

## Smart Service Design Demands in the Fourth Industrial Revolution From a Sociotechnical Perspective

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### Abstract

Recent technological changes have transformed the knowledge production process, opened previously unimaginable new possibilities, and developed unique values as knowledge creators for the future. These have involved the advent of *digital* or *smart services*, which naturally led to ‘smart service design’ in adjacent fields, especially those situated at the intersection of technology and service experiences, and require adaptation of design practices to cope with the new challenges and opportunities and deliver services of tomorrow. However, whether technology could subsume service delivery to such an extent that concepts of empathy, aesthetics, and design, not to mention the human touch, will fall by the wayside is controversial. Thus, this qualitative study was based on selected focus groups for a systemised understanding of service design practices from the perspective of sociotechnical transformation to explore a series of questions: How does the Service 4.0 concept impact the responsibilities of the service designer? 2) What new skills, tools, and methods should be made available when designing smart services? 3) How should current forms of service design education evolve to meet the demands of the future society?

Keywords: Service 4.0, Service Design, Smart Service Design Demand, Technology and Service Experience, Service Design Education

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## Introduction

Service 4.0 is a relatively new concept, mainly concerned with the incorporation of pioneering technologies, including, but not limited to, artificial intelligence (AI), the Internet of Things (IoT), blockchain, machine learning, big data, the metaverse, and robotics. These once abstract concepts now have practical applications embedded in commonplace services (Paschou, 2018), thereby causing a significant transformation in the pattern of service delivery and extending additional benefits to customers.

Previous studies have predicted that in future society, digital-physical connected service systems will be extensively networked and that more services will be connected with other services in its ecosystem (Caruana, 2023; Schwab, 2017). This rapid progression of sophisticated technologies has led to a paradigm shift in traditional service delivery. Moreover, knowledge production has been transformed, unimaginable new possibilities have emerged, and unique value has been created as a knowledge creator for the future. Service providers are becoming more technology reliant in delivering their services with efficiency and scale, which has led to a complete transformation in service delivery that embodies these innovative technological features. Increasingly, advanced technology is becoming instrumental in serving customers, which is observable in situations such as automated health applications using biometric signals in smart devices (Bohr & Memarzadeh, 2020) or algorithms on over-the-top platforms that suggest user-specific digital content stemming from their interaction choices (Pajkovic, 2021). In addition, these technologies have been adapted from previous interactions by amending subsequent ones and constructing customer profiles for enhanced service delivery and increased sales opportunities. All of these components contribute to a comprehensive process of intelligent learning.

This transformative shift in technology applications has led to the creation of the service designer's roles and responsibilities to meet the new demands and effectively cater to the requirements of the changing landscape. The natural corollary to the advent of digitally enhanced services is the concept of 'digitalisation' of 'smart service', which naturally leads to 'smart service design' in adjacent fields that appear at the intersection of technology and service experiences and call for an adaptation of the established practices to accommodate the ensuing challenges and prospects.

The migration towards Service 4.0 has prompted the need to rethink the roles and responsibilities of service designers to subsume service delivery to such a degree that concepts such as empathy, aesthetics, creativity, and design, not to mention human touch, will become obsolete. However, others consider this as an opportunity to upskill and redeploy workers or alter their labour force. These challenges have raised various questions: 1) How does the Service 4.0 concept impact the responsibilities of the service designer? 2) What new skills, tools, and methods should be made available when designing smart services? 3) How should current forms of service design education cater to the requirements of an increasingly digital society?

The aim of this study was to provide understanding of the current status of service designers and identify the potential opportunities and challenges faced by service designers to discern the educational and technical skills that are critical from a sociotechnical viewpoint. It examined the new opportunities involved in service designers' capacities by:

- reviewing literature in service design, service systems, and networks in the context of emerging technological development;

- reviewing recent forms of service design education; and
- conducting a qualitative study based on selected focus groups for a systemised understanding of service design practices and how the recent development of technologies has influenced the way service designers work from the sociotechnical transformation.

To deepen the understanding of these issues, this paper is divided into three main sections. The first section introduces the Service 4.0 concept and its potential implications for the field of service design. The second section provides an overview of the current status of service designers, including their roles, responsibilities, and the challenges they faced (due to emerging technologies). The third section presents a review of the recent developments in service design education, including the incorporation of emerging technologies in curricula, the changes in teaching methods, and the shift towards a more practical approach. This section also includes recommendations for improving service design education, based on the findings from the review. The final section of this paper presents a qualitative study based on the selected focus groups.

In addition, the aim of this study was to uncover the practical implications of technological developments on service design practices and how service designers have adapted their work to these changes. Insights from this study would provide a deeper understanding of the current and future needs of service designers and help inform the development of relevant educational programmes and training initiatives.

By conducting a multi-faceted exploration of the service design field, this paper hopes to contribute valuable insights for both service designers and educators that would help them navigate the rapidly evolving landscape of Service 4.0. It also aims to stimulate further research and discussion on this topic to stimulate the field of service design to continue to evolve in a manner that is responsive to technological advances and societal changes, and to continue to play a vital role in the provision of valuable services in the future society.

### **The Concept and Potential Implications of Service 4.0 in the Field of Service Design**

The service economy represents a paradigm shift in the modality of economic activity, where the central value lies in the provision of intangible services rather than tangible goods (Gallouj & Savona, 2009). These services embrace various sectors such as health care, financial services, education, hospitality, professional services, and information technology (Parrinello, 2004).

The transition from an agrarian economy characterised by physical labour and manufacturing to a service economy typically aligns with a progression towards industrialisation and urbanisation (Ramirez, 1999). As this transition unfolds, the economy changes from labour-intensive activities to more knowledge-intensive pursuits, which means a shift from manufacturing to service-oriented industries instead of manual labour, as value creation hinges more on intellectual abilities and knowledge application.

The rise of the service economy correlates with technological advancements, especially in the sphere of information communication technology (Schwab, 2017). Technologies such as the internet, e-commerce, digital communication tools, and apps have enabled services across international borders and fostered service-led economic growth.

Unique features distinguish the service economy. One such characteristic is that services are produced and consumed simultaneously. Consider, for example, an experience of dining at a restaurant, where service is rendered. The services of food preparation and serving are rendered concurrently with its consumption. This contrasts with the conventional production-consumption process for physical goods. Another distinctive aspect is the emphasis on relationship building and customer service. In the service economy, value is collectively created through interactions between service providers and customers, and these relationships often extend beyond a single transaction (Lusch et al., 2008; Vargo & Lusch, 2004).

Moreover, human capital becomes the key resource in a service economy, shifting the focus from physical assets to dynamic resources such as human knowledge and skills (Heskett et al., 2016; Lusch et al., 2008). Hence, opportunities for continued education and skills training are paramount in the service sector. However, while the service economy presents many opportunities, it also brings challenges such as income inequality, wage disparity, and the predilection for highly skilled workforces (Autor & Dorn, 2013).

Moving forward, the service economy is likely to witness more technological disruptions with emerging paradigms such as Service 4.0 (Paschou et al., 2018), which focuses on harnessing emerging technologies such as IoT and AI to refine service delivery. These latter developments underscore the pressing need for research to investigate the implications of these transformations for the future of the service sector and society. Indeed, the service economy sector presents plentiful opportunities for design-centric thinking to drive innovation. Sectors such as hospitality and tourism, health care, finance, education, communication, and retail have already witnessed this impact.

In a world increasingly embedded with countless services, the ascendancy of the service economy requires designers to develop cross-disciplinary abilities and capacities. These provide pathways for design-driven change across multiple sectors. Simultaneously, it involves the design of both digital and physical spaces where services occur, integrating aspects of user experience, communication, product, and interaction designs. The ultimate aim is to support evolving service structures and provide a seamless, positive experience to end-users.

Simultaneously, service design has emerged as a key discipline that orchestrates these advanced technologies into the service sector (Stickdorn et al., 2018). The synergy between Service 4.0 and service design holds strategic relevance in this technology-driven economy. Service design is an interdisciplinary approach that shapes how services are delivered and experienced (Meroni & Sangiorgi, 2011). In the context of Service 4.0, service designers play a pivotal role in integrating advanced technologies into services, adapting them to customer needs, and simultaneously enhancing the service experience (Barile et al., 2019).

### **Service Design in the Service 4.0**

Service design in the Service 4.0 context helps organisations move towards more customer-centric services (Clatworthy, 2011). Service designers leverage technology to create touchpoints that personalise and enhance customer interactions. For instance, AI and big data analytics help in thoroughly understanding customer behaviours, preferences, and needs. Using these data, service designers can then develop tailored service offerings and experiences (Barile et al., 2019).

Designers also need to address the orchestration of multiple interconnected smart devices and platforms under Service 4.0 to provide a seamless user experience across different touchpoints (Sangiorgi et al., 2017). Therefore, the user-centred approach of service design is critical to managing the complexity of Service 4.0. Despite offering a host of opportunities, Service 4.0 also poses challenges to service design. One key challenge is ethical considerations related to data privacy and security, given the extensive use of personal customer data (Morelli et al., 2017). Thus, designing trustworthy service systems is a critical aspect of service design in Service 4.0.

Service 4.0 represents the technological transformation of services, and service design is vital to harnessing the potentials of these technologies efficiently and ethically. Service designers play a paramount role in shaping the future of service delivery by ensuring that innovative technologies translate into meaningful and superior service experiences.

The interaction commonly used when using services now requires rethinking the new ways of interaction and enables design to include fewer material aspects in its field of action. In the fields of service design and the nascent Service 4.0 paradigm, one intriguing aspect is the increasingly immaterial or less materialised aspect of design and interaction. The shift from tangible, product-based economic models to service-based models and now to digital platform-based models has accentuated the importance of elements that are less physical and more experiential, cognitive, and relational (Stickdorn et al., 2018). The conventional design has been tied closely to the material and tangible world, with a focus on the aesthetics, functionality, and ergonomics of physical artefacts. However, service design shifts this lens to designing processes and experiences involving a complex amalgamation of people, props, and platforms, making its outputs less materialised than traditional product design (Mager, 2009).

The intangible elements of service design are epitomised in the blueprint technique, a prevalent tool that helps visualise and organise complex service processes (Shostack, 2014). Unlike the tangible results in product design, the outputs of service design are abstract, such as customer journeys, personas, or strategy maps that guide the creation and delivery of service experiences (Zomerdijk & Voss, 2009). Interaction in service design underscores this immaterial aspect even more significantly. The essence of service lies in the interactions between service providers and customers, which are, by nature, immaterial, dynamic, and experientially rich (Holmlid & Evenson, 2008). The quality of these interactions heavily influences the quality of the service, shaping customer perceptions, and satisfaction.

### **Less Materials Aspect of Design in Service 4.0**

As Service 4.0 emerges, characterised by the incorporation of emerging technologies such as AI, IoT, and blockchain, the less materialised aspects of service design and interaction are taking on new dimensions (Paschou et al., 2018). For instance, service interactions are increasingly mediated by digital platforms and AI, making them less physical and more virtual. Moreover, in the context of Service 4.0, the design of services extends to the design of algorithms, big data analytics, and automated decision-making systems. Indeed, design thinking is shifting from designing tangible interactions to crafting complex adaptive systems, entailing a nuanced understanding of technological capabilities, data-driven insights, and human-machine interactions.

Simultaneously, the physical presence of user interfaces in Service 4.0 has diminished, making them more immaterial and permeating different aspects of daily life, from smartphones and wearables to ambient voice assistants and augmented reality/virtual reality. This shift also calls for a new understanding of interaction design that acknowledges the increasing invisibility and ubiquity of digital interfaces (Giaccardi & Karana, 2015). However, even as services become less materialised, the human element remains crucial. In a digitalised world of service interactions, designing meaningful, human-centred experiences becomes even more pertinent. Human needs, emotions, and socio-cultural contexts continue to present themselves as key aspects for consideration. Thus, the roles of empathy and a deep understanding of user behaviour have become increasingly prominent.

Therefore, the field of service design, specifically within the framework of Service 4.0, is venturing deeper into the less materialised aspects of design and interaction. This ongoing transition presents a fascinating research trajectory, potentially challenging established principles and practices in design and necessitating new competencies, methodologies, and mindsets.

## **Research Methods**

This research study employed qualitative methods to examine present-day service design education programmes. It also evaluated service design practices on the basis of qualitative data harvested from comprehensive interviews with professionals in the domain of service design and associated service sectors.

The research procedure was categorised into two stages to maintain a systematic approach. The initial phase was dedicated to gathering information about various service studies and closely examining the existing educational offerings of service design and corresponding programmes on a global scale. By utilising QS World University Rankings, a comprehensive list of renowned global universities was created, with a pivotal focus on the top five universities globally. In the context of Hong Kong, the study conducted an in-depth analysis and interpretation of the various emerging service design programmes available.

In the subsequent phase of this research, the focus was shifted to conducting detailed interviews with selected practitioners operating in different service sectors. This method was aimed at attaining a comprehensive understanding of the evolution of these practices within organisations over time. This would pave the way towards an advanced understanding of newly emerging service design practices, potential pathways, and identifying challenges associated with evolving technologies.

The sample pool for these interviews consisted of 15 professionals and 23 current students. The choice of respondents was intended to reflect the respondents' aspirations regarding their future career prospects and recount their professional journeys. By doing so, the study aimed to shed light on the future implications of service design for both educational platforms and the requirements emerging from the advent of Service 4.0.

Data were collected using methods such as semi-structured interviews that encouraged comprehensive and elaborate responses from the participants. Observations were also found to discern the service design competency and roles of designers within an institution's inner workings and respective projects. This multifaceted approach is designed to ensure a well-rounded exploration of service design practices and education.

## Result and Discussion

### The Landscape of Service Design Programme Offering

Service Design programmes worldwide play a crucial role in developing service design as a profession as well as a discipline. Each programme is at the master’s level and emphasises the most common areas of service design—tools/methods, designing service, service innovation and business innovation.

Institutes	RCA (Royal College of Art)	UAL (University of the Arts London)	Politecnico di Milano	Glasgow School of Art	PolyU
QS World Ranking	No. 1	No. 2	No. 5	No. 8	No. 20
Country	UK	UK	Italy	UK	Hong Kong
Level	Master	Master	Master	Master	Master
Programme	MA Service Design	MA Service Design	MA Product Service System Design	MDes Design Innovation & Service Design	MDes Smart Service Design
Format	2 years (Full-time)	1 Year 3 months (Full-time)	1 year (Full-time)	1 year (Full-time)	1 year (Full-time)
Subjects	Service Design Foundation Programme (20 credits); Design Entrepreneurship (20 credits); Design Research and Advanced Methods (20 credits); Design Management and Platform Design (20 credits); Social Innovation and Future Services (20 credits); Implementing and deploying Services at scale (20 credits).	User-Centred Project (40 credits); Ways of Working (20 credits); Design Futures (20 credits); Collaborative Unit (20 credits); Proposal Development (20 credits); Major Project (60 credits).	Business Innovation (6 credits); Design Methods (6 credits); UX Design (6 credits); Innovation Studio (12 credits); Visualization & Prototyping (6 credits); Service Design & Innovation (6 credits); Product Service System Design Studio - Service Design (12 credits); Design Seminar (6 credits); Final Synthesis Design Studio (18 credits); Internship+Final Interview (15 credits).	Core Research Methods: Working Towards the Preferable (20credits); Parallel Project (40 credits); PG Elective (20 credits); Design Innovation Studio 2-Service Design (40 credits); Master's Research Project (60credits)	Designing Services (3 credits); Service Design Principle: systemic perspective (3 credits); Advanced Service Design Methodologies (3 credits); Research and Analysis for Design (3 credits); Smart Service Design Specialism Studio 1 (3 credits); Socio-Technical Service Ecosystem (3 credits); Systemic Innovation and Design for Future (3 credits); Smart Service Design Lab: Data driven Service Design (3 credits); Smart Service Design Studio 2 (3 credits); Design for Service Experience (3 credits); Research and Academic Writing (3 credits); Capstone Project (6 credits)
Credits	120 Credits	180 Credits	120 Credits	180 Credits	36 Credits

Table 1. Top five MA in Service Design programmes worldwide (as of 2022)

Amongst the international institutes in art and design, the RCA’s MA in Service Design programme is uniquely positioned by historical influence over design communities and the industry and has held the No. 1 QS world university ranking since 2013. The programme was introduced in 2012 with the aims of developing research, disseminating new practices, tools and design processes towards solutions to current issues in design and carrying out projects to enhance innovation in both the private and the public sectors in an international context. Within this two-year postgraduate programme, the RCA fully embraces design, technology and business and industry partners. They nurture 120 students (2020), which is the world’s largest postgraduate class dedicated to service design.

Likewise, the UAL in the UK offers a four-term model, which comprises 15 months of full-time study. The UAL’s MA in Service Design programme, which was newly reformatted from MA in Service Experience Design in 2020, is offered by the London College of Communication at the UAL and teaches design disciplines that will broaden students’ understanding of design innovation as a collaborative and interdisciplinary process. The programme develops and serves a range of societal challenges through live design projects with industry partners at both the strategic and systems levels. Students’ backgrounds range from social science and business to other related fields, including those with industry and non-traditional design backgrounds.

Regarding the Mdes Service Design in Innovation School at the Glasgow School of Art in the UK, their MA in Service Design programme comprises six specialist pathways. Their

programme allows students to direct their studies towards their own professional goals and explore a specific context of practice. The service design speciality is taught as an approach to design processes to solve complex social problems and focuses on social value as well as economic impact, which is about addressing problems that affect people and society.

The MA in Product Service System Design programme at Politecnico di Milano aims to explore a combination of products, services, spaces, people, communication and digital artefacts for which sustainable design solutions are needed. Their programme is T-shaped with a vertical axis. The first level focuses on a specific design area (product, communication, fashion, etc.) and integrates with a horizontal axis relating to the acquisition and use of cultural tools and matrices from other disciplinary and cultural spheres in a manner similar to that of PolyU's programme. In particular, Politecnico di Milano offers knowledge of service design methods and tools, analysis of user behaviour, and social and technological innovation phenomena to define design opportunities and thereby enhance students' entrepreneurial skills.

### **Service Design Education in the Context of Hong Kong**

By contrast, Hong Kong Polytechnic University (PolyU)'s Smart Service Design (SSD) programme emphasises advanced service design methodology and lab/studio work collaborating with service industry partners. Considering the global top-tier postgraduate service design programmes, it is expected that the content of PolyU's curricula and its service design involvement in wider communities should contribute to service design, which exclusively implies the nature of the demand for service design professions and an understanding of the current state of the service economy in Hong Kong. PolyU Hong Kong is proposing an emphasis on inter- or trans-disciplinarily approaches backed by technologies. Potential graduates of the SSD programme would enter the field of professionals with everything from strategic to systemic and integrated skills, which will allow them to develop new products and arm them with the service experience and complex communication skills needed in wide service sectors.

Although Hong Kong University's School of Professional and Continuing Education (HKU-Space) and the University of Warwick VTC both offer broad-based service design programmes for both a Postgraduate Diploma in Product Innovation and Service Design and an MSc in Service Management and Design, no Master of Service Design programme was introduced in Hong Kong until 2021. Based on the service economy needs and PolyU's unique proposition in the North East Asian context, this comparison presents a significant, although neglected, new proposal of how service design should be benchmarked against high-level international programmes that run postgraduate programmes in service design.

### **Service Design Demands and Expectations From the Chinese and Hong Kong Context**

In the wake of progressive digital technologies, the service sector's landscape is undergoing a significant transformation. Hong Kong possesses a unique position within this shift to a digitally oriented service economy, making notable contributions of about 90% to the city's economy and even more to the Guangdong–Hong Kong–Macau Greater Bay Area (Statistical Digest of Services Sector, 2020). Hong Kong's economic model has been gradually transitioning from a manufacturing-based milieu to one dominated by service-oriented activities, making it a significant hub for international trade, finance and tourism. This economic metamorphosis has been instigated by government policies of minimal interference

and preferential taxation that have inadvertently attracted myriad overseas corporations specialising in various segments of the service industry to base their operations in the city (Lee, 2019).

Over the past few years, the Hong Kong government has implemented several strategies aimed at transforming Hong Kong into a global technology innovation hub (Wong et al., 2020). The Greater Bay Area initiative is one such significant undertaking, backed by a financial allocation of HKD 50 billion to stimulate innovation and technological development. To catalyse this colossal shift towards a digital economy, the government has fostered collaborations with numerous universities and tech enterprises both within the country and abroad (Cheung & Fong, 2020).

The need for services and technology in the economy is undeniably crucial. However, there is a growing awareness that the realisation of innovation lies not only in technology but also in value-added product, service and system design (Zhang & Song, 2021). Numerous examples can be observed in both the private and public sectors, encompassing diverse industries such as technology, consumer electronics, healthcare, tourism, hospitality, telecommunications, insurance, finance and government services. Respected global consultancies (e.g. IDEO, Livework, Engine, Fjord and EY) currently serve an extensive client base from both these sectors. The requirement here is an integrated approach to designing service experiences and systems that involves a fusion of multiple design disciplines into a systems-based solution. A comprehensive understanding of the technological, commercial and organisational context is also vital for creating and implementing innovative services.

Nevertheless, despite escalated attempts to foster the growth of service design as a professional discipline, there exists a substantial gap between demand and supply due to a significant deficit in the necessary skills in the Hong Kong technology and service sectors. Moreover, the capability for and value of service design are not sufficiently acknowledged (Yang & Sang, 2020). Therefore, reforms are warranted in the prevalent education design that attend to emerging industry needs and potential market demands. Additional measures, such as the establishment of the Service Design Network (SDN) and the SDN Hong Kong Chapter, would be instrumental for curating a professional platform conducive for local and international interdisciplinary collaborations and knowledge exchanges.

### **Service Designer's Expected Career Pathway and Roles in the Service Sector**

According to a thorough analysis of interviews with service industry professionals, including those who pursued postgraduate studies to finesse their skill set, two career path models have been identified. Despite the lack of formal recognition of their designation as service designers and professional designations diverging from 'service designer', their roles align closely with service design job responsibilities. Given the inadequate dissemination and recognition of service design capabilities in the current service industry, many professionals are functioning as service designers under a variety of job titles. (i.e., UX designers, design researchers and design managers).

Such roles are diverse, and their job categories are contingent on the level of recognition and knowledge the organisation has for service design's relevance and capabilities. For instance, organisations that focus on digital products for the service experience employ a slew of professionals with titles such as 'UI/UX designers', 'service researchers' and 'product design managers' to conduct the researching, mapping, visualising and materialising of customer

and stakeholder experiences and journeys. Furthermore, they work closely with teams across the organisation, including the research team, UX team, back-end engineering team and the product owner. Additionally, in organisations closer to digital service management- or consulting-based firms, service designers (or designers in service delivery teams) tend to collaborate closely with stakeholders closer to management, such as service consultants, project managers and service quality managers.

In other words, both tracks require a collaborative mindset, the ability to understand research data and leadership that is more strategic and understands the whole rather than a single product/service. Ultimately, the design of a service encompasses more than the sum of its parts and necessitates a comprehensive, strategic understanding of the whole rather than a narrow focus on individual products or services. It requires a collaborative mindset, a comprehensive understanding of research data and strategic leadership that is not limited to a single product/service. Actuating service design as a profession at the organisational level could help bridge these gaps, meeting the escalating demand intrinsic to a digitally transformed service sector.

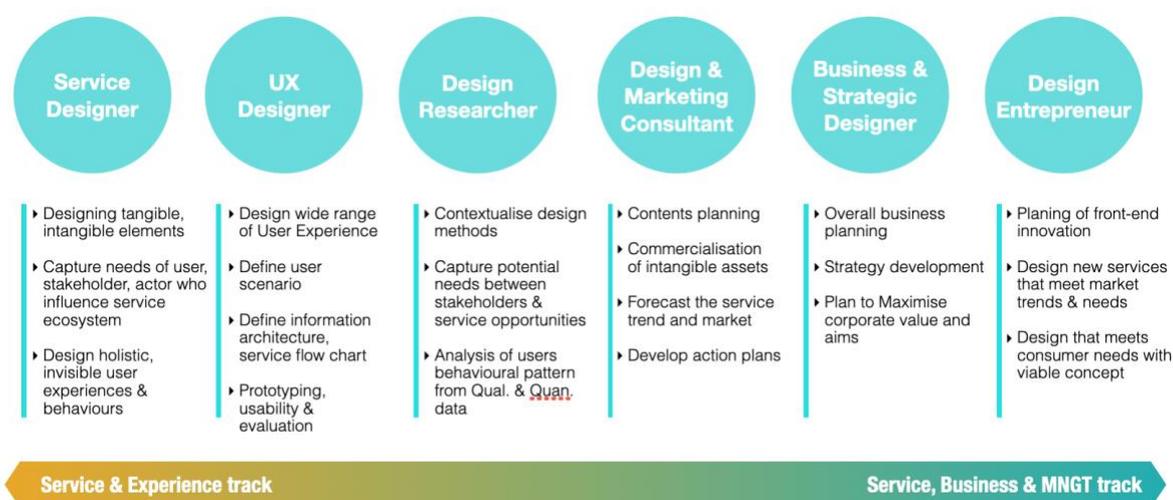


Figure 1. Career pathway and roles in the service sector

## Role of Service Design Profession and Relationship Within Service Sector

As professionals gain experience and redefine the boundaries of predefined roles, their initial understanding of service design evolves. This development entails a comprehensive interpretation of service design and its role within an organisation. Correspondingly, service design has now extended to the implementation stages, thereby fostering both organisational and technological advancements.

In the current era of digital innovation within the service sector, this progression necessitates an amplified focus on technical competencies amalgamated with strengthened project management and stakeholder administration skills (Kimbell, 2011). As companies recognise the need to adapt to a rapidly evolving digital landscape, service design's role as a transformative agent is being understood and valued (Segelström, 2013). The dynamic organisational structures and transformations call for the establishment of a new norm deviating from the traditional 'business as usual'. Service design plays a pivotal role in this deviation by promoting collaborative practices that are essential for integrated design processes.

Service design professionals perceive their role not only as designers but also as strategic contributors to the organisation, as demonstrated by Figure 2. Thus, the service designer's role transitions from focusing on individual projects to undertaking broader strategic management responsibilities, expanding the horizon of service innovation through practices such as scenario building and foresight-based planning.

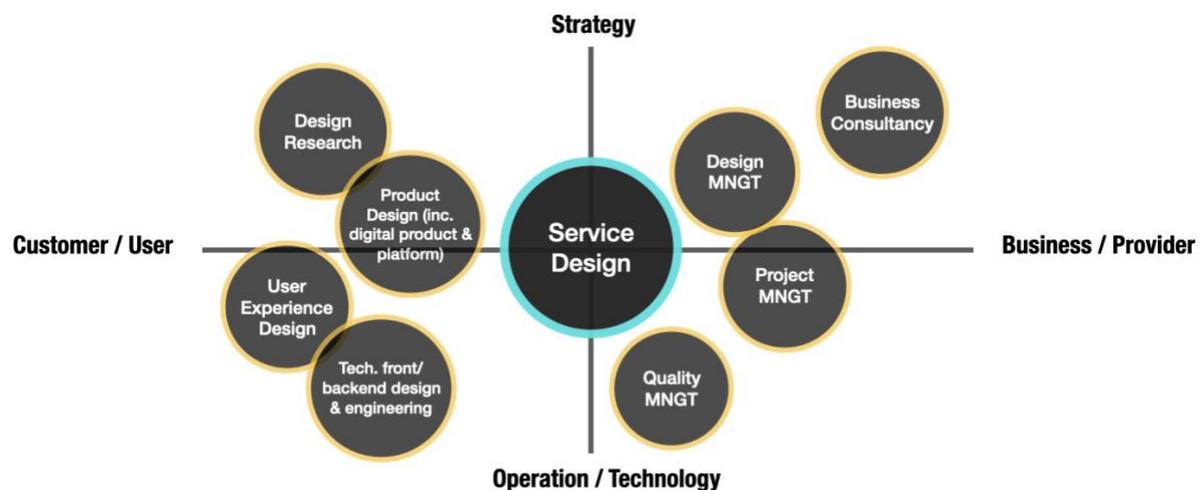


Figure 2. Service design position and relationship within the organisation in the service sector (Author)

However, an issue of contention is that such higher roles are predominantly occupied by senior designers, leaving junior or newly hired designers feeling left out. The rising predominance of automated visualisation and UX tools can substitute for or quicken the operational design tasks of junior designers.

Presumably, then, it might not be as essential for junior designers or those new to service design to learn about service design to become design managers. Instead, it might be more relevant to enhance cooperative and collaborative attitudes towards work, synthesise insights, refine one's interpersonal skills, and broaden one's perspectives to scrutinise issues from various angles.

This evolution validates the growing significance of service design in stimulating organisational transformation and technological advancement, surpassing its traditional boundaries. Hence, service design educators should acknowledge these shifts and develop pedagogies that equip future designers for the versatile roles they may assume in an organisation. Moreover, this recognition will encourage organisations to exploit the expansive capabilities of service design to accommodate the mounting expectations of a digitally advanced service sector. It will also arm service design professionals with the skills necessary to keep pace with swift digital advancements and evolving industry demands.

## Conclusion

This paper has identified three key areas of potential implications for service design in Service 4.0 within the unique Hong Kong context.

First, the study has refined the understanding of service design's role in sectors such as UX, user research, project management, and digital service delivery, highlighting its considerable influence. This influence is largely determined by the characteristics of specific organisations and their service offerings, indicating the importance of context in interpreting and applying service design best practices.

Second, the paper addresses the challenges posed by the growing integration of automation and digital technologies in service design. While these technologies oblige design professionals in the service sector to evolve, they provide opportunities for growth and competency development within the profession.

Third, considering that changes can occur in multiple directions, this study ventures into forecasting roles and structures of the service design profession. It proposes potential scenarios for innovative service design education that reflect the changing landscape of the discipline.

Underscoring the multidisciplinary nature of service design across sectors and domains, this study seeks to pinpoint new opportunities for future professional directions. It also attempts to fathom the unparalleled value that service design confers in an era marked by a rapid technological revolution. As service design transcends traditional boundaries and stakes its significance in driving organisational transformation, its potential contribution to the realm of the digital service sector seems limitless. While challenges are inevitable, the evolution of service design presents monumental prospects for both practitioners and the industrial landscape at large.

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