences, pandemic recovery	
Espoo	yes	SDGs, digitalisation, internationality, sustainability, fairness	Ageing, population, pandemic recovery	Technological literacy
Turku	Not clear	SDGs, sustainability, internationality, meaningful life, Vision of Competence 2040		
Tampere	Not clear	SDGs, internationality, sustainability, equality		
Oulu	Not clear	Sustainability, internationality, safety, European Capital of Culture 2026		Technological literacy

The missing data in Table 1. suggests that certain challenges were difficult to interpret or not clearly addressed in the strategy materials. From a design perspective, a profound understanding of the issue and identifying the main obstacles is a critical first step, which we continue here in this study. In addition to recognising the gap between technology and its human users, two other findings from the preliminary study can be stated: 1) different Finnish cities have different levels of design maturity when it comes to executing empathic design, and 2) the primary goal of design activities is to provide answers for problems relating to both human and technological obstacles.

Systematic Literature Review

The search for articles analysed in this literature review started by identifying the keywords of a key paper read for our earlier article (Hyysalo et al., 2023). The article included the following keywords: city organisation, public sector, service design, and human-centred design. Based on these keywords, two different kinds of modified combinations of these keywords were tried in the same database. This led to Initial Search A and Initial Search B (see Table 2), from which

Initial Search A led to too few results, and Initial Search B included too many international cases. Based on Initial search B, Refined search B2 was performed. However, more databases were needed. Thus, the search (Refined search B3) was extended to ProQuest and SCOPUS. The results from the databases were combined, and duplicates were removed, resulting in 119 articles which were deemed satisfactory.

Table 2. The Overview of Database Searches for the Literature Review.

Stage	Database	Keywords	Result (articles)	Reason for refining the search
Initial search A	Web of Science	ALL=(Public service design, empathy, experience design, design challenges)	11	Too few results
Initial search B	Web of Science	ALL=(service design, city design, emotional design, design challenges)	94	Too many international cases
Refined search B2	Web of Science	ALL=(service design AND city design AND Finland AND challenges)	99	Another database needed
Refined search B3	Web of Science + ProQuest + SCOPUS	ALL=(service design AND city design AND Finland AND challenges)	119	Result satisfactory

After satisfactory search results, two filtering rounds were executed in order to find the most relevant articles for closer analysis and review. First, papers with criteria "not Finnish perspective" or "other field of study" were omitted, resulting in 75 articles. The second filtering round focused only on design perspective, the omitting criteria being "not design perspective", resulting in 24 highly relevant papers for this study (See Figure 1).



Figure 1. The article selection process.

The analysis of the remaining 24 papers was conducted by coding them thematically in NVivo initially to two main categories: "technological challenges" OR "human challenges" by three researchers. Researchers considered the process and outcome of each project by asking questions such as, 'What could be the future of the city with these research outcomes?' and 'What could be the impacts on citizens?' to validate the empathic design practices found in the literature. In addition, everyone was allowed to add new categories according to their consideration if needed. After two discussion sessions with all three researchers, these categories were organised with an affinity diagram in Miro.

Analysis of the Data

Affinity diagramming was utilised to analyse the data. As mentioned, the process of analysing the data progressed in three steps: 1) coding of the articles, 2) categorising and tagging the codes (quotes), and 3) recognising the relationships, which meant visual analysis in the Miro board. In addition to categorising the codes, The Four Levels of Design Management: Designence, defined by de Mozota and Wolff (2019), was applied to tagging individual codes to address the crucial places where designers can make the most significant impact. Tagging challenges with the Four Levels of Design Management also helped researchers recognise relationships between the categories.

As mentioned, after coding, seven themes or categories of challenges were recognised in addition to the main two (human and technology-related): environmental, geographic, sustainability, service-related, resource-related, systemic and management. In order to narrow the scope to fit our research questions better, some categories were combined, and subcategories were created based on careful consideration and discussion with all the researchers. Service and design-related categories were combined under the main category of service-related challenges. There was also a diligent discussion about environmental and sustainability challenges, after which it was decided to distribute clear environmental themes under environmental challenges. Since themes often overlapped with each other, creating artificial borders for categories was challenging, and eventually, some categories became part of multiple main categories. In addition, it was decided that sustainability-related challenges alone are too broad a theme for this study, so it was also distributed into relevant parts between other categories. Geographic challenges and systemic challenges were also challenging categories to integrate.

Table 3. The Analysed Categories.

Main categories	Subcategories
Human-related challenges	population, social structures, professional challenges, sustainability, geographic challenges
Technology-related challenges	data-related challenges, types of technologies, smart technology, a need for innovation
Environmental challenges	sustainability-related challenges
Management-related challenges	roles, resource-related challenges, geographic challenges
Service-related challenges	design-related challenges, service-quality challenges, solutions
Systemic challenges	sustainability-related challenges

Eventually, six main categories were inspected more carefully (see Table 3). Human-related challenges and technology-related challenges remained our main categories, and the focus was primarily on them. Human-related challenges addressed subcategories in themes such as population (mainly growth and structure), social structures (for instance, lifestyle, social inequity and communication), professional challenges, sustainability, and geographic challenges (for example, logistics, transportation in general, locations of facilities).

Technology-related challenges included subcategories of data-related challenges (for instance, disruptions in data flows, multiple incompatible data sources, overall view), types of technologies (multiple different, outdated or too novel) and a need for innovation (both too rapid and too slow). Human-related challenges and technology-related challenges seemed to intertwine with each other.

RESULTS

Researchers utilise main and subcategories to elicit the hierarchy of design management challenges for managing a city. A framework encompassing human, technology, management, service, system and environment challenges is structured by design management hierarchy, 4LDM. In addition, a model of city governance for design challenges is derived from the framework and the thorough review of the selected literature.

A Framework of Design Management Challenges for City Governance

As described in Figure 2, the human challenges at the strategic level are related to Inequality, Power structures, Social impact and a deeper understanding of natural systems. For example, the City of Turku in Hodson et al. (2023) tackles the balance of natural resource challenges from the strategic approach and envisions the future technology development plan by thoroughly comprehending the city's resources. Technological challenges on the same level are also about power structures but more about data and privacy on a larger scale. The cultural level of human challenges contains cultural differences, expectations, attitudes, beliefs, and, from a professional perspective, difficulties in interdisciplinary work. Technological challenges at this level include existential change (embodied vs. virtual) and socio-digital solutions. On a functional level, human challenges touch on difficulties in communication, a large number of stakeholders, and a need for a better understanding of social processes. On the other hand, technological challenges on this level point out user autonomy issues and the need for understanding technology. On an operational level, human challenges are related to logistics, population growth, power distribution and interdisciplinary cooperation. Technological challenges also include logistics, material management, and data.

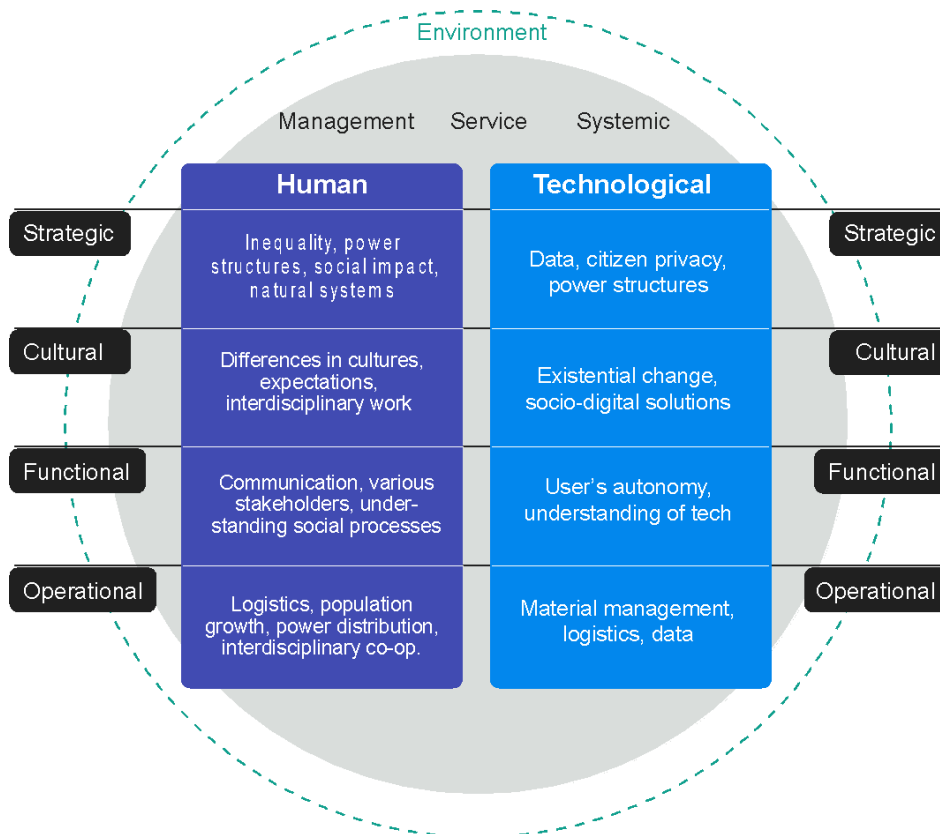


Figure 2. The framework of city governance challenges in 4LDM.

Other categories that have an impact on human and technology challenges were also recognised: management-, service-, and systemic-related challenges. In addition, environmental challenges, including sustainability, need to be taken into account in every step. The main themes of challenges in human and technology categories are arranged according to the four levels of design management. Other categories (management, service, systemic and environment) also have their impact placed on the outer rim.

The Categories of the City Governance Challenges

The results of the systematic literature review were not only categorised but also arranged according to the four levels of design management, as summarised in Table 4. It was possible to point out the design process's challenges directly.

Table 4. The Categorised Human and Technological Challenges by 4LDM.

4LDM	Human challenges	Technological challenges
Strategic	Inequality (Hodson et al., 2023), Power structure (Pirinen et al., 2022; Rönkkö & Herneoja, 2021; Suomalainen et al., 2022), Social Impact (Hodson et al., 2023), Natural systems (Alam & Porras, 2018; Chaowen & Fricker, 2021); Jakstis et al., 2023; Luusua et al., 2017; Mesimäki et al., 2019; Ojala et al., 2015)	Strategic data management (Laihonen & Mäntylä, 2018), Citizen privacy (Ehrenberg & Keinonen, 2021), Power structure (Pirinen et al., 2022; Rönkkö & Herneoja, 2021; Suomalainen et al., 2022)
Cultural	Cultural diversity (Di Marino & Lapintie, 2015; Di Marino & Lapintie, 2020; Hyysalo et al., 2023; Laihonen & Mäntylä, 2018), Cultural demands (Vladykina et al., 2019), Interdisciplinary work (Rönkkö & Herneoja, 2021)	Existential change (Vladykina et al., 2019), Socio-digital solutions (Di Marino & Lapintie, 2020; Pirinen & Tervo, 2020)
Functional	Communication (Di Marino & Lapintie, 2020; Hyysalo et al., 2023; Laihonen & Mäntylä, 2018), Diverse stakeholders (Pirinen et al., 2022; Suomalainen et al., 2022), Understanding social processes (Di Marino & Lapintie, 2020; Pirinen & Tervo, 2020)	User autonomy (Ehrenberg & Keinonen, 2021), Understanding of Technology (Hodson et al., 2023; Pirinen & Tervo, 2020)
Operational	Logistics (Ojala et al., 2015), Population growth (Ehrenberg & Keinonen, 2021; Parantainen & Meriläinen, 2003), Power distribution (Pirinen et al., 2022; Rönkkö & Herneoja, 2021; Suomalainen et al., 2022), Interdisciplinary cooperation (Hyysalo et al., 2023; Pirinen et al., 2022; Rönkkö et al., 2018)	Material management (Ehrenberg & Keinonen, 2021; Rönkkö & Herneoja, 2021), Logistics (Ojala et al., 2015; Parantainen & Meriläinen, 2003), Operational data management (Jääskeläinen & Lönnqvist, 2009; Laihonen & Mäntylä, 2018; Rönkkö et al., 2018)

Another result of this study was also the phenomenon of how the challenges of human and technology categories are distributed on four levels of design management. Challenges in the human category are focused on the strategic level, and challenges in the technology category can mostly be placed on the operational level (See Figure 2). The rigorous activities at the specific design management level imply the practitioners' focus on design management and empathic design. In contrast, the less rigorous levels can be interpreted as the finalising level. For example, management activities of societal value begin at the strategic level and are finalised when operational activities are determined (Steyn & Niemann, 2014). Although city governance is not linear, this observation indicates the crucial starting point for managing empathic design activities.

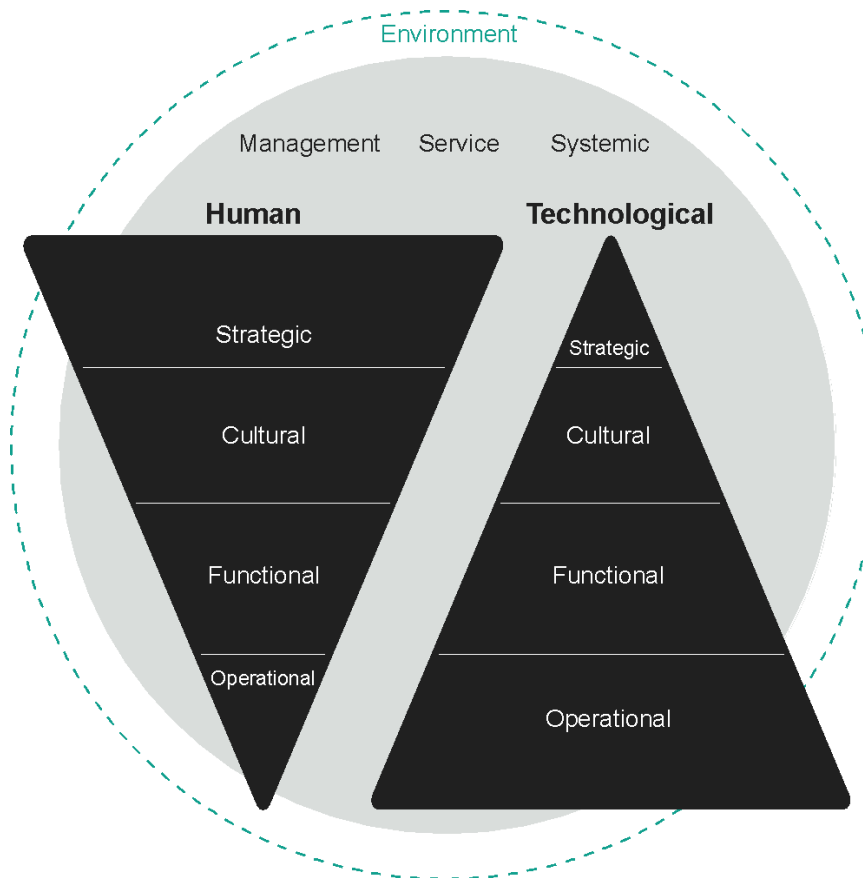


Figure 3. The model of city governance for design challenges.

The challenges of human and technology categories are emphasised differently on the four design management levels. The area of each level represents the relative focus on the challenges. For example, the human challenges in city management are mostly dealt with by strategic vision and planning, while operational activities are dominant for technological challenges. However, fewer activities at a level do not mean a less critical level. Ojala et al. (2015) describe logistics management as being executed in simple and limited activities. However, it needs to be planned with a comprehensive understanding of natural resources, social impact and equality among cities. Instead, Figure 3 can be interpreted as the general tendency of the current city governing process.

FINDINGS AND DISCUSSION

The analysis in our study only scratches the surface. There is a potential to gain a deeper understanding of design challenges on different design management levels if the categories suggested here are studied further. More profound and overall understanding is needed from various perspectives, and interdisciplinary cooperation needs to be valued. However, paying attention to the levels of design management from an empathy perspective provides a valuable tool for designers to approach challenges in modern society. As we live in times when it is

crucial to think in a systemic way when facing a myriad of complex challenges, empathetic design applied consciously to specific design levels may help bridge the gap between different groups of people. Tuomala and Baxter (2019) studied how an empathetic approach throughout the design process assists in the context of politics to unite people for decision-making. The empathetic decisions made on a political level related to technologies we use in everyday life have the possibility of supporting people by using services offered via various technologies, such as digital health services or online immigration services (Sustar & Mattelmäki, 2017).

In addition, Tracy and Hutchinson (2019) argue that the empathic understanding of users at the operational level facilitates the relevant design application in service. The designer's empathy also promotes the strategic design of autonomous cars (Pettersson, 2017). Hence, empathy enables designers to tackle complex societal issues and orchestrates the available resources to strengthen the city's ecosystem (Visnjic et al., 2016). In this context, this study's proposed model and categorisation allow practitioners to recognise the current position and prepare related activities.

As researchers consider empathic design practices in city governance, human challenges may appear dominant in the categories outlined in Table 4. However, technological challenges are equally significant for delivering empathic services to citizens by empowering them through personalised solutions (El-Haddadeh et al., 2019; Sepasgozar et al., 2019) and increasing the transparency of the decision-making process (Webster & Leleux, 2018). Furthermore, as shown in Table 4 and Figure 3, contemporary human and technological challenges in city governance are intertwined and have cross-domain impacts (Barns et al., 2017; Jiang, 2021; Mondschein et al., 2021). For example, the power structure of an organisation represents both human and technological challenges (Pirinen et al., 2022; Rönkkö & Herneoja, 2021; Suomalainen et al., 2022), yet it empowers subsidiaries at the operational level (Pirinen et al., 2022) and facilitates smooth communication at the functional level (Di Marino & Lapintie, 2020). Therefore, the findings underscore the need for a balanced investigation of human and technological challenges in city governance.

Additionally, empathic design has been embedded in managerial activities such as Human-centred design (Hess & Fila, 2016; Lee, 2014; Thomas & McDonagh, 2013) and Experience design (Andresa & Juanitab, 2019). However, emotions and empathy in design practices still need rigorous investigation in complex managerial circumstances (Balaam et al., 2019; Guo et al., 2021). Since a city is a socioeconomic network of people (Alexander, 2019), we need more systemic information on resources, differences, challenges and possibilities related to service design in the public sector. Furthermore, service design methods provide inexpensive ways to develop services with various stakeholders (Stickdorn et al., 2018). As we identified in Table 1, all benchmarked cities implement co-design or participatory design methods for creating services. In this context, the other key contribution of this study is to ascertain the empathic design activities throughout the city's governance in four discrete management levels.

CONCLUSIONS AND FUTURE STUDIES

The empathic design of a city enriches citizens' everyday experiences (McDonagh et al., 2003). Developing a service culture and preparing for the future requires customer understanding and empathy from municipal organisations. Korpikoski describes how organisations can develop

empathy and the importance of empathy in organisations or communities (Korpikoski, 2022). For example, the technological literacy challenge in Table 1 alerts us not to assume citizens' technological literacy. There might be more co-design participants who need technical support. For these changes to occur, a more comprehensive understanding of design management and learning a new way to co-develop with customers/citizens are required. We should create a vision of utilising these resources further in terms of service design management and empathy.

Firstly, continuous efforts to investigate sub-category items at each 4LDM level are necessary. As described in Table 4, some challenges, such as the Understanding of Technology (digital literacy), only existed in the fourth Industrial Revolution. As society becomes dynamic and changes, there will be more complex and new managerial challenges for city governance (McPhearson et al., 2016; Visnjic et al., 2016). The framework (Figure 2) and model (Figure 3) aim to propose a platform that facilitates the categorisation of challenges for determining macro-level activities but not the definite items for each management level. It is also essential to clarify whether service design tools and methods are executed to reflect the practical needs of citizens. For example, Jyrämä and Mattelmäki (2015) argue that the possibility of individual designers influencing public sector operations is still limited.

Even though an understanding of design management combined with an empathic design approach seems to aid in bridging the gap between human and technological challenges, some crucial aspects still need to be considered. In other words, design tools and methods must be more inclusive and relevant to the city's strategic focus (Bianchini & Parkinson, 1993; Stevens & Franck, 2015). To get to the strategic level with design tools, researchers should strengthen their understanding of (service) design management and the importance of empathy. Lastly, but most importantly, it is necessary to develop an instrument which prevents over-empathising a particular group. Balanced empathy among communities and organisations reduces biased views within society (Stephan & Finlay, 1999). From the designer's perspective, too much empathy for a single audience diminishes the service quality (Bove, 2019). Therefore, the systemic instrument must be placed to manage the empathic design activities.

IMPLICATIONS FOR RESEARCH, APPLICATION, OR POLICY

The proposed model in Figure 2 demonstrates the sub-themes of governing challenges. The illustration in Figure 3 summarises the strategic focus on each design management level. Practitioners can determine the strategic focus of tackling social issues by cross-referencing these diagrams. For example, suppose a city wants to solve issues related to Inequality. In that case, the city officers should start questioning related to the Strategic level of design management, such as, "Why is there inequality in our city?" and "Why does it matter to all citizens?". Then, the officers must narrow the scope to the Operational level. On the other hand, if citizens' understanding of technology (technical literacy) matters to a newly developed digital solution, officers need to ask Functional level questions, such as "How does the solution approach citizens?" and "How can it be simpler and easier?". These self-questions can be further developed into strategic-level decisions, such as aligning the vision of new technology development with the city's brand identity. In short, researchers and practitioners can easily determine the key activities by continuously investigating the challenges shown in Table 4.

ENDNOTES

1. **4LDM:Designence.** 4LDM stands for the Four levels of Design Management proposed by Borja de Mozota (2006). The four levels of design management are proposed in Borja de Mozota's initial article (2006) and further developed in Borja de Mozota and Wolff (2019). Designence is the name of a company that develops the value-measuring model at four levels. 4LDM in this research represents the Four levels of Design management proposed by Borja de Mozota (2006) and Borja de Mozota and Wolff (2019).

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