Integrating Speculative and Systemic Approaches into Service Design

To support service innovation that embeds future and systemic issues

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Humans live in multiple social service systems. These social service systems are composed of multiple levels of services and service systems. Influenced by various systemic factors and system interconnections, designers face more complex systemic challenges and uncertain future challenges when dealing with these service issues. Therefore, to better deal with the systemic and future issues embedded in services, this paper explores the relationships between systemic and speculative approaches and service design; and also discusses how designers need to evolve their design capabilities to better adapt to complex systemic challenges and uncertain future challenges.

This paper proposes the synthesis that systemic and speculative approaches, with their characteristics of systemic thinking, long-term perspective, and critical/reflective thinking, can cut into the service design process and help service designers to deal with more systemic and future-related problems through the application of relevant thinking and methods. Through literature review, the paper clarifies the relationships and possibilities between speculative and systemic approaches and service design, identifying shared concerns, complementary contributions, and gaps that need to be considered.

Then proposes an extension of systemic design and the speculative approach into the service design process. Besides, through interviews with five design school's service design program leaders and comparing the programs, the paper also proposes five design capabilities that service designers should better evolve further.

KEYWORDS: service design, systemic design, speculative Approach, Approach Integration

RSD TOPIC: Methods & Methodology

Introduction

Service design is increasingly playing a transformative role in promoting service system transformation (Kimbell, 2014; Patrício et al., 2018; Sangiorgi, 2011; Vink et al., 2021). Humans live within multiple social systems, which are all service systems (Fisk, 2009). A service system is defined as a dynamic value-cocreation configuration of resources, including people (as an atomic service system), communities, organisations, cities, nations, shared information (e.g., language and laws), and technology (Maglio et al., 2009). All these service systems are interconnected to other service systems by value propositions (Spohrer et al., 2007) and interact to co-create value (Maglio et al., 2009). This study is based on the logic that the social systems people live in are composed of multiple interconnected and interactive service systems that the wider network included (van der Bijl-Brouwer, 2022). In this scenario, service design is facing more and more complex and uncertain challenges when dealing with and designing services or service systems - because these challenges go beyond the design of a single product or service, toward the changing needs that people face in their daily lives (Mager et al., 2020), and the great degree of uncertainty brought by the unpredictable changes of the social systems (Locy, 2020).

In order to deal with the complexity at the systemic level and the uncertainty of the future brought by the emerging service challenge, this paper proposes a research hypothesis that systemic design and the speculative approach can be organically

integrated with the service design process to better cope with the systemic and future issues. Both systemic design and the speculative approach are considered capable of dealing with complex (social) problems (Auger, 2013; Jones, 2014; Mitrović, 2015). In addition, for the uncertainty of the future, the speculative approach can problematise and concretise uncertainty through envisioning the future and having the capability to construct alternative futures, thus bringing collective reflection (Dunne & Raby, 2013a; Kimbell & Vesnić-Alujević, 2020). The integration aims to extract perspectives, thinking, methods, and actions from systemic design and the speculative approach to better deal with complexity and uncertainty and explore their entry points and convergence into service design.

> In this paper, we address two main questions: How does service design embed systemic and speculative approaches? And, when facing complexity and future uncertainty, how do the service design capabilities evolve?

The purpose of this paper is to clarify the relationships, opportunities, and criticalities between systemic and speculative approaches and service design by literature review, identifying shared concerns, complementary contributions, and gaps that need to be considered. Based on the theoretical evidence, we then go on to summarise the current integration that engages systemic and speculative approaches or thinking in service design through design education and practice. Besides, we interviewed 10 design experts in the academia, who are both active in education and applied research, to understand how the current systemic and speculative approaches in service design is carried out in 1) the design practice, the design process, and methods used, the application field, and what kind of contextual factors will impact; and 2) in the design education, how systemic and speculative approaches are currently being applied in the teaching processes to explore the new capabilities that service designers need to evolve for addressing emerging future and systemic issues and learn how the capabilities can be enhanced. The results are twofold: from one side to better frame the theoretical frameworks that connect systemic and speculative approaches and service design and also explore what capabilities are brought (or needed) by these integrations and what should be noted in the discipline evolution.

Methodology

Literature review

From 2021 to March 2022, we conducted an electronic database search using various Internet search engines: Google Scholar, SCOPUS, and Web of Science. We also conducted a complement search on the cross-referenced articles found in the search. Many search keywords were used to find studies included in the review, and the scope of search keywords cut across three perspectives: service design, systemic design, and speculative approach. In the service design literature, the key literature focuses on the years 2016 to 2021, a period when service design research is shifting toward the S-D logic, and therefore the literature refers to many concepts concerning the service ecosystem perspective. Besides, as an emerging design approach, the literature related to the speculative approach is also mainly focused on 2016 to 2021. Different from the other two design approaches that have shifted and emerged in the past few years, the literature on systemic design reviewed in this article is more evenly distributed in terms of years, from 2009 to 2022.

Figure 1 illustrates the search keywords used in the literature review process and the stepwise screening stages. According to the criteria, by screening the literature about the three approaches separately and the literature that mentioned two or all three approaches simultaneously, we ultimately identified the most relevant 23 (service design), 22 (systemic design), 25 (speculative approach), and 12 (integration) articles as the primary content of the literature review.

Through the literature review, this paper aims to explain:

1. How service design has evolved and the rising challenges that service designers are facing related to systemic and future issues;
2. The range and relationships between the three design approaches, the current theoretical and practical status of the speculative approach or systemic design in the service design process (common points and conflict points), as well as the mutual influence between them.

Based on the literature review, a current picture of the design processes of service design, systemic design, and speculative approach is illustrated.
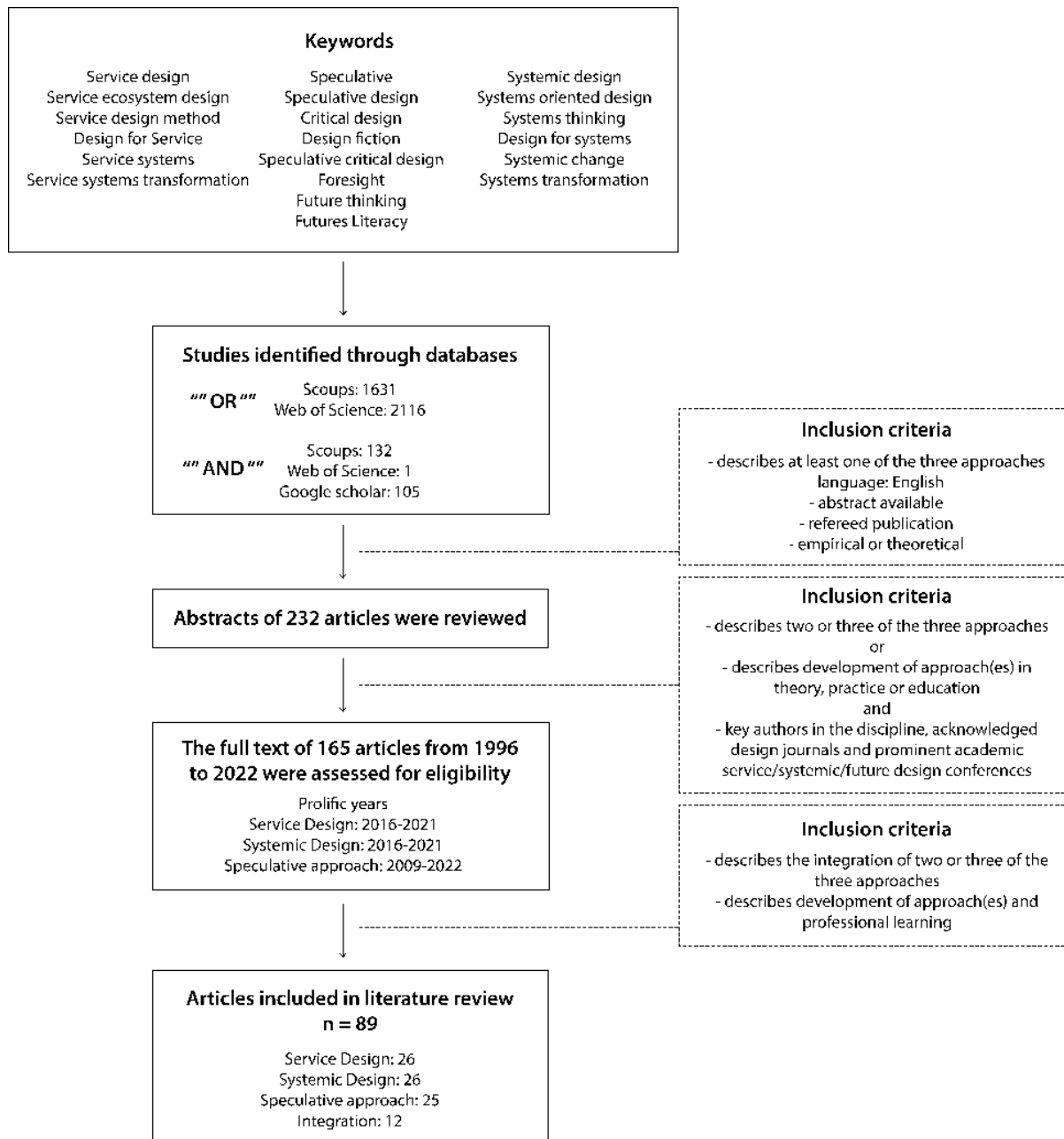

Keywords

Service design	Speculative	Systemic design
Service ecosystem design	Speculative design	Systems oriented design
Service design method	Critical design	Systems thinking
Design for Service	Design fiction	Design for systems
Service systems	Speculative critical design	Systemic change
Service systems transformation	Foresight	Systems transformation
	Future thinking	
	Futures Literacy	

Studies identified through databases

"" OR ""
Scoups: 1631
Web of Science: 2116

"" AND ""
Scoups: 132
Web of Science: 1
Google scholar: 105

Inclusion criteria
- describes at least one of the three approaches
language: English
- abstract available
- refereed publication
- empirical or theoretical

Abstracts of 232 articles were reviewed

Inclusion criteria
- describes two or three of the three approaches
or
- describes development of approach(es) in theory, practice or education
and
- key authors in the discipline, acknowledged design journals and prominent academic service/systemic/future design conferences

The full text of 165 articles from 1996 to 2022 were assessed for eligibility
Prolific years
Service Design: 2016-2021
Systemic Design: 2016-2021
Speculative approach: 2009-2022

Inclusion criteria
- describes the integration of two or three of the three approaches
- describes development of approach(es) and professional learning

Articles included in literature review
n = 89

Service Design: 26
Systemic Design: 26
Speculative approach: 25
Integration: 12

Figure 1. Literature review process in this study.

Expert interviews

Based on the insights gathered from the literature review, we structured ten interviews with ten academic experts dealing with service design, systemic design, and speculative approach. All ten experts have experience in both teaching and applied research. Among them, at least one well-known expert majoring in one of the three approaches and several experts working across fields.

The interviews with the experts aimed to understand:

1. Whether and how systemic and speculative approaches are currently being applied to the service design process in the research/practical projects. Understand what opportunities such convergent applications present and what criticalities need attention.
2. How systemic and speculative approaches are currently being applied to the service design education process in their schools' service design programs, what design processes and tools are being applied, what capabilities students need to build and evolve, and what to look at for in the future.

Through expert interviews, the opportunities and criticalities that can be brought by convergent applications will be summarized; in addition, the program structure, teaching and learning processes, methods, and development of capabilities of service design programs in the five design schools will be summarized.

According to the literature review and the expert interviews, we propose a synthesis of how systemic and speculative approaches can be extended into the SD process, the design methods that can be used in the different stages, and the capabilities that need to evolve.

Towards integration of systemic and speculative approaches into service design

As mentioned, when facing increasingly complex, systemic, and uncertain service challenges, we argue that systemic and speculative approaches can help expand the service design process to become more holistic, long-term, and co-creative. In this

section, we reviewed the literature to describe the challenges faced in the evolution of service design and the relationships between the approaches that are both interconnected, complementary, and conflict in the process and purpose. Also, a design process map based on the past, present, and future is built in order to elaborate in more detail on the comparison (Sangiorgi, 2009) of the three approaches in terms of process.

Service design, systemic design, and speculative approach

The transformative, large-scale, and futures-oriented issues emerging in the theoretical/practical evolution of service design

Service design, a human-centered approach, originally focused on designing human experiences for dyadic relationships and interactions of customers and service providers (Sangiorgi, 2009), is now go beyond enhancing service experiences to a service system level of transformation (Patrício et al., 2020). Service design is increasingly considered as an engine for wider societal transformations and a catalyst for change, and design is increasingly focusing on the transformative role of services (Kimbell, 2014; Sangiorgi, 2011). Service design is considered as a transformative practice and an intentional pathway to promote the service system transformation (Patrício et al., 2018; Sangiorgi, 2011; Vink et al., 2021). In the service systems, the reform of service and service systems through service design can promote higher-level service system transformation (Koskela-Huotari et al., 2021).

Service design scholars are increasingly recognizing that as service design (and design) evolves, it is confronting the complexity and large-scale problems posed by the contexts in which service design operates (Manzini, 2011; Sangiorgi et al., 2017; Vink et al., 2021). The emergence of new challenges is influenced by the systemic factors behind them (political, economic, socio-cultural, etc.). In a world where everything is interconnected, the interconnectedness of things brings complexity, so it is important to look at systems holistically and identify efficient leverage points (Meadows, 2008; Sevaldson, 2009).

Besides, service design is also a future and action-driven practice (Koskela-Huotari et al., 2021; Mager et al., 2020). The great shifts, conflicts, and crises of recent years have brought tremendous shocks and changes to social systems, illustrating that, under the

great degree of uncertainty, while we can predict that the world will change, we do not know in what ways it will change, which making service challenges fraught with uncertainty (Locy, 2020). Given the service design practices and actors are interconnected and interdependent in a wider context, service design also needs to go further to be conscious of the impact it creates, its intended and unintended consequences for people, organizations, communities, and the world at large, i.e., the service systems, to better cope with uncertainty (Mager et al., 2020). In order to achieve this, not only service designers but also other actors in the system need to improve their "Futures Literacy," which is a capacity to reflect on the past, sense and make sense of the present and anticipate futures with this reflective body of knowledge (KARLSEN, 2021; UNESCO, 2019).

The focus on systemic and future service issues is actually a shift from a human-centered paradigm of service solutions designed for the present human experience to a more holistic consideration of system diversity and a more long-term/visioning consideration of system possibilities (Dunne & Raby, 2013a; Gampp, 2021; Mitrović, 2015; Sevaldson, 2009). This shift implies the need for service design to adopt a systemic perspective, including the micro, meso, and macro levels, to contribute to evolving holistic views, actors' relational thinking, as well as the long-term/future vision, which is an essential capability of the Futures Literacy for a multitude of actors involved (Drew et al., 2021; Jones, 2014; McPhearson et al., 2016; Morgan, 2021; Sangiorgi, 2011). In order to view uncertainty from a long-term perspective, service designers should not only evaluate the past and present of the relevant system but also think about the possible futures. By embracing systemic and future thinking, designers can anticipate possible challenges in the future (Mager et al., 2020).

Therefore, service design needs to be further extended to further integrate systems thinking and future thinking in order to better deal with the emerging large-scale, complex, and futures-oriented challenges for service systems transformation.

Systemic design and speculative design are two design approaches that are representative when referring to systems thinking and future thinking. Both systemic design and the speculative design are considered capable of dealing with complex (social) problems (Auger, 2013; Jones, 2014; Mitrović, 2015). In addition, for the

uncertainty of the future, the speculative design can problematize and concretize uncertainty through envisioning the future and having the capability to construct alternative futures, thus bringing collective reflection (Dunne & Raby, 2013a; Kimbell & Vesnić-Alujević, 2020).

Systemic design

The complexity comes from the interconnectedness of things (Sevaldson, 2009). As mentioned earlier, we can consider society as a service system containing many sub-services and sub-service systems, and each service is interconnected (van der Bijl-Brouwer 2022; Fisk 2009; Maglio et al., 2009). The complexity of society requires specialized design and system facilitators, as well as the necessary stakeholders (Jones, 2018). Therefore, to better deal with the systemic service challenges, the research refers to systemic design, which is a design practice with systemic thinking (Sevaldson & Jones, 2019).

Design practice is considered as an approach that can analyse systems, design for, or intervene in systems, thus achieving positive societal impact (Ackoff, 2004; Banathy, 1996). However, design practice often ignores deep understanding as irrelevant to futures-oriented change (Jones, 2014). Systems thinking traditionally has been on understanding the behavior of societal phenomena within the context of the larger whole and demonstrates an analytical bias (Jones, 2014; van der Bijl-Brouwer & Malcolm, 2020). Systems approaches include processes to investigate and analyse systems, as well as strategies to design or intervene in systems(van der Bijl-Brouwer & Malcolm, 2020).

Systemic design integrates systems thinking and human-centered design to help designers shift their focus from single elements to the whole picture while considering actors within the system (Jones, 2018). Other than the designer's perspective, actors within the systems also play roles in systemic design. As part of a larger system, individuals influence and are influenced by other system factors. Therefore, there is a need to understand the relationships/interconnections between the different system actors and create conversations. Strengthening the relationships between other system

actors can contribute to changing their value systems, which in turn promotes systemic change (Drew et al., 2021).

Speculative approach(es)

To address the uncertainty brought by the future, Futures Literacy (FL) is a capability needed. UNESCO (2019) defines Futures Literacy as "the skill that allows people to better understand the role of the future in what they see and do. Being futures literate empowers the imagination, enhances our ability to prepare, recover and invent as changes occur. It is a universally accessible skill that builds on the innate human capacity to imagine the future."

In the design disciplines, going beyond the traditional product, service, and communication design, speculative design, is considered a practice that utilizes imagination and critically provokes public reflection. speculative design strives to foster social dreaming and discuss what the future should be (Mitrovic, 2015). Regarding futures-oriented, speculative design relies on imagination and aims to open a new perspective for the Wicked Problem, using design to create future innovation as a social dreaming approach. The speculative design approach brings narrative and fictional qualities into the design and 'expresses the unthinkable' through the language of design. In terms of criticality, according to Dunne and Raby (2013), "critical design uses speculative design proposals to challenge narrow assumptions, preconceptions, and givens about the role products play in everyday life (p.35)". Additionally, Dunne held that the conceptual and aesthetic qualities of dialogic objects could influence people to reflect and discuss critically, which could, in turn, lead to social change (Zelenko, 2007). By encouraging public debate about the social issues, this approach with an implicit "call to action" stimulates practical imagination and action by people to imagine and perform the change (Dunne & Raby, 2013b; Hanna, 2019).

Carl DiSalvo (2012, p.109) mentioned that critical design and design fiction "can broadly be considered as kinds of speculative design because what is common across this work is the use of designerly means to express foresight in compelling, often provocative ways, which are intended to engage audiences in considerations of what might be." Similarly, other future-oriented speculative practices, which also use alternative futures

to engage and provoke audiences thinking and reflection, can broadly be considered as kinds of speculative appraoch in this research (see Figure 2), they have different priorities in terms of definition, purpose, characteristics, focus, and so on (Tharp & Tharp, 2015). Since the relevant design practices are scattered and trivial, here we collect, sort out and compare the design approaches or methods with the following properties, which aim to enable the service design and designers to better deal with future and systemic problems:

1. with the nature of future-thinking or envisioning;
2. with the nature of critical/speculative;
3. can lead to public/collective discursive and reflection.
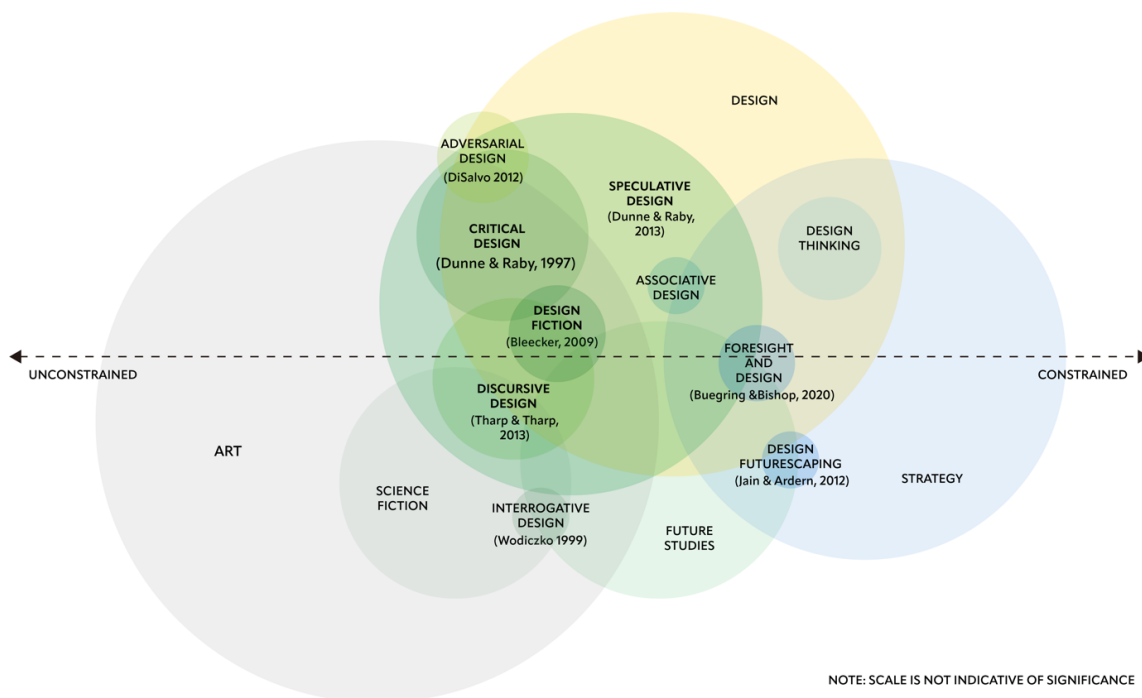
Figure 2. Mapping of speculative approaches, adapted from Montgomery's speculative design mapping v 2.0).

Therefore, among these subsidiary approaches or methods of speculative approaches, the four approaches/methods: speculative design (Dunne & Raby, 2013a), Critical design (Dunne, 2005), design Fiction (Sterling, 2009), Discursive design (Tharp & Tharp, 2013), are filtered out and collectively referred to as the speculative approach in this paper.

Systemic and speculative perspectives on service design

In the development of service design, the systemic and speculative perspectives have been embedded in the service design process. In terms of the thinking and methods of each of these three approaches, they are both complementary but also in some conflict. The systemic and speculative approach can introduce abilities for dealing with complexity and uncertainty into the service design process. However, in design practice, the methods and tools of these three approaches are fragmented, and a seemingly related but conflicting design process can be confusing for both designers and co-creators (Lin et al., 2021).

To better understand the design process of the three design approaches and the temporal relationship between different stages, we mapped the three design approaches together based on the three phases of past, present, and future. As can be seen from the map, service design and systemic design processes extract information from the 'past,' design in the 'present,' and derive a result-oriented design solution for the near future. However, the speculative approach's design process is mainly placed in the 'future,' and the output, not solution-oriented, can inspire reflection, back casting to the 'present' to support the design in the 'present.' In addition to the design process, the systemic and speculative perspectives are also linked and impact service design in terms of thinking and capability.
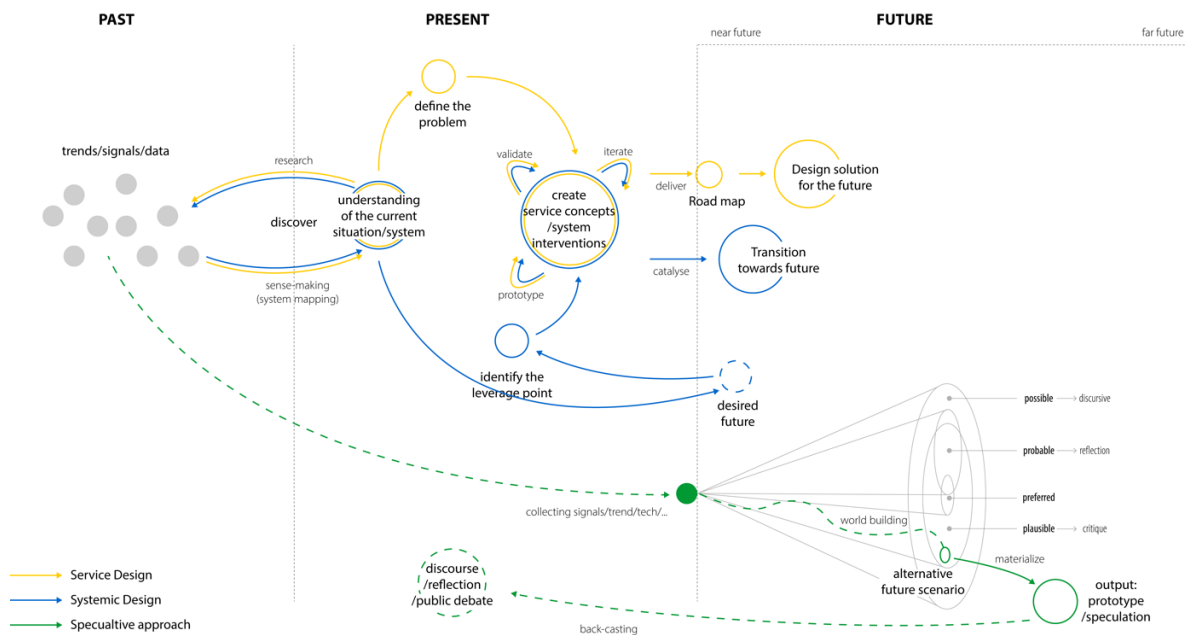
Figure 3. Matching processes of service design, systemic design, and speculative approach; adapted from Design Council (2013; 2021); Dunne and Raby (2013); systemicdesigntoolkit.org, Mitrovic (2016), The Extrapolation Factory (2016), Van Ael (2018), Van Ael & Jones (2021), Voros (2003).

Systemic perspective on service design

Currently, most accounts of service design apply a linear "cause-and-effect relationships" process that focuses on adapting the parts of a service system in isolation without addressing the complexity of the system as a whole ("Non-Linear Approaches to Service Design," 2021). Under the rising challenge of complexity and uncertainty, service designers are increasingly faced with the enormous complexity of overlapping service systems. The linear reductionist approach to service design limits designers' long-term vision and integrity, and it is difficult to cope with the unintended variability of reality (Vink, 2021).

In service design literature, the systemic perspective has been mentioned more and more in recent years and has become increasingly common (e.g., Sangiorgi et al., 2017; Van Ael & Jones, 2021; van der Bijl-Brouwer, 2017, 2022; Vargo & Akaka, 2012; Vink,

2021). From the service design perspective, with the evolving conceptualization of service design and based on the S-D logic's service ecosystem perspective, the focus of service design has changed from design of services to design for service (Kimbell, 2011) The focus of service design has shifted from designing services as an invisible market offering to "proposing and creating new kinds of value relation" (Kimbell, 2011, p42), creating the conditions for value-in-use rather than directly designing service offerings (Meroni & Sangiorgi, 2011). Service design is increasingly considered an engine for wider societal transformations (Sangiorgi, 2011) and also considered a reflective practice, which involves the evolution of the visible and invisible elements within the systems (Vink et al., 2019; Wetter-Edman et al., 2018).

From the systemic perspective, scholar van der Bijl-Brouwer (2022) distinguishes the systemic view on service systems into two different focuses: focus on system design and focus on systemic change or designing with the system. The former view focuses on the parts of the system that can be designed (Patrício et al., 2011), while the latter focuses on understanding and dealing with the complexity and uncertainty of service systems.

The service ecosystem perspective, which falls into the latter category, is one of the most discussed systemic perspectives recently. A service ecosystem is a relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange, and emphasizes the complexity, dynamics, and multi-actors of value co-creation (Vargo & Akaka, 2012). In order to further conceptualize service design in complex service systems, Vink et al. (2021) re-conceptualized service design and constructed the systemic conceptualization of service design, which is service ecosystem design.

Since this study aims to better deal with systemic and future service design issues, which means that the service design process should organically integrate the systemic and speculative perspectives, thinking, and approaches, thereby creating service system value in complex and uncertain multi-stakeholders' contexts or promoting the service systems and even societal transformation. As a systemic perspective and approach on service design, service ecosystem design recognizes the agency and participation of all actors and emphasizes that through collective reflexivity and reformation by different levels of actors (from micro to meso to macro; Vargo & Lusch, 2016) to intentional

shaping of institutional arrangements and promote the emergence of desired value co-creation forms (Vink et al., 2021). Actors are able to consciously influence long-term changes in the complex service ecosystems in which they are embedded (Mele et al., 2018; Nenonen et al., 2018). Therefore, service ecosystem design seems a promising approach for organic integration in this study.

However, in this case, it is still necessary to consider how to engage actors at different levels and facilitate the collective reflexivity and reformation with a long-term, holistic and critical perspective.

Speculative perspective on service design

This study emphasizes merging future thinking into the service design process because it is a capability that can help both designers and actors to effectively step out of the frame and have a long-term perspective(Buehring & Liedtka, 2018; Candy, 2018; KARLSEN, 2021; Prosser & Basra, 2018; Spencer, 2022). As an important capability when dealing with complex issues, future and vision thinking require empowerment and active participation (Sangiorgi, 2011; Slaughter, 1998; Toivonen et al., 2021). The approach of envisioning futures could help citizens, organizations, and institutions reflect on complex problems and long-term challenges bottom-up, imagine ways to address them and develop a goal to inform collective actions in the present (Pereira et al., 2021; Ramos et al., 2019; Rana et al., 2020).

From a theoretical point of view, the process and focus of service design and the speculative design have apparent differences. As mentioned above, many service design processes and practices are still linear ("Non-Linear Approaches to Service Design," 2021). Its paradigm focuses on humans, and its results focus on developing useful service solutions or improving service experience in the present contexts. Conversely, the speculative design is more radical, encouraging people to imagine various alternative future scenarios - and the process is a divergent tree structure. And this futures-oriented paradigm encourages not only designers but also actors around to think, critique, and question the current systems in different ways by striving for provocation and collective discursive (Gerber, 2018a; Pasman, 2016).

Although the focuses are different, the two design approaches have many similar tools but achieve different results. For example, both service design and the speculative approaches can use methods like "world/scenario building" or "storytelling" to make it easier for actors to understand possible future scenarios and deeper information -- that is, the various systemic aspects (political, economic, socio-cultural, environmental, etc.) that contribute to constructing future worlds. However, as mentioned above, the future scenarios of service design are located in the "near future", while the alternative futures of the speculative design are located in the "long future". The near-future scenarios construction allows designers and participants better to understand the possible short-term effects of current changes, but the scenarios of the long-term future do not emphasize "realizability." Instead, the scenarios help designers predict the requirements, challenges, and impacts that may occur in the process, and further think and reflect on the current system through retrospection (Gerber, 2018b; Mager et al., 2020). But this theoretical gap might lead to confusion in practice.

In academia, there are only a few academic studies (Kueh et al., 2022; McGee, 2021) on the integration of speculative design and service design. Therefore, a clear design process, methods, and tools that can guide service designers on how to better apply future tools in the service design process are under-explored. This leads to the gap when service designers apply these two design approaches from the theoretical to the practical level, designers may follow different design processes and focuses when using the two approaches, and there is no clear entry point, resulting in a random application of methods and tools. Although speculative design has been applied to service design sporadically in many design practices, the application is random - involving some of the tools of speculative design separately in the early research phase or the later ideation phase rather than as one of the clear phases.

Systemic design and speculative approach

In addition to the connections between systemic and speculative approaches and service design, there is already an interaction between systemic design and the speculative approach.

According to the systemic design Methodology proposed by Van Ael & Jones (2021), the step "Defining the Desired Future: Value proposition, foresight models" showcase the intersection of systemic design and Future studies. In the systemic design process (Van Ael et al., 2019), "creating a vision for the future" is located between the "system mapping" and "detecting leverage points." It suggests the need to consider the long-term view at an early stage in the system design approach.

The purpose of this 'alternative desired future' is to utilize the long-term perspective, using a common 'language' to help stakeholders articulate the common desired future and the intended value creation (systemicdesigntoolkit.org). The "Desired Future" emphasized in this process is also what Strategic Foresight tries to constitute. The systemic design constructs the future narrative by introducing the Strategic Foresight. Multiple paths to future outcomes are often constructed to reveal a set of potentials and action points (Jones, 2017) -- which might be leverage points in system design.

In terms of common ground, the speculative approach and strategic foresight are not predictions of the future; they envision the possibility of the long-term future. Nevertheless, strategic foresight is featured with a planning characteristic. It is about exploring different plausible futures to "anticipate trends, risks, emerging issues, and their potential implications and opportunities in order to draw useful insights for strategic planning, policy-making, and preparedness" (Strategic Foresight, n.d.).

On the other hand, the speculative approach is not limited to plausible futures and can be more unrealistic, critical, and reflective. Moreover, the speculative approach emphasizes arousing the public's thinking, reflection, and discourse rather than a plan (Dunne & Raby, 2013a).

Service ecosystem design needs to engage multi-actors within the system for collective reflexivity and reformation to achieve value co-creation for the system transformation, and it requires designing for higher levels of the paradigmatic radicalness of transformation, enabling the disruption of fundamental assumptions and beliefs, norms, values, and the exploration of radically new service futures (Koskela-Huotari et al., 2021; Rousseau, 1995). With its critical/speculative and discourse-provoking nature, the speculative approach may help with this process.

Service design, systemic and speculative approaches in education and practice: emerging connections

From March to May 2022, 10 online interviews with service design and speculative/systemic approaches experts were conducted, including 5 service design program leaders from the University of the Arts London, OCAD University, Parsons School of Design, Tsinghua University and Politecnico di Milano (see Table 1). The outline of the interview questions focuses on the two research questions to be answered in this paper. Interviews with experts intend to contribute to the first question of how service design embeds systemic and speculative approaches, and interviews with schools' program leaders focus on the second question of how the service design capabilities evolve.

IN PRACTICE

The practice of systemic perspective has developed significantly in the application of service ecosystem design and organizational change (e.g., Aguirre, 2020; Koskela-Huotari et al., 2021; van der Bijl-Brouwer, 2022; Vink, 2019). Besides, in the interviewed experts' practice of applied research, the experts whose main research field is in service design and (or) the speculative approach acknowledge that system thinking is needed in this process. They claim that the systemic approach is usually not used as a starting point or a method but as a base logic of thinking throughout the whole project.

> [expert quote 1]: Changes within systems are interconnected, so the designers should know more about the other part of the system, not only the design(...) The way of training should be more considering open to the systemic content, such as history and social science.

> [expert quote 2]: Systems thinking should be considered as the underlying logic in the integrated approach.

> [expert quote 3]: In fact, I think all of the future work is systems-oriented in some manner. We're looking at all of the different characters or actors who could be playing a part. We're not only looking at the specific technologies and the objects that would

live in those worlds. We're looking at the connections and interrelations between the people and the technologies.

In contrast, the speculative approach cuts through the service design process by applying fragmented methods and tools. Experts in the speculative field place more emphasis on the non-outcome-oriented nature of the speculative approach, where the results do not serve as feasible solutions in and of themselves but can provoke and inspire others, including service designers, to tackle the current problems.

[expert quote 4]: Our work does not involve designing for the present situation, but the results of applying the speculative approach, such as design fiction, can inspire our clients through the future possibilities presented, thus serving the design of the present.

[expert quote 5]: For example, we're using science and technology to reduce disease. At the same time, there's a general fear among scientists that this might cause more problems by introducing an unknown gene line in a species that could not control. This is a moment where there are possible directions that we could go, and we don't have a clear sense of which way is the right way to go. In this case, we need to use the systemic and speculative approaches to complicate and confuse these things so that we can see a broader range of outcomes and a broader landscape of change.

Most the cross-disciplinary experts state that in their service design practice, most practices still use the speculative approach as a preliminary research tool to create (mainly) desired future scenarios for actors to have a common vision or goal for the future. And the process of speculation at this stage is still mostly conducted at the expert level (including designers, science fiction writers, science and technology experts, and other experts with professional knowledge).

[expert quote 6]: We are using the speculative approach mainly in the research phase, to ask questions, and explore possible future needs and challenges that may arise in the future by creating alternative future scenarios.

[expert quote 7]: We work with science fiction writers to create design fiction and use them as probes to inspire and engage stakeholders for co-creation.

Although the current speculative practices are still mainly carried out at the expert level due to the threshold brought by future thinking and creativeness, some experts emphasized that the speculative approach can bring remarkable co-creation effect when it is participatory with the public - because no one can say they are absolutely right when creating an alternative future.

> [expert quote 8]: The speculative approach can help bring everyone to a similar level. We were initially concerned that people might be afraid to use these tools (in the pre-co-creation phase). But then we found that the speculative approach allows people to go beyond the limits of what is 'realistic' or 'ridiculous' because what you want goes way beyond those boundaries. It helps to break the social conventions between people. No one knows more than the other, because we are not talking about here or now. And then you transfer it to the critical dimension, you are back to the here or now, making the contribution very different.

> [expert quote 9]: Sometimes we think of experts having field knowledge or expertise in a certain field or academic knowledge. But many times, the people who can propose the most interesting visions of change don't necessarily have an academic background or industry background. Instead, they're coming from their own lived day-to-day experience. We can think of those people as experience experts in their own lived experiences.

> [expert quote 10]: When we think about the points that we don't agree on, futures can actually help us to hold these discussions.

It's also worth noting that the expert-led speculative approach and design processes are prone to "privileged" issues. The speculative approach is often criticized for being elitist and practiced primarily by a privileged, mostly white, male, middle-class population (Martins 2014). While many speculative designs aim to promote more future-oriented and critical thinking by anticipating different kinds of issues (e.g., Dunne & Raby, 2013; Malpass, 2013), speculative design can get bogged down in designer-centered, emphasizing the designer's own concerns (Light, 2021). The ideology of designers is based on the socio-cultural context of their knowledge and design practice (Søndergaard & Hansen, 2017). Different perspectives from different contexts can lead

to different visions even between designers. Therefore, some experts said that the design process should be more inclusive and co-creative with more diverse perspectives in the interview.

> *[expert quote 11]: We look at kind of the non-White, non-Western approaches to thinking about change, such as Afrofuturism, looking at how some of those perspectives can invert the ways the traditional narratives of futures and change have looked for many years.*

> *[expert quote 12]: Sometimes there are some tensions between different cultural backgrounds, and the local students will be more leading or have their own kind of groups themselves(...) I think the differences can be more important than language, culture, and comfort level because those are complex and difficult when dealing with complex projects. If people have to collaborate interculturally and become an entirely new group, it pushes people into new ways of thinking and working.*

In summary, the systemic and speculative approach can bring the following opportunities and criticalities in practice.

Opportunities

1. **Not confined to the current contexts, think the "unthinkable"**
   Since the speculative approach is not limited by the current realities, alternative futures are more pioneering and can help people think about situations that are usually considered "impossible."
2. **Break silos and create common scenarios to lower the participation threshold**
   The speculative approach helps break down social conventions and boundaries between people, and the relational thinking and long-term vision brought by the systemic approach can also contribute to creating shared future scenarios, which can encourage and engage everyone to have a say in the future.
3. **Better communication of the complex/abstract issues to the 'audience'**
   In addition, placing people in the same (even co-created) future scenario allows them to think and discuss using more straightforward visual or experiential language rather than professional terms.

Criticalities

1. **High threshold for the 'beginners' (refers to people who have not been exposed to such approaches before, with or without a design background)**
The speculative approach requires the use of imagination to envision possible futures and visualize to present them. And the systemic design requires a designerly way to deal with systemic tensions. Therefore, the entry threshold to using the approach is higher for beginners without a relevant background or design background.

2. **The multi-directional speculations might bring confusion to the 'audience'**
Although creating alternative future scenarios is meant to give people a space for discussion, making too many speculative scenarios in different directions might confuse actors when dealing with complex systemic problems.

3. **It does be influenced by different contexts (geographical, socio-cultural, ideological, etc.)**
The future scenarios created are influenced heavily by the systemic contexts to which the creators belong, including geography, socio-culture, ideology, etc. Therefore, when using the speculative approach, it is necessary to consider not only the context of the issue but also the contexts that the creators themselves have to avoid intentional or unintentional exclusion or bias.

IN EDUCATION

Currently, in design education, service design has become more and more of a common program, and its curriculum is more general in design schools compared to systemic design and speculative design. Nineteen of the top 30 design schools in the 2022 QS World University Rankings by Subject: Art & Design, have explicit master's programs in service design. In a number of these programs, design schools incorporate thinking, processes, methods, and tools related to systemic design and speculative design into the service design curriculum. There are also design schools that are known professionally in systemic design but are not ranked in the top 30 and also have service design attributes in their teaching. Therefore, this paper uses the Master of service design program as a foundation from which to explore the embedding of systemic design and speculative design.

To understand what and how service design capabilities need to evolve when facing complexity and future uncertainty, we interviewed the leaders of service design programs at five design schools, which use all three design approaches simultaneously in their educational process, to understand the program structure and teaching methods they use to get students to learn systemic and speculative approaches in the service design educational process. Furthermore, understand what capabilities students need and can develop with such educational experiences. Through the interviews, we summarized information about the five service design programs, including the design approaches involved, the educational process, and the capabilities developed (Table 1).

School	Program	Service Design	Systemic approach	Specualtive approach	Educational process	Capabilities
London College of Communication (LCC), University of the Arts London (UAL) London, UK	MA Service Design	✓	✓	✓	1) from human-centered to system, ecosystem, organization, and community oriented, bringing the course to the system level; and 2) from the present to the future. The teaching process in this program is step by step, from the traditional service design process in the first semester, to start to understand the knowledge at the system level in the second semester, and then to explore the future design in the third semester by getting exposed to the Speculative approach. These steps are taken in collaboration with many partners and students in the industry. The partners see this as a growing area and the students need the knowledge and capabilities to do this. So the program cover not only traditional service design, but also many other areas, such as policy design.	1. Narrative and communication skills (making diegetic objects); 2. the capability to engage stakeholders
Parsons School of Design, The New School New York, USA	MFA in Transdisciplinary Design: Service oriented design	✓	✓	✓	The Transdisciplinary Design MFA employs a collaborative, systems-oriented approach to design and social thought, emphasizing design-led research. The Speculative & Discursive Studio in this program investigates the ways in which design can be used as a practice of critique, speculation, and hypothetical proposition, suggesting other worlds or variations of our worlds. Students will learn and develop techniques and methods for identifying opportunities in existing complex systems and discovering ways to propose vivid, thought-provoking alternatives to those systems. The studio will consist of two main phases: the first is an exploration of speculative and futures-oriented methods and precedents, the second focused on a specific context. We will carry methods from the first phase into the second phase, creating opportunities for deeper and more focused research and reflection.	1. be able to explore uncertainties and imagination; 2. distill specific images of futures or images of change; 3. shaping discussions; 4. build consensus. (It doesn't always do that. There are many futures projects that actually push us away from one another, but there are some futures projects that can kind of build consensus, bring us together, and help us support one another) 5. support the formulation of plans.
Politecnico di Milano Milan, Italy	Master Degree in PSSD (Product-Service System Design)	✓	○	○	Although the program's pedagogical introduction does not explicitly state using systemic or speculative approaches, these methods and tools are embedded in the program's curricular practices - such as Giga mapping and scenario building are taught and used in the course.	1. critical and reflective thinking; 2. future thinking
OCAD University Toronto, Canada	MDes in Strategic Foresight and Innovation	○	✓	○	The course assigns students the systemic design tools, and then they go through the relevant references on the tools to get an in-depth understanding of how to use the tools. Then the students will be asked to share the tools with other students. This will give them a deeper understanding of the tool. Using the systemic tools, they can get a research-based synthesis, then develop a proposal for either a system map synthesis map or a system out of the complex system.	1. the ability to access the system 2. navigate complex problems and work with complexity 3. foresight
Tsinghua University Beijing, China	Information Art & Design	○	○	○	The program is Information Art and Design. But Service Design, Systemic Design, and future thinking are embedded and interspersed throughout the instructional process. The program offers elective courses that students from different disciplines can participate in, which are highly interdisciplinary and co-creative. The elective courses focus on integrating future thinking and design thinking, which is a process of tool integration. Students learn how future thinking can be applied to the design process by learning how to use the tools. The elective courses are like nodes where different knowledge is progressively imparted.	1. critical and reflective thinking; 2. future thinking 3. be communicative, narrative and expressive

Table 1. List of five service design programs. ✓- major; ○- minor

Findings

In this section, we propose an extension synthesis and design capabilities that need to be evolved when facing systemic and future service challenges according to our literature review and expert interviews.

Extension map

The literature and interviews found that the integrated application of these three approaches is fragmented and scattered. Therefore, after summarizing multiple design approaches' processes (e.g., Design Council, 2019, 2021; Dunne & Raby, 2013; Mitrović, 2015; Montgomery & Woebken, 2016; Van Ael et al., 2019; Van Ael & Jones, 2021; Voros, 2003) and the practical experience of experts, we introduced a meta-process that extends systemic and speculative approaches to the service design process (see Figure 4). The study in this paper aims to construct a comprehensive meta-process rather than a specific application process since the need for flexible adaptations for different issues with different contexts, including selecting the directions of the design process and the choice of methods and tools.

Based on the extension map, we propose a table of methods and tools for selection (see Table 2). The stages of this table are based on the service design process and extend the systemic and speculative approaches' methods and tools into the service design steps. With this table, the service designer can choose different methods by referring to different steps. Nevertheless, we would like to emphasize that since most of these methods and tools can be used creatively and adaptively, many of the methods associated with individual stages can be useful for other purposes in other stages of the process.
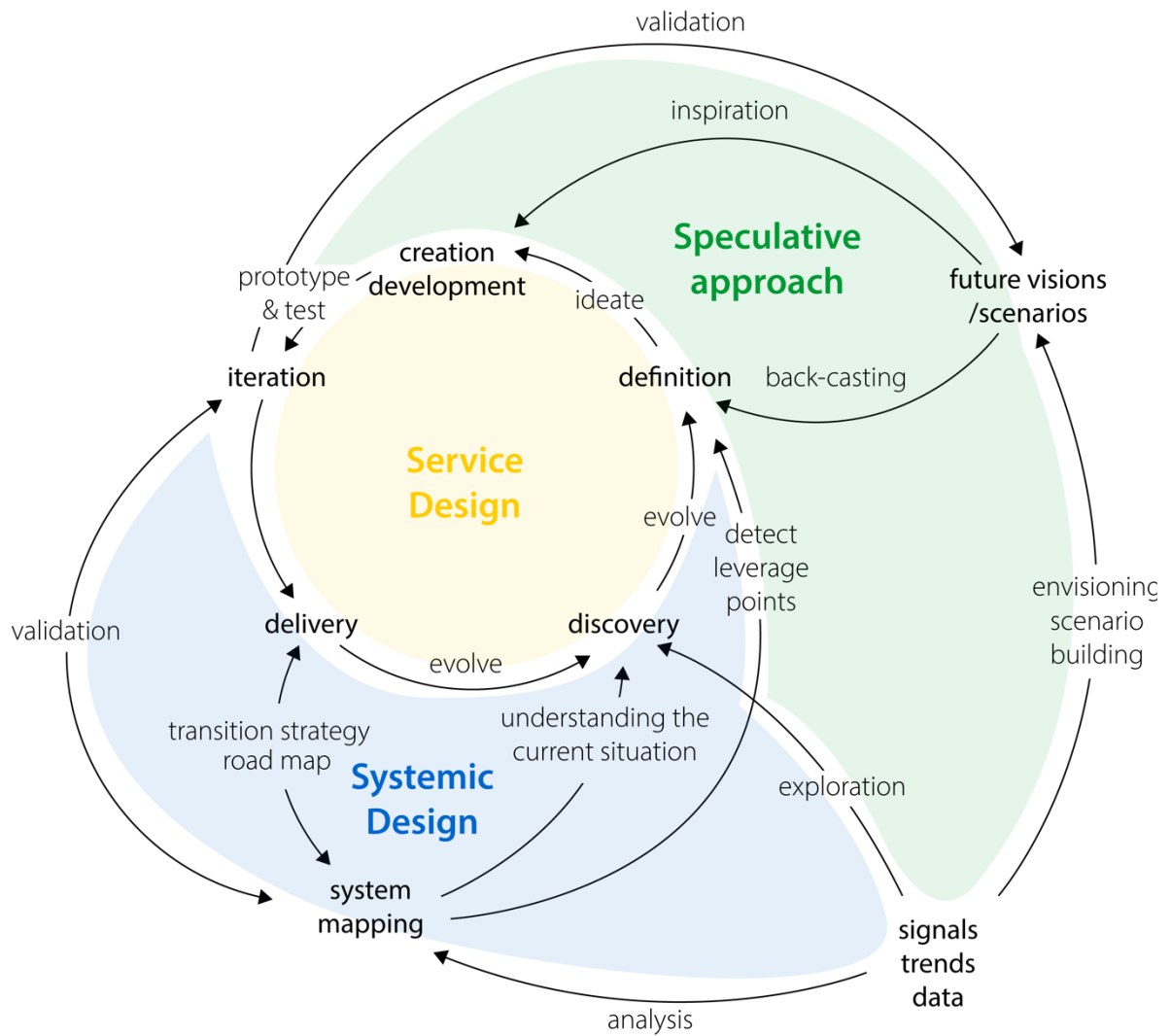
Figure 4. A proposed extension of systemic design and the speculative approach into the service design process.

Illustrative methods and tools

	Service Design	Systemic Design	Speculative approach
discovery	Ethnography Design probes Contextual interviews Observations Environment scanning	Rich context Actors maps Niche discovery Contextual interviews Multicapitals systems map	Delphi Trends analysis Future timeline Future wheels
definition	Ethnography Design probes Contextual interviews Observations Environment scanning Actors maps	Systems maps Influence map Value proposition Three horizons Future state scenarios Leverage points	'What If' Questions Implication Mapping
creation development	Storyboard Journey maps Service ecosystem maps Service blueprint	Intervention strategy	Co-creation workshops Design games Trend cards Future Things Future personas Scenario building
iteration	Prototypes Testing	Systemic Evaluation ZIP-analysis	Provotype Drama Collaborative Provowriting Provotype Recap
delivery	Road maps Business model canvas	Transition strategy Adaptive cycle strategy Collaboration model Roadmap for transition	

Service Design process

Table 2. Methods and tools grounded on the proposed extension into the service design process.

(Service) designers capabilities: a possible evolution

Service design capabilities have been a concern for both academics and the market (Becermen & Simeone, 2021; Giordano, 2019; Martinkenaite et al., 2017; Morelli et al., 2019, 2021). In this paper, we use the term 'capabilities' as the broad umbrella term, which also includes 'skills' and 'competencies' (Johnson et al., 2017).

Service design scholars (Ehn et al., 2020) have summarized the synthesis of most required service designers' capabilities by comparing the academic definition and market needs. Their study concluded that there is a consistency between the academic definition of service design capabilities and the synthesis of market-required capabilities. There is consistency between the academic definition of (service) design competencies and the synthesis of capabilities required by the market. However, the design capabilities required by the market for service designers are not necessarily able to be educated and developed through current service design education.

To better explore the capabilities that service designers need to further develop when facing new challenges, we have compiled and summarized the following five capabilities that were mentioned many times in the expert interviews. These capabilities are emphasized by the experts who have experience in their teaching or practice, indicating that design students, designers, and co-creators need to use them to better deal with complexity at the system level or to apply the speculative approach better to create future scenarios to provoke discussion. These design capabilities are partially present in systemic and speculative approaches, but need to be further evolved in service design.

1. ***Critical and reflective thinking***

The experts emphasized the importance of critical and reflective thinking in capability development in the interviews. Critical and reflective thinking is relevant to the collaborative design process and speculative output and extends to the designer's personal reflection. In terms of process and outcome, applying the speculative approach can bring about criticality and provoke reflection among actors. From the designer's personal perspective, it is challenged to reflect on the way the designer sees the world during the design process (Søndergaard & Hansen, 2017). Even in the speculative approach, the designer's own (structurally privileged) position is often left

untouched (Dunne, 2005; Martins, 2014). Designers need to expand and reflect on how their imagination deals with different types of information, known or unknown. For example, reflect on how to deal with different information under different contexts without being "privileged," question the designer's assumptions, avoid stereotypical perceptions and bias, and explore complexity and uncertainty.

2. Future envisioning

The capacity of building new shared and orienting visions is seen as a fundamental quality in transformation processes (Manzini & Jegou, 2003). However, traditional service design tends to focus on the 'near future', when service design solutions can be implemented. But when faced with the challenges of complexity and uncertainty, future thinking and long-term visions need to evolve further, unconstrained by feasibility and realizability (Asian Development Bank, 2020; Moffatt, 2007; WBCSD Sustainable Lifestyles Cluster, 2018). Service designers better to expand their perspectives, explore the boundaries of uncertainty, and expand their imagination to broaden landscapes to see more possibilities for change and to build resilience (Prosser & Basra, 2018).

3. Systemic thinking and holistic view

The systems thinking and holistic view that comes with the systemic approach should be conceived as a deeply ingrained mindset and a base logic of thinking throughout this integration (Prosser & Basra, 2018). The interconnected actors and services involved in the service systems, from the micro to the meso to the macro community level, are all part of a constantly changing system. The elements within service systems are not isolated, and with the change of elements, the interconnected parts interact and influence each other (Sevaldson, 2009). In this case, dealing with complexity at the system level requires systems thinking and a holistic view, and this interconnection of systems exists in both present and future scenarios.

4. Visualizing and Shaping complexity

According to the experts interviewed, prototypes and artefacts of the tangible and intangible services in future scenarios that can be experienced and interacted with are more engaging and thought-provoking than presented only in words or pictures. Service

designers can distil and shape the elements of imaginary scenarios to create experiential futures that can better engage stakeholders. Embodied futures take that one step further and essentially allow people to act into the future. Therefore, this requires service designers to evolve the capability of shaping and building to create more immersive future experiences, thus enhancing engagement in the co-creation process.

5. *Narrative, communication, and discussion*

The active participation of actors is essential in the transformation driven by service design. It requires active actors' participation and the capacity to imagine and envision possible and positive futures (Sangiorgi, 2011). Although everyone is born with the ability to imagine, anticipate, speculate and discuss the future, people are mostly concerned with the near future, the daily life that affects oneself. On the other hand, the ability to think long-term about possible futures is largely imbalanced and applied primarily by experts in organizations or governments (Ramos et al., 2019). When the existing discourses around the future are dominated by dystopian visions of societal and environmental collapse and business-as-usual scenarios, people may increasingly see the future as something to be afraid of and want to take refuge in the past (McPhearson et al., 2016; Morgan, 2021). The lack of collective discourses about long-term futures in wider society impede collective imagination and intelligence (Ramos et al., 2019).

Designers can lower the threshold of collective participation through better narrative and communication skills, to actively empower the public to think about the future and engage them in exploring alternative futures and visions of the future, encouraging long-term thinking and informing collective actions in the present to foster service and further societal transformation (McPhearson et al., 2016; Morgan, 2021).

Conclusion

In this paper, we raise a concern regarding how service design and service designers should evolve in their thinking, approaches, and capabilities in the face of increasingly complex and uncertain service design challenges. It is realized that as service design evolves and the issues to be addressed go beyond a human-centered paradigm of service solutions, the new challenges become increasingly complex, diverse and unpredictable at the system level. It is crucial to converge on a systemic and future-oriented model for service design to deal with this complexity and uncertainty.

Based on this, we propose the synthesis that systemic and speculative approaches, with their characteristics of systemic thinking, long-term perspective, and critical/reflective thinking, can cut into the service design process and help service designers to deal with more systemic and future-related problems through the application of relevant thinking and methods. Through the literature review, we found that the three design approaches are related (including overlaps and conflicts) but not organically integrated; then, reviewing our interviews, we summarized the points to consider and reflect on in the design process and proposed five design capabilities that service designers should better evolve further. We suggest a more holistic and systemic level of understanding when dealing with systemic and future issues, open up more possibilities for change, and engage more actors within systems to co-create, thus promoting value co-creation and transformation at the service system level.

This paper deals with experiences and insights from academia. In future research, the study will further expand the scope of the investigation of the knowledge and experience of the broader area of design practice - the insights from design practice in the real world will be extracted to iterate on the proposed extension map, and design capabilities need to evolve from a more practical perspective.

Acknowledgements

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