



RESEARCH REPORT

Enhancing User Experience: Spatial Architectural Framework

Colleen Meyer

u17013586

Supervisor

Janri Barker

Department of Architecture
Faculty of Engineering, the Built
Environment and Information Technology
University of Pretoria
South Africa

4 July 2024

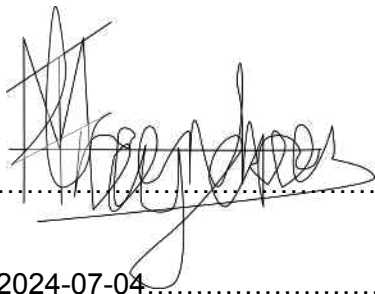
© University of Pretoria

DECLARATION OF ORIGINALITY

I declare that the mini-dissertation, Enhancing User Experience: Spatial Architectural Framework, which has been submitted in fulfilment of part of the requirements for the module of DIT 803, at the University of Pretoria, is my own work and has not previously been submitted by me for any degree at the University of Pretoria or any other tertiary institution.

I declare that I obtained the applicable research ethics approval in order to conduct the research that has been described in this dissertation.

I declare that I have observed the ethical standards required in terms of the University of Pretoria's ethics code for researchers and have followed the policy guidelines for responsible research.

Signature: 

Date: 2024-07-04.....

TABLE OF CONTENTS

1. LIST OF FIGURES.....	4
2. LIST OF TABLES.....	5
3. ABSTRACT.....	6
Keywords:.....	6
4. INTRODUCTION.....	6
4.1. Defining people, place and programme.....	8
4.1.1. Place.....	8
4.1.2. People.....	8
4.1.3. Programme.....	9
5. THEORETICAL FRAMEWORK.....	10
5.1. Integrating and overlapping people, place and programme.....	11
5.1.1. Place:.....	11
5.1.2. People:.....	11
5.1.3. Programme:.....	11
5.2 Introducing Interdisciplinary Concepts.....	14
5.3. Defining Interdisciplinary Concepts.....	14
5.3.1. Business Process Design (BPD).....	14
5.3.2. Service Design (SD).....	15
5.3.3. Interior Spatial Design (ISD).....	15
6. RESEARCH METHODOLOGY.....	18
6.1. Review Question.....	24
Step 1: Review Question.....	24
6.1.1. Study sub-questions and objectives.....	24
6.2. Sampling.....	25
Step 2a: Searching.....	25
Step 2b and 2c: Screening & Selecting.....	28
6.3. Data Collection & Critical Appraisal.....	29
Step 3: Data Collection & Critical Appraisal.....	29
7. RESULTS & FINDINGS.....	33
Step 4a: Data Analysis.....	33
7.1. Business Process Design Tools.....	33
7.1.1. BPD Tools.....	34
7.2. Service Design Tools.....	36
7.2.1. SD Tools.....	37
7.3. Interior Spatial Design Tools.....	40
7.3.1. ISD Tools.....	41
7.4. Service Design and Interior Spatial Design Tools.....	44
7.5. Business Process Design, Service Design and Interior Spatial Design Tools.....	47
8. DISCUSSION.....	50
Step 4b: Synthesis (Lubbe et al., 2020).....	50
8.1. Spatial Framework Development.....	54
Stage 1: Client and User.....	56
Stage 2: Site Analysis.....	56
Stage 3: Building Analysis.....	57
Stage 4: Pre-Design.....	57
Stage 5: Schematic/Next Phase.....	57
8.2. Future Development.....	58
9. CONCLUSION.....	58
10. REFERENCES.....	59
11. APPENDICES.....	64

1. LIST OF FIGURES

Introduction:

Figure 1: Problems: In the pre-design phase, User-Centred design is neglected, and People, Place, and Programme within architecture are disconnected (Author, 2024).

Figure 2: Programmatic requirements (Geburu, 2018; Hersberger, 1985; Popov and Goza, 2016)

Figure 3: People, Place and Programme and interdisciplinarity co-ordination between BPD, SD and ISD (Author, 2024)

Theoretical Framework:

Figure 4: Space syntax and narrative theory relationship (Author, 2024)

Figure 5: Programme identification (Author, 2024)

Figure 6: People, place, programme (PPP) and user experience diagram (Author, 2024)

Figure 7: Research fields, diagram (Author, 2024)

Figure 8: BPD, SD, ISD and user experience diagram (Author, 2024)

Research Methodology:

Figure 9: Conventional primary research process for an ILR presented by various authors over time (Lubbe et al., 2020).

Figure 10: ILR five-step research process (Lubbe et al., 2020).

Figure 11: Research process diagram to indicate documentation onto an Excel spreadsheet throughout the process (Author, 2024).

Figure 12: Excel Spreadsheet Documentation (Author, 2024)

Figure 13: Overview of the Research Question being investigated (Author, 2024)

Figure 14: Keyword strings (Author, 2024)

Figure 15: PRISMA Diagram (Author, 2024)

Figure 16: Representation Image of the Critical Appraisal Checklist (Beattie et al., 2015). For the complete checklist and appraisal example, see Appendix B and C.

Results and Findings

Figure 17: Value Chain internal activities of Starbucks (Dieffenbacher, 2022)

Figure 18: BPMN with a Value Chain forming part of this tool (Pratama and Utama, 2019)

Figure 19: User Experience, Spatial Qualities and Programmatic Requirements within the Value Chain Tool (Author, 2024)

Figure 20: BPD diagram (Author, 2024)

Figure 21: SD diagram (Author, 2024)

Figure 22: User states and context (Buhley, 2020).

Figure 23: Jobs to be Done (Ulwick, 2016).

Figure 24: User Experience, Spatial Qualities and Programmatic Requirements within the User States & Context and Jobs to be Done Tools (Author, 2024)

Figure 25: ISD diagram (Author, 2024)

Figure 26: User Experience Evaluation Framework (Dong and Liu, 2018).

Figure 27: The SUE Model (Juliá Nehme et al., 2020).

Figure 28: User Experience, Spatial Qualities and Programmatic Requirements within the User Experience Evaluation Framework and Sue Model Tools (Author, 2024)

Figure 29: Double Diamond method (Chang and Chuang, 2021; Wilson and Davies, 2019)

Figure 30: Service Design (Online store) Customer Journey Mapping (Athuraliya, 2020).

Figure 31: Spatial Design Customer Journey Mapping (online-spatial journey and spatial journey) (Athuraliya, 2020).

Figure 32: The Spatial Service System Map of Elderly Centre De Lisdodde documenting existing services (workshops, co-working spaces) and existing space. Identifying opportunities for new services and spaces (van Geetsom and Wilkinson, 2021)

Figure 33: Spatial walkthroughs (Chafi and Cobaleda-Cordero, 2022).

Figure 34: Service Blueprint shows all the steps and activities involved in the phone service (Trkman et al., 2015).

Figure 35: Service Blueprinting involving the service panel for an App service (Marquez, 2015).

Figure 36: Relationship diagram of product experience (PX), user experience (UX) and customer experiences (CX) (Girginkaya and Ergen, 2021)

Figure 37: Relationship diagram within BPD, SD and ISD adapted from Girginkaya and Ergen (2021)

Discussion:

Figure 38: Proposed Spatial Framework stages and categories with suggested tools (Author, 2024)

2. LIST OF TABLES

Table 1: Definitions and abbreviations

Table 2: Keyword identification

Table 3: Inclusion and exclusion criteria for search strategy

Table 4: Selection criteria to determine the most effective tools accommodating user experience, place, programme and people.

Table 5: Final tool selection (n=10) to enhance user experience.

Table 6: Analyse & Evaluate BPD, SD and ISD tools.

3. ABSTRACT

This integrative review investigates how business process design, service design, and interior spatial design tools can improve user experience, spatial qualities, and programmatic requirements in the pre-design phase of architecture. Better spatial design can be achieved by understanding the relationship between people, place, and programme. The integrative literature review identified existing tools in these interdisciplinary fields to enhance user experiences during the pre-design phase. Of 206 articles, 60 were analysed, highlighting ten tools best suited to this purpose. User experience in architecture often suffers due to the neglect of people, place, and programme. This review shows how these tools can be combined, adapted, and developed into a pre-design framework to define user experience, spatial qualities, and programmatic requirements and improve overall architectural outcomes.

Keywords:

business process design, service design, spatial design, pre-design phase, user experience, programmatic requirements, and spatial qualities

4. INTRODUCTION

A comfortable interior space welcomes people, making them feel safe and at ease, while an uncomfortable space can make people feel threatened (Ediae et al., 2022). Well-considered spatial design is vital to accommodating people within a physical environment by incorporating spatial qualities and programmatic requirements that shape their experience (Girginkaya and Ergen, 2021; Lee, 2022). Identifying user needs and requirements within a space is crucial for adequate accommodation and improving the pre-design phase (Ndovela et al., 2022). There is a close relationship between people, place, and programme, as they mutually influence how effectively user needs are met (Gebbru, 2018). These three concepts define the spatial qualities, programmatic requirements, and user experience within spatial design.

A notable disconnect exists between research and practical application within the architectural domain. The design process has evolved, notably with the emergence of technology, which has brought advantages (De Rosa, 2022). The conventional spatial design process comprises five stages: the pre-design phase, schematic design, design development, construction documents and bidding. The pre-design phase is often overlooked and needs a standardised process (Chuang and Chien, 2021). Research should prioritise identifying and understanding this phase's most effective methods and benefits. In the field, assumptions prevail regarding the nature of pre-design, leading to varied approaches across different practices (Chuang and Chien, 2021). Diverse methods in the pre-design phase are not inherently problematic, but the lack of a well-defined, adaptable structure and clear processes reduces their effectiveness. This also affects the architect-client relationship, as clients often need help understanding all aspects of the pre-design phase (Chuang and Chien, 2021).

Defining the scope of the pre-design phase is necessary for starting a project, identifying user and client needs, and shaping all subsequent phases (Erebor et al., 2019). Girginkaya and Ergen (2021) emphasise that this phase involves thorough research into the physical and social environment of the project area. Essential tasks include defining the project's scope, conducting site analysis, detailing requirements, and planning the budget. This involves site visits, surveys, and data analysis from client or user discussions to understand their often-overlooked needs and habits (Erebor et al., 2019). This gap hinders the incorporation of user-centric approaches during the pre-design phase. This stagnation challenges architects, designers, planners, and end users, as there is no consistent framework to guide the initial stages of a project (De Rosa, 2022). This is why the pre-design phase is critical for determining the detailed scope of requirements. Rigorous analysis in this phase ensures that client or user needs are met, resulting in a positive user experience and well-performing spatial qualities (Gebbru, 2018).

User experience in architecture is defined by interactions with the physical environment, other users, and the surrounding space (Bilgin, 2023). As users engage with and perceive elements within the space through their senses, this experience evolves into a narrative, crafting memorable experiences characterised by accessibility, usability, satisfaction, responsiveness, and visual appeal (Chafi and Cobaleda-Cordero, 2022; Cheng, 2019; Bilgin, 2023; Ediae et al., 2022; Unanue et al., 2021). However, projects often involve extensive documentation, leading to overlooked requirements and unmet needs that result in neglected user experience (Gebbru, 2018; Kock and Steen, 2012; Popov and Goza, 2016). Despite existing research on user experience, its exploration concerning user needs and programmes within physical spatial environments remains incomplete (Musulin and Strahonja, 2023). In interior architectural design, human factors such as inclusivity, comfort, and desires significantly influence the overall user experience (Ferdous, 2020). This involves considering how a space's physical and emotional qualities affect users and their physical interactions with that space (Lee, 2022).

People, place, and programme concepts are valuable in architecture because they define how users interact within a space (Lee, 2022). These elements influence each other, creating a holistic approach to spatial design. Architecture traditionally focuses on the physical aspects of space and form but often overlooks how people interact with and experience spaces, which gives buildings meaning (Shields, 2023). Despite their significance in daily life, spatial qualities and user needs are often neglected in the design process (Lee, 2022; Sime, 1986). Without a straightforward approach to integrating user needs and programmatic requirements, the potential for optimal user experience in the physical environment is compromised (Erebor et al., 2019). Understanding how people interact with their environments is crucial in architecture (Popov and Goza, 2016), as buildings and places significantly shape user experience (Ediae et al., 2022; Salama et al., 2024; Yamu, van Nes, and Garau, 2021). This understanding forms the basis for innovative approaches in architectural planning, creating a comprehensive framework applicable across different fields to shape effective spatial design (Girginkaya and Ergen, 2021).

Nicolini (2022) stresses the importance of interdisciplinary collaboration in exploring and discussing user-centred approaches, integrating people, places, social, environmental, and cultural aspects with flexible frameworks. Currently, fields like Business Process Design (BPD), Service Design (SD), and Interior Spatial Design (ISD) operate independently and require integration (De Rosa, 2022). These fields use tools in isolation, often neglecting factors such as user experience, spatial qualities, and programmatic requirements (Musulin and Strahonja, 2023). While each field's tools excel in different areas, they often lack strength in others. Integrating these disciplines enhances interior architecture by effectively addressing user experience, spatial qualities, and programmatic requirements within spatial design (Girginkaya and Ergen, 2021; Lee, 2022). This integration considers concepts of people, place, and program, promoting interrelationships among interdisciplinary fields and establishing a structured approach to spatial design in architecture (Salama et al., 2024).

Business Process Design (BPD) centres on meeting user and functional requirements, placing a strong emphasis on customer satisfaction and excelling in programmatic needs (Babb, 2024; Smith, 2003). Service Design (SD) focuses on human-centred services, prioritising user involvement and process requirements (Musulin and Strahonja, 2023). SD collaborates with both Business Process Design (BPD) and Interior Spatial Design (ISD), aiming to enhance service delivery to users or clients, thereby improving programmatic requirements and user experiences. Interior Spatial Design (ISD) concentrates on how users perceive and interact with their physical surroundings, highlighting spatial qualities and user presence within spaces (Radder, Koekemoer, & Van, 2019). Integrating these disciplines offers a comprehensive approach to meeting user needs and creating effective spatial designs.

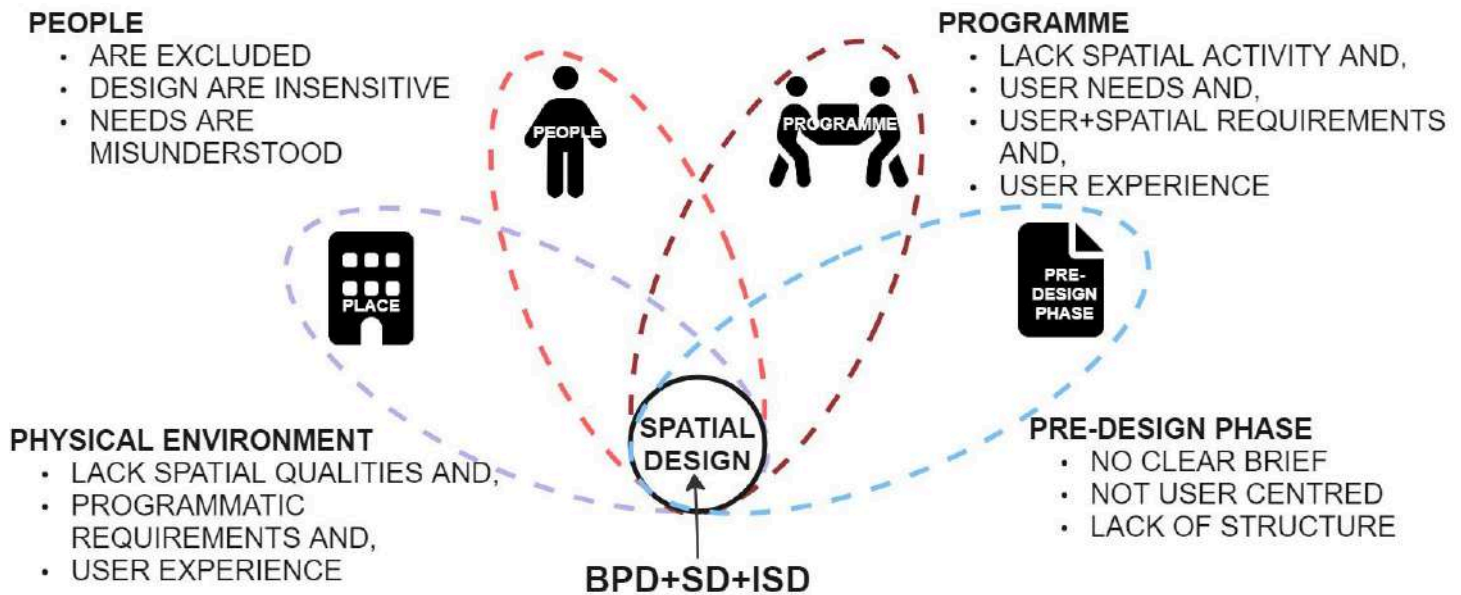


Figure 1: Problems: In the pre-design phase, User-Centred design is neglected, and People, Place, and Programme within architecture are disconnected (Author, 2024).

The study aims to enhance user experiences by analysing, combining, and adapting existing tools from business process design (BPD), service design (SD), and interior spatial design (ISD). It focuses on documenting spatial qualities, programmatic requirements, and user experience to improve the pre-design phase with a clear brief and requirements (Geburu, 2018), promoting safer and more accessible environments (Samreen and Jha, 2024).

4.1. Defining people, place and programme

4.1.1. Place

Architects design spaces by focusing on their shape and size, sometimes without fully considering how people will use and feel in them (Seamon, 2002). Architecture as a place means that a building can either enhance or detract from its connection and integration with users (Sime, 1986). Familiarity with a physical environment creates muscle memory through specific spatial experiences and behavioural connections, shaping how people interact with and perceive the space (Lee, 2022; Shields, 2023). De Rosa (2022) explains that the relationship between place and people on a psychological level makes users feel good about themselves and fosters emotional attachments, creating meaningful places (Mace, 2016; Seamon, 2002; Sime, 1986). Seamon (2002) extends this concept beyond the exterior walls of a building, encompassing events, actions, and experiences. Spaces become settings where narratives of place, identity, and community are lived and felt, enhancing user experience by making it more coherent and impactful. Physical environments are important as they shape the perception and experience of the user, creating a holistic view (Ediae et al., 2022; Salama et al., 2024; Yamu, van Nes, and Garau, 2021).

4.1.2. People

In architecture, people are the users or clients who occupy, use, interact with, or experience a space or building (Shields, 2023). Consideration of people's needs, behaviours, interactions, and satisfaction is important for navigating spaces and using products or services effectively, taking into account physical, sensory, and behavioural aspects (Lee, 2022). People store memories and emotions linked to places they have experienced, often viewing these places unconsciously. This process visually represents the physical environment through memory and experience (Lee, 2022; Popov and Goza, 2016; Shields, 2023). It is a personal and social experience, meaning interior

spaces can evoke different responses from different people (De Rosa, 2022; Lee, 2022; Popov and Goza, 2016). Popov and Goza (2016) state that the relationship between activities within a space and the user's needs connects people to their environments. Understanding this relationship helps explain human behaviour in different settings (Lee, 2022).

4.1.3. Programme

In architecture, a programme outlines and describes the functions, requirements, and activities a building or space must support (Figure 2). It guides the entire design process and focuses on understanding users' needs (Gebru, 2018; Popov and Goza, 2016). A programme in design focuses on understanding users' or clients' situations, needs and desires within the physical environment. People's activities within a space create specific requirements for that environment (Karp, 1969; Popov and Goza, 2016). These interactions between programmatic needs and spatial configurations define the criteria for activities in a space (Kock and Steen, 2012). Gebru (2018) and Kock and Steen (2012) highlight the importance of identifying current user needs to ensure the physical environment meets them through a tailored programme. The physical space's layout, orientation, function, connections, lighting, sound, and temperature are essential to achieving programmatic requirements (Gebru, 2018; Popov and Goza, 2016).

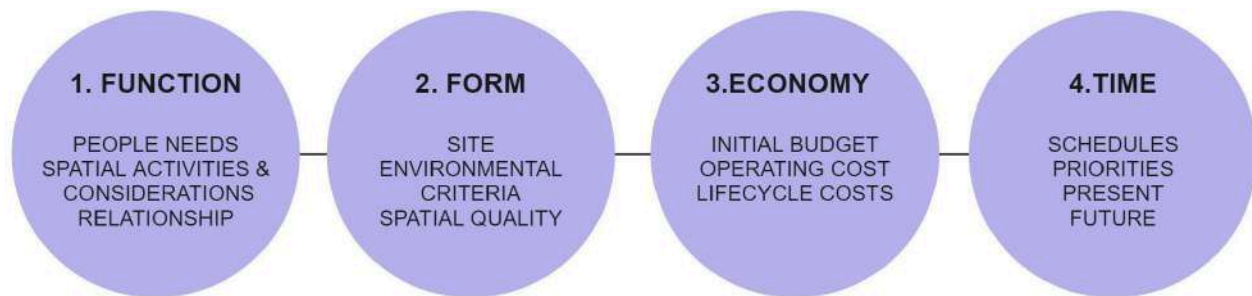


Figure 2 Programmatic requirements (Gebru, 2018; Hershberger, 1985; Popov and Goza, 2016)

This paper further explores the interrelation, mutual influence, and impact of people, place and programme within spatial design in the architecture domain. It is important to examine people, place, and programme (PPP) across the three selected interdisciplinary fields of Business Process Design (BPD), Service Design (SD), and Interior Spatial Design (ISD) to assess their representation within these domains (Figure 3). Using an interior architecture perspective, this study employs narrative theory and space syntax to address the physical environment's tangible aspects and the impact on user needs and experience (De Rosa, 2022). Understanding what users need is crucial and can enhance user experience. It is shaped by the qualities and flow of space and deepened by knowing the processes and requirements within architecture (Baradaran Rahimi et al., 2018).

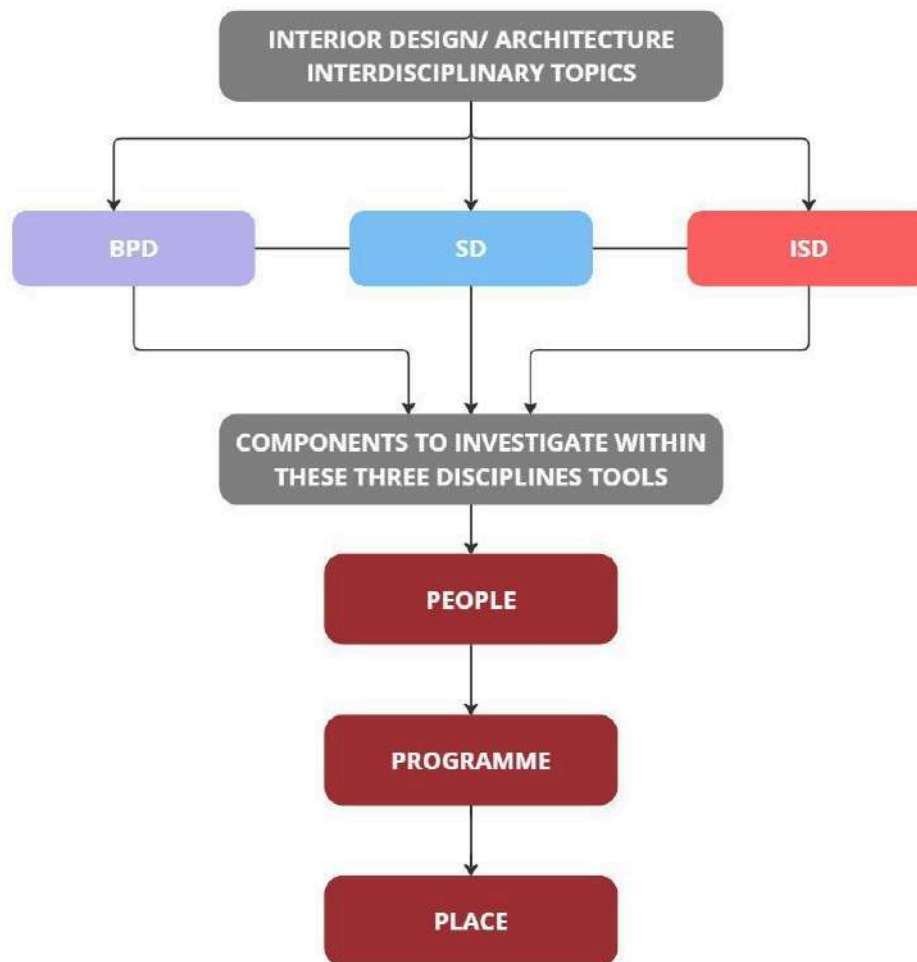


Figure 3 People, Place and Programme and interdisciplinarity co-ordination between BPD, SD and ISD (Author, 2024)

5. THEORETICAL FRAMEWORK

Narrative theory in architecture uses storytelling principles to design and perceive spaces, creating functional environments that tell stories through spatial arrangement, forms, materials, and symbols (Juliá Nehme et al., 2023). This approach aims to evoke emotional responses and engage users deeply, enabling architects to create memorable, immersive experiences (Salama et al., 2024). It is applied in both the design process and interpretation of existing buildings, offering a comprehensive framework for analysing the reviewed studies (Wheele et al., 2023). Bernard Tschumi highlights the narrative nature of architecture, focusing on people and their movement (Juliá Nehme et al., 2023; Hong, 2020).

Space syntax in architecture examines how spatial layouts affect connectivity, accessibility, and visibility in buildings and urban areas, influencing human behaviour and social interactions (Karimi, 2018). It links theoretical insights with practical applications, enhancing understanding of the spatial organisation and its impact on users (Yamu, van Nes, and Garau, 2021). From interior spaces to urban contexts, space syntax focuses on space usage, movement patterns, and visual connections (Karimi, 2018). This evidence-based approach improves design and planning by highlighting the relationship between spatial configurations and their social consequences, known as the space-society paradigm (Yamu, van Nes, and Garau, 2021).

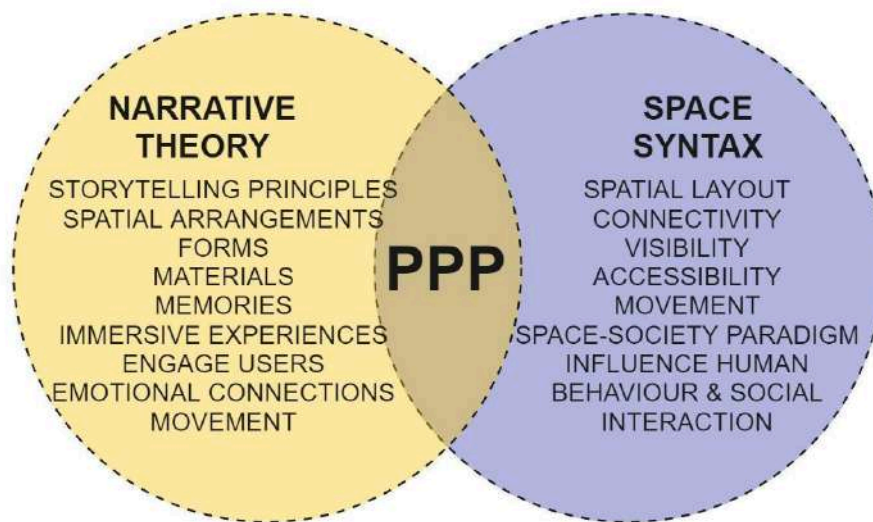


Figure 4 Space syntax and narrative theory relationship (Author, 2024)

Space syntax and narrative theory (Figure 4) might appear separate in their approaches and applications, primarily because they belong to different realms of theory where space syntax is more quantitative and narrative theory more qualitative. However, they share common ground in investigating how spaces impact human behaviour and user experience.

5.1. Integrating and overlapping people, place and programme

People, place and programme as a holistic approach towards spatial design and present the overlapping parts of narrative theory and space syntax:

5.1.1. Place:

Space syntax and narrative theory both examine how people experience and interpret environments. Space syntax examines how spatial layouts influence movement, visibility, and social interactions, shaping how people navigate and use spaces (Yamu, van Nes, and Garau, 2021). On the other hand, narrative theory studies how stories and narratives affect our understanding and experience of spaces (Salama et al., 2024). Combining these theories in architecture provides a comprehensive view of how physical spaces are shaped by and shape the narratives people create—whether it is the dynamic story of a busy city square or the serene feeling of a park (Salama et al., 2024). These narratives go beyond physical features to include people's emotional, cultural, and social connections with their environments, highlighting the link between physical spaces and social interactions (De Rosa, 2022).

5.1.2. People:

Both theories help us understand human behaviour in environments. Space syntax provides data on how specific spatial layouts can predict or influence movement patterns and social interactions, which are parts of the daily stories people create about their surroundings (Karimi, 2018). Narrative theory explains how these patterns and interactions become part of personal or communal stories (De Rosa, 2022). Bernard Tschumi suggests that people's behaviour in an environment has a purpose, whether conscious or unconscious, and they play a vital role in architecture by engaging in various experiences (Hong, 2020).

5.1.3. Programme:

A building needs a function, activity, or event to exist (Hong, 2020). Space syntax and narrative theory consider spaces' cultural and social contexts. Narrative theory explores how these contexts

shape the activities associated with and within those spaces, while space syntax demonstrates how physical layouts can support or hinder the narratives created by these activities (Juliá Nehme et al., 2023; Karimi, 2018). Combining space syntax and narrative theory in architecture and design can make design decisions more intentional (Figure 5). Space syntax can shape physical layouts to encourage certain behaviours and interactions, like fostering community in residential areas or workplace efficiency (Yamu, van Nes, and Garau, 2021). Narrative theory helps designers think about how a space tells a story or conveys a message, enhancing its emotional and psychological impact (De Rosa, 2022).

*A museum is used as an example to illustrate the concept of a programme and its subcategories.



Figure 5 Programme identification (Author, 2024)

The integration of space syntax and narrative theory in architecture and design aims to create environments that are both functional and resonate with users on a deeper narrative level, addressing their needs and integrating spatial qualities and programmatic requirements (Salama et al., 2024; Yamu, van Nes, and Garau, 2021).

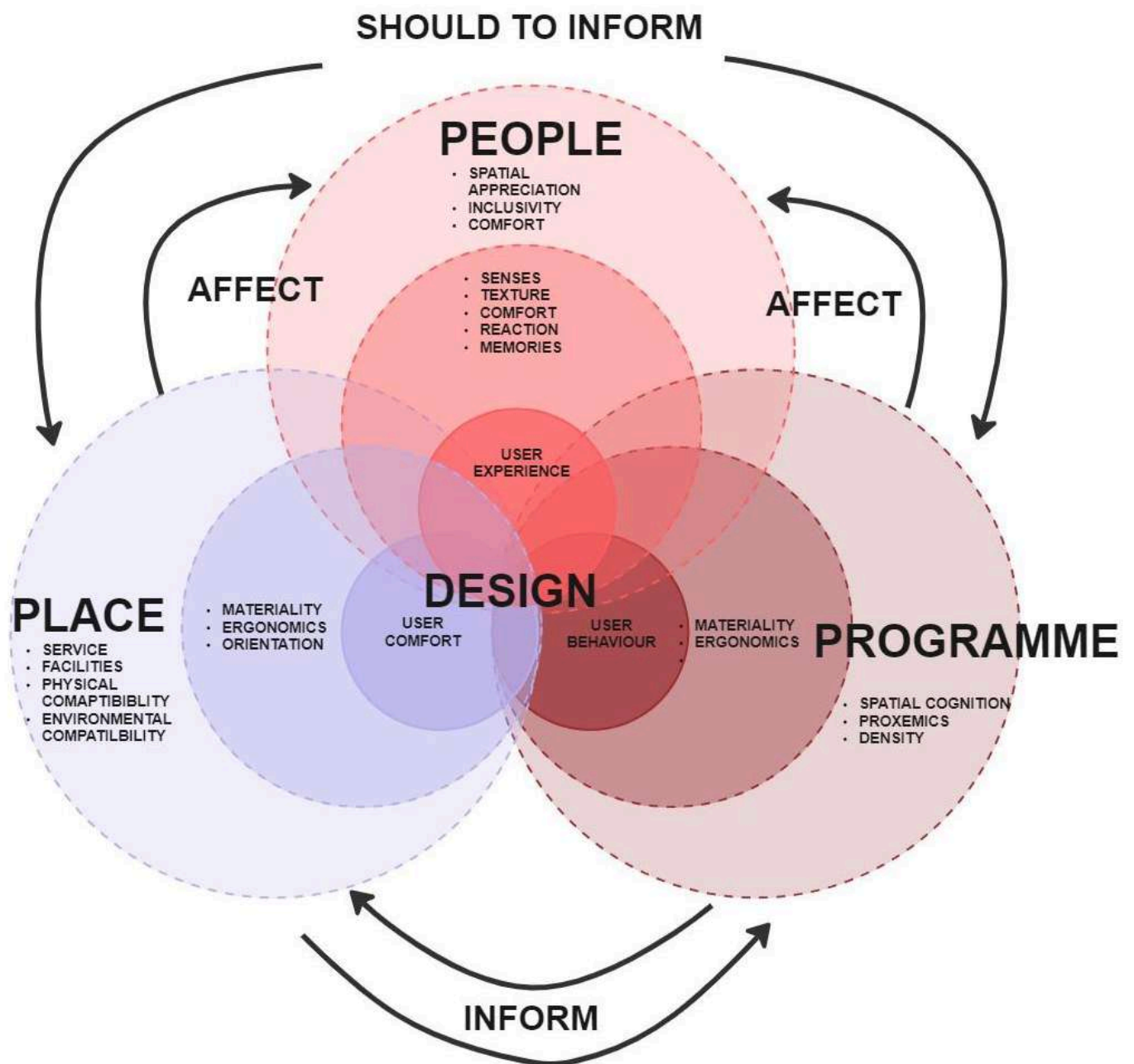


Figure 6 People, place, programme (PPP) and user experience diagram (Author, 2024)

The PPP diagram (Figure 6) illustrates the interconnected relationship between programme, place, and people, demonstrating how each element influences spatial design. The programme affects user experience based on functionality, while the spatial qualities of the place impact how well it accommodates the programme (Popov and Goza, 2016). Together, these components determine how effectively user needs and requirements are met. People should inform both the place and the programme to improve the user experience in spatial design. (De Rosa, 2022; Lee, 2022). The PPP forms a holistic system that should be considered across interdisciplinary topics, guiding and shaping the valuable components of these fields to create effective spatial design. This approach can lead to physical environments better aligned with social needs and user experience (Salama et al., 2024).

5.2 Introducing Interdisciplinary Concepts

Integrating and connecting people, place and programme, extending the investigation into interdisciplinary fields such as Business Process Design (BPD), Service Design (SD), and Interior Spatial Design (ISP) that currently operate independently but could benefit from interdisciplinary interaction (De Rosa, 2022). With the aim to identify tools and models that can facilitate the development of a more effective pre-design framework. The challenge lies in effectively combining, adapting, and developing tools from business process design (BPD), service design (SD), and interior spatial design (ISD) to create a comprehensive model. This model must be functional and applicable during the pre-design phase to establish and document user experience, programmatic requirements, processes, spatial features, and interconnections.

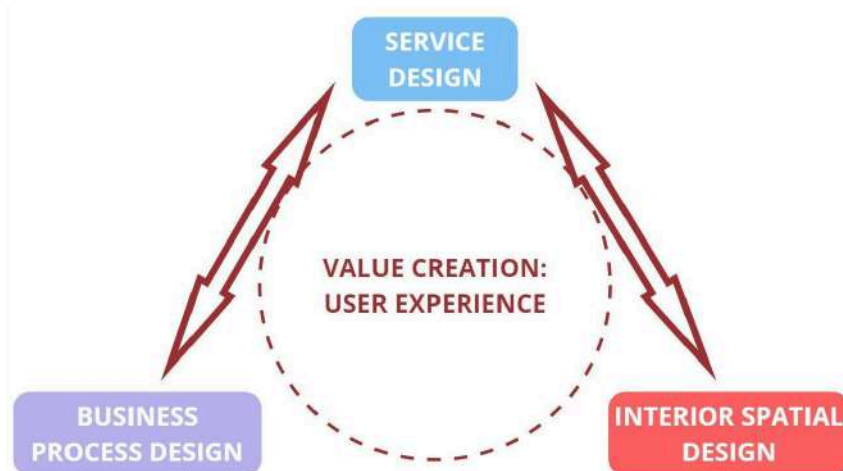


Figure 7 Research fields, diagram (Author, 2024)

Recognising the importance of user experience (UX) in the studies, it is important to consider UX within Business Process Design (BPD), Service Design (SD), and Interior Spatial Design (ISD) to identify the right tools (Figure 7). This integration aims to build a valuable pre-design framework that includes people, programmes, and places. By connecting these concepts, methods, and tools, creating a structured framework that enhances UX, focusing on its spatial and programmatic aspects (Wilson and Davies, 2019).

Although discipline-specific tools and methods have been developed in BPD, SD, and ISD, there often needs to be more interconnection between these areas in literature and practice (Musulin and Strahonja, 2023). Using tools from these fields is key for creating a holistic pre-design framework that clarifies its purpose and function, enhancing user experience in architecture's spatial, qualitative, and programmatic aspects (Wilson and Davies, 2019). This approach improves later design phases and ensures a comfortable and satisfying user environment (Unanue et al., 2021). Due to the complex nature of BPD, SD and ISD, they are often viewed separately, highlighting the need for clear definitions to explain the research framework.

5.3. Defining Interdisciplinary Concepts

5.3.1. Business Process Design (BPD)

Business Process Design involves creating clear and effective processes and workflows that help a company achieve its goals and are easily replicated, thereby improving user and functional requirements (Babb, 2024; Smith, 2003; van Rensburg, 2014). These processes must be designed appropriately to ensure optimal performance and establish the best outcomes, prioritising customer satisfaction over systems and their information (Babb, 2024; Galvin and Singer, 1996). Business processes are pertinent as they provide structured, valuable results through a sequence of actions, tasks, or workflows, improving business operations (Babb, 2024; Dunzer et al., 2024; Trkman et

al., 2015; Xiao and Zheng, 2012; Галина et al., 2019). Trkman et al. (2015) state that these processes reduce outcome costs. Dunzer et al. (2024) suggest that enhancing customer satisfaction is linked to effectively managing customer business processes within broader organisational operations. Processes are an effective way to optimise, connect, control, analyse, design, and implement operational activities within and across organisations (Dunzer et al., 2024; Xiao and Zheng, 2012; Галина et al., 2019).

5.3.2. Service Design (SD)

It is an interdisciplinary field defined as planning and organising a human-centred, holistic, interactive, practical, creative, and iterative approach to creating new service futures. It involves services, stakeholders, various disciplines, and users in the design process (Musulin and Strahonja, 2023; Wang, 2014; Zurlo, 2018). Authors such as Collina et al. (2018), Unanue et al. (2021), and Wang et al. (2019) discuss the core components of service design. They describe it as being centred around four main elements. Firstly, service design is user-centred, placing the user at the core, with the effectiveness of the service process reflected in the user experience. The service should be usable, efficient, effective, and desirable (Collina et al., 2018; Unanue et al., 2021). Secondly, the physical space of users includes incorporating customers, employees, and stakeholders into the service and experience (Unanue et al., 2021). Wang (2014) emphasises how service design can enhance the user experience by improving the physical environment and interactions within the space. Thirdly, the structure and characteristics of the service determine the outcome and the effectiveness of the user experience. Lastly, service design links various disciplines, which supports the service and impacts the user's experience positively or negatively (Wang et al., 2019).

5.3.3. Interior Spatial Design (ISD)

Interior design involves shaping enclosed spaces within existing buildings, emphasising the design of volume and creating documentation for these interventions in the built environment (Königk, 2015). ISD aims to create environments that promote users' health, safety, and comfort through aesthetics, adaptability, and accessibility (Lee, 2022; Ndovela et al., 2022). Traditionally, user needs in the physical environment were overlooked, but recent developments have highlighted their importance, especially in ISD (Girginkaya and Ergen, 2021; Ndovela et al., 2022). Understanding user interactions with a space's physical and emotional aspects is beneficial. ISD addresses these needs by considering users' desires and experiences (Girginkaya and Ergen, 2021). Spatial design significantly impacts those who use spaces, influencing their daily experiences beyond architectural boundaries. Engaging users with spatial elements through their movements and actions, connecting with their physical and emotional selves and the space (Girginkaya and Ergen, 2021; Lee, 2022). Our senses—sight, sound, smell, taste, and touch—strongly affect our emotions and give us environmental cues (Radder, Koekemoer, & Van, 2019). Enhancing spatial quality involves visual aspects such as material, texture, colour, sounds, smells, and tactile sensations. Therefore, the interior spatial design reflects users' experiences, perceptions, and interactions, illustrating how they utilise and adapt to the space (Lee, 2022).

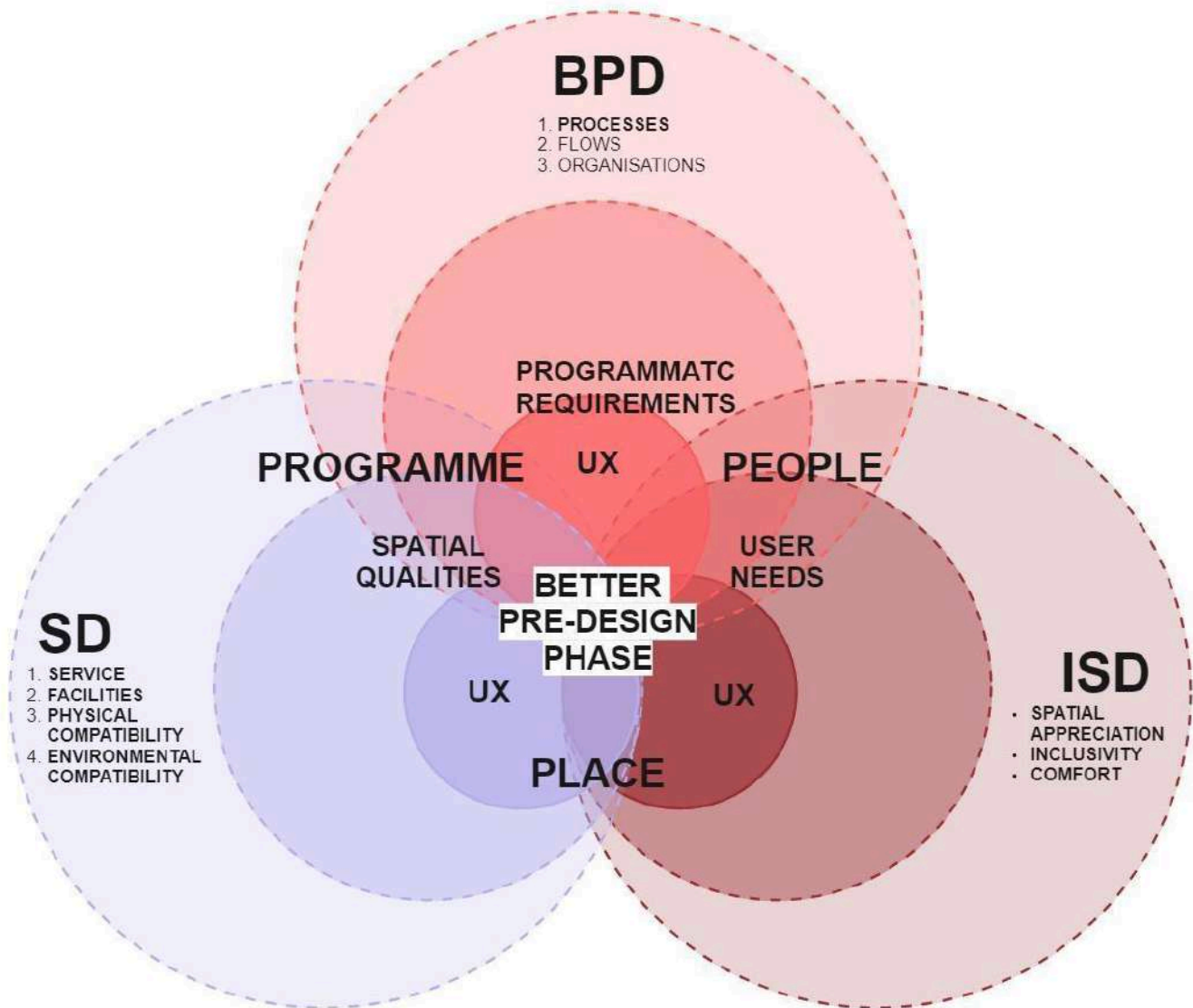


Figure 8: BPD, SD, ISD and user experience diagram (Author, 2024)

This paper analyses the similarities and differences between tools used in business process design (BPD), service design (SD), and interior spatial design (ISD), integrating people, place, and programme to improve user experience (Figure 8). By examining the similarities and overlaps of existing tools and methods, the aim is to propose a new pre-design framework that determines and enhances spatial quality, user experiences and programmatic requirements. This study employs an integrative literature review process to gather collective insights on these topics, focusing on tools that measure and document spatial qualities, programmatic requirements, and user experience. This is discussed in the methodology to follow.

Given the complex nature of concepts like BPD, SD, ISD, and User Experience (UX) within spatial design, readers need to familiarise themselves with the abbreviations and terminologies used. Table 1 provides a comprehensive list of these abbreviations and their descriptions.

Table 1 Definitions and abbreviations

ABBREVIATION	TERM	SYNONYMS	DEFINITION
UX	User Experience	UX, CX (customer experience), human interface, human-centred,	User experience in architecture is defined by how people interact with the physical structure, each other, and the surrounding environment. Their needs and desires are met when they engage with and perceive elements within the space through their senses (Chafi and Cobaleda-Cordero, 2022; Cheng, 2019; Ediae et al., 2022).
BPD	Business Process Design	BPM (Business Process Management), Business process modelling	Business process design (BPD) systematically enhances system performance and value through process-oriented thinking (Trkman et al., 2015). BPD manages business processes across various organisations, defining a process as a series of tasks or activities to achieve a specific outcome (Hafeez, 2020).
SD	Service Design	SD, interaction design	Service design aims to create functional, usable, and desirable services from the user's perspective. (Marquez, 2015; Wilson and Davies, 2019; Zurlo et al., 2018). It involves incorporating customers, employees, and stakeholders into the experience (Collina et al., 2018; Unanue et al., 2021). Improving the physical environment and interactions within, it can significantly enhance the user experience (Wang, 2014).
ISD	Interior Spatial Design	Architecture, interior, design, interior design, Interior architecture, interface design	Interior spatial design focuses on how the physical environment influences users' social interactions and experiences, aiming to create safe, comfortable spaces that meet their needs. It involves shaping enclosed spaces within existing buildings, emphasising volume design, and documenting these changes in the built environment (Girginkaya and Ergen, 2021; Königk, 2015; Ndovela et al., 2022; Nicolini, 2022).
	Tools	Techniques, models, methods, systems, devices, instruments, mechanisms, user journey maps, archetypes, service mapping, service blueprint	Implementation devices are used to structure, plot, or document processes or programmes and have a specific outcome.
	Pre-Design	Concept, conceptual phase, planning, and inception	The pre-design phase involves comprehensive research into the physical and social context of the project area. Tasks include defining the project's scope, performing site analysis,

			outlining requirements, and planning the budget (Girginkaya and Ergen, 2021).
	Programmatic Processes	Programme, use, function, activity, process, operational, business process, workflow	A series of activities or steps that are considered within a project. Design programming emphasises understanding user needs and desires in a physical environment. The activities people perform in a space generate requirements for that environment (Gebu, 2018; Karp, 1969; Kock and Steen, 2012; Popov and Goza, 2016).
	Spatial Qualities	Material, characteristics, infrastructure, built fabric, physical environment, building, architecture, dimension, place	The planes, objects or things a person can touch and measure. Spatial qualities encompass various measurable aspects of the physical environment, such as accessibility, scale, proportion, indoor environmental quality, sequence, ventilation, and lighting, which directly and perceptibly impact users (Gattupalli, 2023). Additionally, these parameters can influence intangible aspects like feelings of safety, happiness, and belonging, contributing to an overall positive user experience (Gattupalli, 2023).

6. RESEARCH METHODOLOGY

This paper makes use of an integrative literature review (ILR) as its chosen research methodology. An ILR is an evidence-driven approach that facilitates a comprehensive understanding of a specific phenomenon by assessing it holistically (Lubbe et al., 2020). It synthesises existing research on the topic and explains the significance of the findings and their practical applicability (Torraco, 2016). An ILR can present the state of current research if it is well-prepared and offers valuable research contributions (Torraco, 2016). This approach adopts a systematic method, follows a well-organised process with clear steps, and employs strategies to minimise bias. The advantages of an ILR include determining the review's objective and any gaps in the literature, pointing out areas that require more research, and combining subjects from related field studies (Russell, 2005).

The conventional primary research process for an ILR typically involves five steps: 1. Defining the research question or Problem Identification, 2. Searching and Sampling research, 3. Data Collection and Evaluation, 4. Data Analysis or Evaluation of Data, and 5. Presenting or Interpretation of the findings (Russell, 2005). Various scholars, including Russell (2005), Whittemore and Knafl (2005), de Souza et al. (2010), and Torraco (2005), have refined their approach towards an ILR process over time (refer to Figure 9).

The generic process of primary research	Different processes describe for integrative literature review	
	Russell (2005)	Whittemore and Knafl (2005)
1. Research question	1. Problem formulation	1. Problem identification
2. Sampling		2. Literature search
3. Data collection	2. Data collection or literature search	3. Data evaluation (critical appraisal)
4. Data analysis	3. Evaluation of data 4. Data analysis	4a. Data analysis (data extraction) 4b. Data synthesis
5. Presentation of the findings and discussion	5. Interpretation and presentation of results	5. Presentation
The generic process of primary research		
	de Souza et al. (2010)	Torraco (2005)
1. Research question	1. Preparing the guiding question	1. Problem formulation
2. Sampling	2. Searching or sampling the literature	
3. Data collection	3. Data collection (data extraction)	2. Data collection
4. Data analysis	4. Critical analysis of the studies included (critical appraisal, data synthesis)	3. Evaluation of data 4. Data analysis
5. Presentation of the findings and discussion	5. Discussion of the results 6. Presentation of the integrative literature review	5. Interpretation and presentation of results

Figure 9 Conventional primary research process for an ILR presented by various authors over time (Lubbe et al., 2020).

The authors further refine their ILR approaches to establish a comprehensive and detailed step-by-step process for an ILR. A notable adaptation by Lubbe et al. (2020) simplifies and deepens the conventional process. Their method starts with formulating a specific research question, followed by the selection and critical appraisal of literature to extract pertinent data. This data is then synthesised to present comprehensive findings. Their approach entails thoroughly analysing the selected research pertinent to the topics and achieving a holistic integration of the findings. Lubbe et al. (2020) define their process into five steps: 1. Defining the research question, 2. Selecting a sample, 3. Gathering data, 4. Analysing the data, and 5. Presenting the findings (Figure 10).

ILR PROCESS STEPS		CONSIDERATIONS	SAMPLE OF RECORD THAT CAN BE USED																																	
1.Review question	PICOTS, PICO, PICOT, PICOS, PIOTS (Alternatively consider SPICE or SPIDER for qualitative studies)		P – Population	I – Intervention	C – Comparison	O – Outcome(s)	T – Time	S - Setting																												
2.Sampling process 2a. Search – scoping search and search strategy development 2b. Screening (title and abstract) 2c. Selection of full text documents (sampling complete)	▪ Inclusion and exclusion criteria ▪ Keyword formulation ▪ Sources of evidence such as data bases, catalogues, grey literature ▪ Role of the librarian ▪ Selection of document to be included Update PRISMA as review continues	Identification Screening Eligibility Included	PRISMA Flow Diagram for ILR Records identified through database searching (n =) Additional records identified through other sources , i.e. reference lists (n =) Records after duplicates removed (n =) records screened by reading title and abstract (n =) Full-text articles assessed for eligibility (n =) Records to be included in critical appraisal process (n =) FINAL number of documents included for data extraction/synthesis (n =) Records excluded (n =) add to exclusion record Records excluded due to not addressing the review question (n =) add to exclusion record Records excluded due to poor-methodological quality (n =) add to exclusion record																																	
Fig 1.1: Flow Diagram for ILR (Adapted from PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analysis) (Moher et al., 2009)																																				
3. Data collection Critical appraisal (CA) of sample according to methodological CA tools	Various critical analysis tools, such as Johns Hopkins, CASP	Table 1.1: Sample of a summary document for the critical analysis (CA) of selected documents included in sample <table><tr><th>Citation</th><th>CA tool</th><th>Quality of evidence</th><th>Level of evidence</th></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>							Citation	CA tool	Quality of evidence	Level of evidence																								
Citation	CA tool	Quality of evidence	Level of evidence																																	
4. Data analysis 4a. Data extraction from full text into data extraction table	Use Excel spread sheet or tailor-made software such as EPPI reviewer or standardised data extraction tables for example MASTARI and NOTARI data extraction tools (Joanna Briggs Institute, 2015)	Figure 1.2: Sample of data extraction table of articles found to be of good quality/level of evidence <table><tr><th>Author(s)</th><th>Citation</th><th>Question</th><th>Aim & Objectives</th><th>Methodology</th><th>Findings</th><th>Identified themes</th></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>							Author(s)	Citation	Question	Aim & Objectives	Methodology	Findings	Identified themes																					
Author(s)	Citation	Question	Aim & Objectives	Methodology	Findings	Identified themes																														
4b Synthesis of extracted data and thematic analysis	Derive new knowledge through content/ thematic analysis process of themes identified during data extraction	Figure 1.3: Thematic synthesis table to summarise new constructs derived from good quality documents <table><tr><th>Identified themes (from extraction table)</th><th>New categories (from thematic analysis)</th><th>Supporting references</th><th>Discussion</th></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>							Identified themes (from extraction table)	New categories (from thematic analysis)	Supporting references	Discussion																								
Identified themes (from extraction table)	New categories (from thematic analysis)	Supporting references	Discussion																																	
5.Presentation of data/results	Discuss all themes with relevant referencing from good quality articles	Theme 1 – Discuss Theme 2 – Discuss Theme 3 – Discuss																																		

Figure 10: ILR five-step research process (Lubbe et al., 2020).

In this paper, this refined five-step process is applied to explore Business Process Design (BPD), Service Design (SD), and Interior Spatial Design (ISD) tools, focusing on their interdisciplinary application within interior architecture. This method enables the analysis and synthesis of these tools during the pre-design phase to enhance the user experience. This section explains and details the first three steps of the ILR process, followed by the fourth step, which analyses the tools in the results section (see Figure 11 for an overview of the research process). The results and final step are synthesised in the discussion and conclusion section.

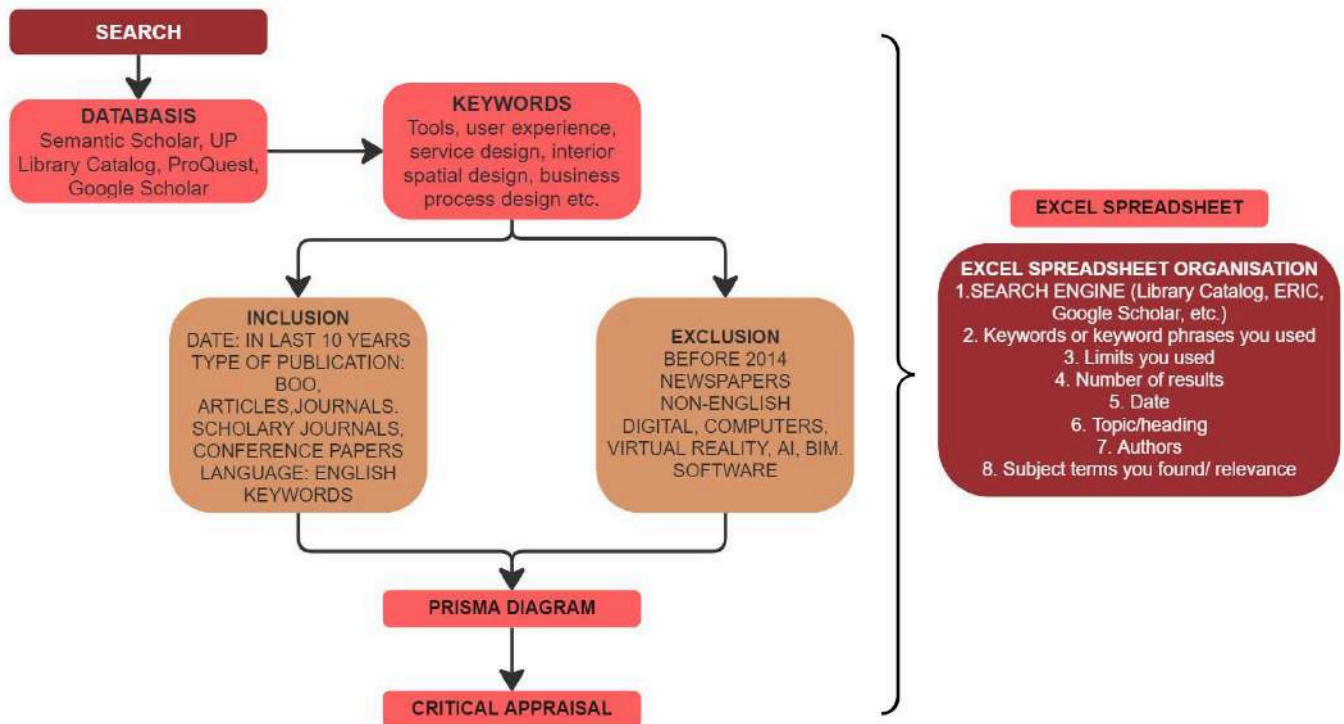


Figure 11: Research process diagram to indicate documentation onto an Excel spreadsheet throughout the process (Author, 2024).

Lubbe et al. (2020) developed a search strategy and collected relevant data as the initial steps. The strategy for this paper was to use an Excel spreadsheet (Figure 12) to track searching, scoping, screening, selecting literature, data extraction, synthesis, and presentation of the results. The Excel spreadsheet categorises search engines, keywords, keyword strings, study titles, dates, authors, summaries, and relevance to previously identified research topics.

SEARCH ENGINE	KEYWORD 1	KEYWORD 2	KEYWORD 3	KEYWORD 4	DATE
ResearchGate	business process management	workflow	design	interior	2023
Edsco host	business process management	workflow	design		2013
GOOGLE SCHOLAR	Tools	Business process modelling	User experience	Programmatic processes	2012
James Cook	user experience	BPM	TOOLSMETHODS		2021
Proquest	business process management	(tools OR methods OR techniques)	user experience		2015
GOOGLE SCHOLAR	business process	innovative technology	methodological and analytical tool	interaction design	2019
Proquest	BUSINESS PROCESS MANAGEMENT	CUSTOMER EXPERIENCE	TOOLSMETHODS	SERVICE DESIGN	2019
Science Direct	business process management	workflow	design		2013

Figure 12: Excel Spreadsheet Documentation (Author, 2024)

TITLE OF ARTICLE/BOOK/ JOURNAL	AUTHORS	RELEVANCY (ex. "specific" tool/model/program/methods/a keyword etc.)
"Design Principles for Using Business Process Management Systems" Chapter in Book	Sebastian Dunzer, Willi Tang, Nico Hochstädter, Sandra Zlíker & Martin Matzner	//Business process management (BPM) enables continuous improvement of business processes. Business process management systems (BPMS) serve as an entry point to BPM activities and afford firms to manage, execute, and automate business processes. //These design principles comprise user management, process modeling, automation, logging, monitoring, integration, and case handling.
Control Flow Pattern Recognition For BPMN Process Models. Academic Journal	Yeh-Chun Juan Kuo-Yen Yuan	//Business process models are implicitly composed of a set of control flow patterns, such as the Parallel Split, Synchronization, Exclusive Choice, and Simple Merge, etc. //A three-phased framework to recognize the constituent control flow patterns and their interrelationship for a Business Process Modeling Notation (BPMN) process model
Essential Business Process Modeling (CHAPTER 1)	Michael Havey	standard ways to code rigorous processes that are centerpieces of a service-oriented architecture (SOA), which defines how networks interact so that one can perform a service for the other.
Human factor in business process management: modeling competencies of BPM roles	Hrabal, Martin ; Tuček, David ; Molnár, Václav ; Fedorko, Gabriel	The proposed competence models can be utilized during business process management (BPM) implementation while appointing process owners, analysts and industrial engineers and their further development
From business process management to customer process management	Trkman, Peter, Mertens, Willem, Viaene, Stijn, Gemmel, Paul,	//The purpose of this paper is to argue that in order to achieve customer centricity through business process management (BPM), companies have to obtain the profound understanding of customers' processes and when necessary change not only the interactions with but also the processes of their customers. A method is presented that allows doing this in a systematic manner.
The Innovative Technology for Modeling Management Business Process of the Enterprise	Galyna Ryzhakova, Dmytro Ryzhakov, Serhiy Petrukha, Tetiana Ishchenko, Tetyana Honcharenko	//presents recent innovative technology for modeling business processes of enterprises based on process management //considers the creation and justification of the updated methodological and analytical tools for assessing, selecting and regulating the production system of administration of an enterprise project portfolio in a single operating management system.
Business Process Analysis for Transfer Payment Transaction Case Study: An LPG Distributor Company in Bandung	Pratama, Jonathan, Akbar Adhi Utama	This research aims to understand the current situation of the business process, give a solution for the business issue faced by the company, and speed up the business process.
Formal workflow design analytics using data flow modelling Chapter in Book	Sun, Sherry X Zhao, J. Leon	//We investigate the possibility of incorporating formal analytics into workflow design, thus alleviating the intellectual challenge faced by business analysts when creating workflow models. // The workflow design analytics we propose helps construct a workflow model based on information about the relevant activities and their associated data. //workflow design from a manual and experiential effort into a more systematic and rigorous approach.

Figure 12 (continue): Excel Spreadsheet Documentation (Author, 2024)

The ILR research process in this section is as follows:

6.1. Review Question

Step 1: Review Question

Lubbe et al. (2020) start with reviewing the research question. The research question formulated below is designed to be both answerable and searchable. It is specific, identifies gaps in the existing literature, and aligns with ILR strategies for effective data collection and extraction.

RQ: Which tools stemming from business process design, service design and spatial design can be used in the interior architecture pre-design phase to determine and document user experience, programmatic processes, and spatial qualities? (see Figure 13)

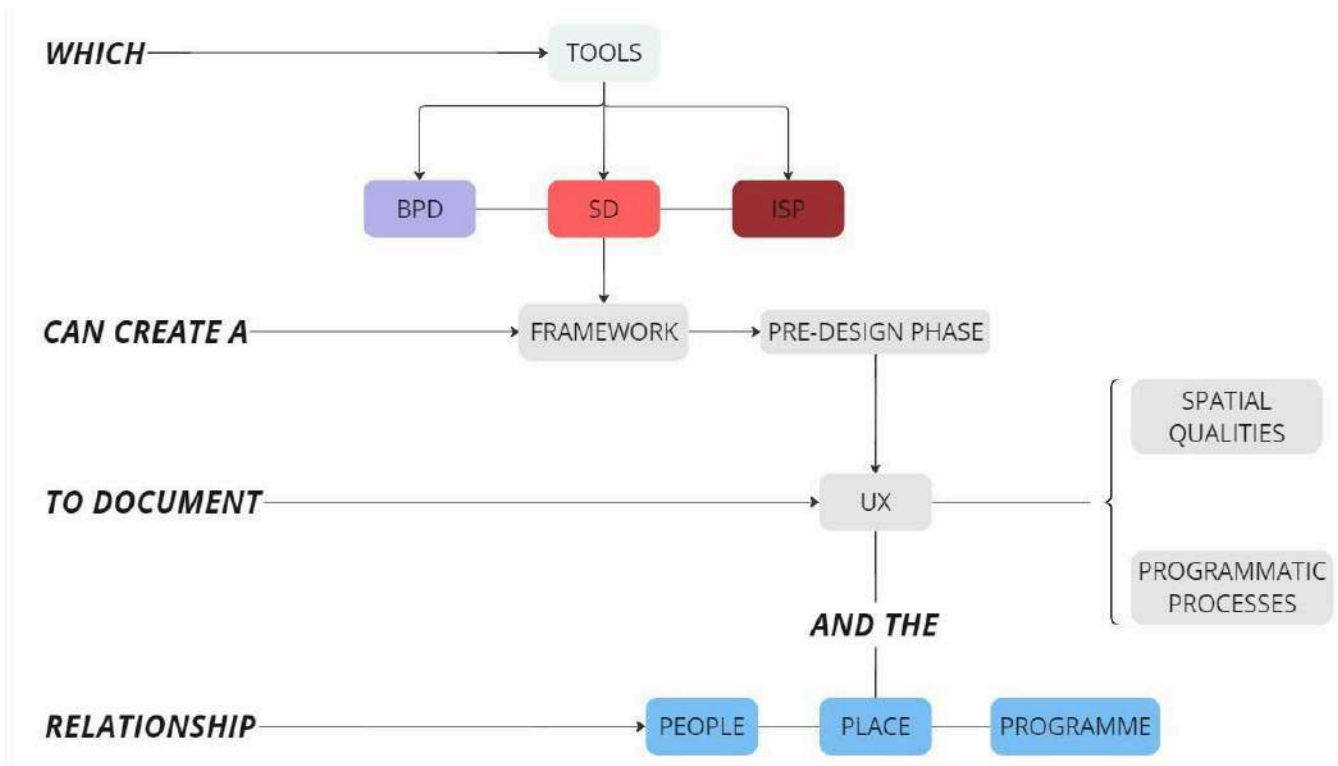


Figure 13: Overview of the Research Question being investigated (Author, 2024)

The research question examines the perspectives within the interdisciplinary fields of BPD, SD, and ISD. It investigates and compares tools from each field, exploring how they influence spatial qualities and user experience within a physical environment (place), affecting people and incorporating programmes (PPP). Additionally, it explores the potential development of a new pre-design phase framework emerging from the overlap of these tools. This question incorporates the elements of an effective review question—setting, perspective, intervention, comparison, and evaluation (SPICE), as Lubbe et al. (2020) identified.

6.1.1. Study sub-questions and objectives

The following sub-questions were created from the main research question to guide the specific topics (BPD, SD, and ISD) and concepts (user experience, spatial qualities, and programmatic requirements) that need to be considered:

- What are BPD, SD, and ISD disciplines, and how do they relate and differ?

- What tools or methods are used in BPD, SD, and ISD, and how do they compare? What challenges and opportunities do they present?
- What are the strengths and limitations of current tools in capturing user experience, programmatic processes, and spatial qualities?
- How effective is the developed spatial framework in establishing and documenting user experience, people, place (physical environment), programme, and their relationships?
- How can BPD, SD, and ISD tools be integrated and adapted to create a framework for the pre-design phase?

The following objectives were formulated to highlight important elements and address specific aspects of the review question and sub-questions. They aim to guide the study towards a precise and well-defined solution:

- Investigate existing tools and methodologies in business process design, service design, and interior spatial design.
- Analyse the strengths and limitations of current tools in capturing user experience, programmatic requirements, and spatial qualities.
- Develop a framework for integrating and adapting tools from business process design, service design, and spatial design to create a comprehensive model for the pre-design phase.
- Evaluate the effectiveness of the developed spatial framework in establishing and documenting user experience, people, place (physical environment), programme, and their relationships.
- Provide recommendations for practitioners on implementing the developed framework in real-world design projects.

The research question and these objectives aim to delineate the necessary study topics, methods, and tools for clarification, establishment, and identification.

6.2. Sampling

The literature sampling process, step 2 of the Lubbe et al. (2020) ILR process, is structured and employs a systematic strategy to gather reliable evidence. This step is segmented into three distinct parts: 2a. Searching, 2b Screening, and 2c Selecting (Lubbe et al., 2020).

Step 2a: Searching

The process starts by selecting databases to find relevant sources that address the research question. These databases included Elsevier, ScienceDirect, EBSCOhost, JSTOR, MIT Library, ProQuest, ResearchGate, Academia, and Google Scholar. The selection of these databases was based on their accessibility and article availability. The search yielded a large sample, necessitating refining the search strategy to increase specificity.

- *Identifying keywords and strings* (see Appendix A for string combinations)

The review question serves as a guide to identifying keywords and search strings to be used when searching for sources on databases. Table 2 emphasises the relevant keywords and their synonyms, selected for their standard usage to simplify searches on specific topics. These keywords are incorporated with boolean operators in the chosen databases to optimise the combination of terms for more effective searches.

Table 2: Keyword identification

Keyword: Research question	Synonyms	Most Familiar keyword
Tools:	Techniques, methods, models, systems, aids, instruments, devices, mechanisms, observational table, user journey maps, archetypes, service mapping, and service blueprint	Tools and methods
Business process design:	BPD, Business process management, and business process modelling	BPD
Service design:	SD SxD interaction design	SD
Spatial design:	Architecture, interior, design, interior design, interior architecture, interface design	Architecture, interior, design, interior design, spatial design
Pre-design:	Concept, conceptual phase, planning, and inception	Pre-design
User experience:	UX, customer experience (CX), human interface, human-centred, behavioural, people, places, process, programme	User experience, people, place, programme
Programmatic processes:	Programme, use, function, activity, process, operational, business process, workflow	Programme, function, activity
Spatial qualities:	Material, characteristics, infrastructure, built fabric, physical environment, building, architecture, dimension, place	Physical environment, building, architecture, place

These keywords are strategically combined to refine and scope the search for the most accurate results. The combinations for each database may differ. All data collected is systematically organised in a spreadsheet, which first identifies the database from which it was sourced, followed by the keyword combinations used (see Appendix A), the title and date of the article, and its relevance, annotated with notes or comments. Figure 14 shows an image of this Excel spreadsheet, indicating some keyword combinations. The most accurate keywords are categorised and plotted under their respective topics: BPD, SD, ISP, or PPP.

SEARCH ENGINE	KEYWORD 1	KEYWORD 2	KEYWORD 3	KEYWORD 4
ResearchGate	business process management	workflow	design	interior
Ebsco host	business process management	workflow	design	
GOOGLE SCHOLAR	Tools	Business process modelling	User experience	Programmatic processes
James Cook	user experience	BPM	TOOLS/METHODS	
Proquest	business process management	(tools OR methods OR techniques)	user experience	
GOOGLE SCHOLAR	business process	innovative technology	methodological and analytical tool	interaction design
Proquest	BUSINESS PROCESS MANAGEMENT	CUSTOMER EXPERIENCE	TOOLS/METHODS	SERVICE DESIGN

Figure 14: Keyword strings documented in Excel spreadsheet (Author, 2024)

- *Inclusion and exclusion criteria*

Inclusion and exclusion criteria were established to refine and specify the research focus. This criteria narrowed the search to aspects relevant to the research question (refer to Table 3). The inclusion criteria encompassed articles published within the past ten years (2014–2024), including online articles, printed books, journals, conference papers, and peer-reviewed sources in the English language. The selected literature should also include tools, methods, and techniques to document or define programmatic requirements, user experience, or spatial qualities.

The exclusion criteria involve filtering out literature that does not directly respond to or engage with the research question. This excludes sources such as newspapers, honours dissertations, topics unrelated to BIM (Building Information Modeling), virtual reality, non-English documents, computer science, AI (Artificial Intelligence), and research that does not address the physical environment. Older versions of sources outside the past ten years are also excluded. This criteria further excludes articles with misleading titles unrelated to BPD, SD, ISD, and PPP concepts, removes duplicates, and eliminates articles that are inaccessible or unavailable online.

Table 3: Inclusion and exclusion criteria for search strategy

Inclusion	Exclusion
Past 10 years (2014–2024)	Newspapers
Online articles	Honours Dissertation
Printed books	Sources that use the term "architecture" refer to fields other than building or spatial architecture, such as computer architecture and scientific architecture.
Journals	Sources that use the term "design" refer to fields other than interior or spatial design, such as graphic design, clothing design, software design, etc.
Conference papers,	BIM
Peer-reviewed sources	Virtual Reality
English language	Non-English
User experience (UX)	Computer Science
Tools/methods/techniques	AI
Application within physical environments	Non-Physical Environment

Step 2b and 2c: Screening & Selecting

Using designated keywords and inclusion and exclusion criteria to refine the search strategy yielded n=206 relevant and legible documents. Many documents were subsequently excluded due to duplications, irrelevance to the topic, or failure to address the review question. A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flowchart (Figure 15) was employed to document the process rationale for determining the relevancy of each document (Cullis, 2021). A broad understanding of each text's content was obtained by broadly reviewing the literature, including abstracts, introductions, and conclusions. In some cases, a more in-depth examination of the document was necessary to ascertain its relevance.

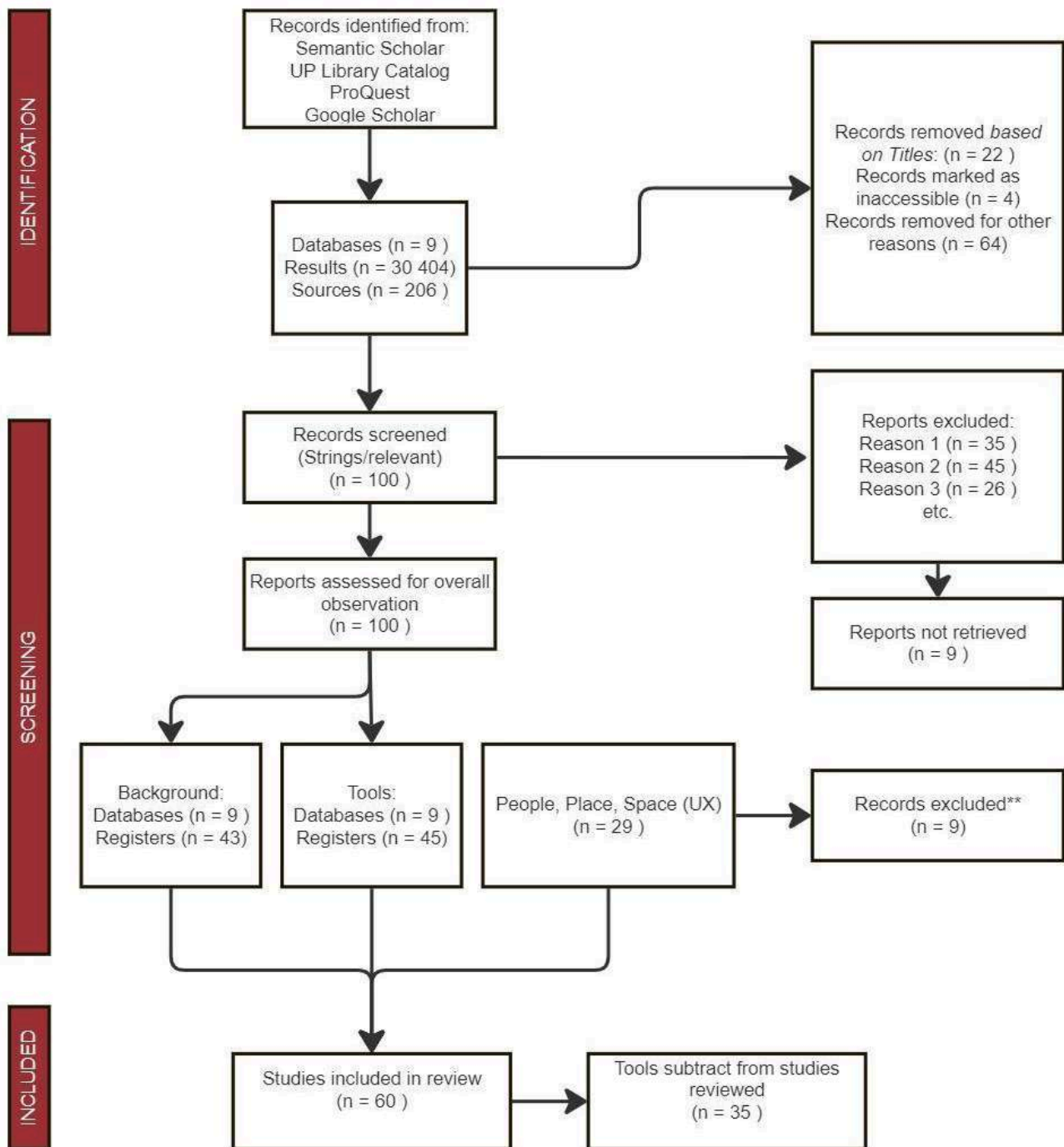


Figure 15: PRISMA Diagram (Author, 2024)

6.3. Data Collection & Critical Appraisal

Step 3: Data Collection & Critical Appraisal

An important step in the process involves a rigorous critical appraisal (CA) to assess the quality and relevance of the full-text documents (Lubbe et al., 2020). This ensures that the evidence gathered is robust and reliable for the study of this ILR. Various tools exist for critical appraisal, but for this ILR, a checklist from Beattie et al. (2015) (Appendix B) was employed alongside an Excel spreadsheet. This study looks at tools from BPD, SD, and ISD, as well as PPP concepts and user experience, to appraise the relevant research papers.

The checklist categorises each article based on title, abstract, introduction, methods, results (findings), discussion (and conclusion), and future research (Appendix C). Each category has specific criteria to assess compliance with the paper's aims. Each reviewed research paper is evaluated using this checklist and is deemed relevant if it meets the criteria or irrelevant if it does not.

SECTION/TOPIC	#	CHECKLIST ITEM
TITLE		
Title	1	Identify the report as an integrative review, systematic, or both.
ABSTRACT		
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.
INTRODUCTION		
Rationale	3	Describe the rationale for the review in the context of what is already known.
Objectives	4	Provide an explicit statement of questions being addressed regarding participants, interventions, comparisons, outcomes, and study design (PICOS (Lubbe et al., 2020)).
METHODS		
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.

Figure 16 Representation Image of the Critical Appraisal Checklist (Beattie et al., 2015). For the complete checklist and appraisal example, see Appendix B and C.

As a result of this process, a study sample comprising $n=60$ documents was obtained, all deemed relevant, accessible, and screened for quality. These articles were also chosen for their ability to address user experience and tools within the BPD, SD and ISD (see Appendix D for characteristics of evaluated/analysed studies).

- **Critical Appraisal of the Tools**

The selection criteria used to identify the most effective tools and methods for enhancing user experience during the pre-design phase evaluated each tool based on four key aspects: its applicability within the physical environment, ability to support the design programme, potential to improve user experience, and inclusion of people through interactions with the service, product, or design. This evaluation highlighted the critical role of considering user experience in the built architectural environment (Ediae et al., 2022).

To effectively measure these four aspects, specific criteria must be met, including usability and functionality (programme), accessibility (place), and usefulness (people). The tools are evaluated for effectiveness, efficiency, and ability to meet user needs (see Table 4). The four aspects are rated on a scale from 0 to 3, where 0 indicates none, 1 indicates some reference, 2 indicates applicability, and 3 indicates high relevance. The tools are scored as follows:

Table 4: Selection criteria to determine the most effective tools accommodating user experience, place, programme and people.

	Tool	UX	Place	Programme	People	Total Score
BPD	Value Chain	2	1	2	2	7
	Business Process Modelling Notion (BPMN)	2	1	2	2	7
	Service Blueprint	2	0	3	1	6
	Five-Diamond Method	1	0	2	0	3
SD	Double Diamond	2	1	2	2	7
	Service Blueprint	2	1	1	2	6
	Customer journey map	3	2	1	2	8
	System mapping	1	0	2	1	4
	Spatial Service System Map	3	2	2	3	10
	Spatial Walk-Throughs	2	3	2	2	9
	Card Sorting	2	2	0	1	5
	Behavioural Observation Mapping	2	1	1	2	6
	Photographic traces	0	1	0	2	3
	Personas	0	0	2	2	4
	Archetypes	0	0	2	2	4
	Service Ecosystem	2	0	1	1	4
	User States & Contexts	3	2	2	2	9
	Service experience layers	1	0	2	1	4
	Jobs to be done	3	2	2	1	8
ISP	Double Diamond	2	1	2	2	7
	Service Blueprint	2	2	2	2	8
	Customer journey map	3	2	2	2	9
	Spatial Service System Map	3	2	2	3	10
	Spatial Walk-Throughs	2	3	2	2	9
	Card Sorting	2	2	0	1	4
	Behavioural Observation Mapping	2	1	1	2	6

	Tool	UX	Place	Programme	People	Total Score
ISP	Photographic traces	0	1	0	2	3
	User experience evaluation framework	3	3	2	2	10
	Sensory Slider	1	2	1	1	5
	SUE Model	3	2	2	2	9
	AEIOU	2	2	1	1	6
	Graphic documentation (Diagrams, Bubble diagrams, sketches, orthographic drawings CAD drawings, physical & digital models)	1	3	2	0	6
	Process/Space/ Mapping	1	3	2	0	6
	Flow Analysis	1	1	0	1	3
	Workflow Optimisation	1	0	2	1	4

Based on the tool selection criteria, 16 appropriate tools were identified for documenting user experience during the pre-design phase. The value chain tool (Abdulkader et al., 2020) is incorporated into BPMN, forming a part of the overall tool (Pratama and Utama, 2019). The Double Diamond tool (Chang and Chuang, 2021; Wilson and Davies, 2019), Customer Journey Mapping (Chafi and Cobaleda-Cordero, 2022; Girginkaya and Ergen, 2021), Spatial Service System Map (van Geetsom and Wilkinson, 2021), and Spatial Walkthroughs (Chafi and Cobaleda-Cordero, 2022) are tools found within both the SD and ISD disciplines, suggesting commonalities between these two fields. Additionally, the Service Blueprint tool (Marquez, 2015; Trkman et al., 2015; Zurlo et al., 2018) appears in all three disciplines, indicating an overlap among them. Consequently, this yields n=10 tools deemed suitable for use (Table 5).

Table 5: Final tool selection (n=10) to enhance user experience.

	Tool	UX	Place	Programme	People	Total Score
BPD	A. BPMN (+ Value Chain)	2	1	2	2	7
SD	B. User States & Contexts	3	2	2	2	9
	C. Jobs to be done	3	2	2	1	8
ISP	D. User experience evaluation framework	3	3	2	2	10
	E. SUE Model	3	2	2	2	9
SD + ISD	F. Double Diamond	2	1	2	2	7
	G. Customer journey map	3	2	2	2	9
	H. Spatial Service System Map	3	2	2	3	10
	I. Spatial Walk-Throughs	2	3	2	2	9

	Tool	UX	Place	Programme	People	Total Score
BPD + SD + ISD	J. Service Blueprint	2	2	2	2	8

Despite efforts to improve spaces and programmes, there's still a gap in understanding and combining tools and methods from interdisciplinary fields like business process design (BPD), service design (SD), and interior spatial design (ISD) to enhance user experience (Baradaran Rahimi et al., 2018). The shared tools and intentions across these disciplines suggest the potential for beneficial interdisciplinary collaboration. Each field can learn from and contribute to the others, with ISD particularly benefiting from understanding and using these tools to improve programmatic requirements, spatial qualities, and user experience. Further elaboration on these topics and their tools will be provided in the results and findings section. Next, the study findings will be analysed, followed by a discussion and conclusion to synthesise and formulate a practical pre-design phase framework.

7. RESULTS & FINDINGS

In step 4 of the ILR process by Lubbe et al. (2020), data analysis begins. After the selected documents underwent a comprehensive assessment, the tools (n=10) used for BPD, SD, ISD, and PPP to enhance user experience were identified. Step 4a delves deeper into these tools to assess their limitations, interrelationships, and synthesis. The final selection of tools is categorised into subdivisions and labelled from A to J, as shown in Table 5. The subdivisions for BPD, SD, and ISD, along with their respective tools, are highlighted. Tools that overlap between these disciplines are placed in the relevant subdivisions of SD and ISD tools and BPD, SD, and ISD tools.

Step 4a: Data Analysis

7.1. Business Process Design Tools

Business Process Design (BPD) is a structured approach focused on improving system performance and value through process-oriented thinking (Trkman et al., 2015). Babb (2024), Smith (2003), and van Rensburg (2014) highlight the importance of systematically designing and implementing efficient and adaptable processes, integrating both increasingly digitised and traditional user/customer engagement methods. BPD involves sequential actions aimed at achieving specific outcomes and evolves to meet changing customer requirements and needs (Dunzer et al., 2024; Ryzhakova et al., 2023; Xiao and Zheng, 2012; Галина et al., 2019).

In the context of BPD, users or clients are part of an ecosystem that includes organisations, institutions, and individuals influencing the company (Abdulkader et al., 2020). Services within BPD are defined by interactions between providers and customers, with customer behaviour shaping internal processes (Trkman et al., 2015). Understanding customer needs is crucial for improving processes and methods (Trkman et al., 2015). BPD aligns value capture and creation by connecting user needs with processes, often using information technology systems for efficiency (Babb, 2024; Pratama and Utama, 2019; Smith, 2003). However, these processes are increasingly digitised and neglect traditional user engagement (Trkman et al., 2015). These tools aim to solve problems and meet customer needs (Grisold et al., 2022; Le Loarne and Maalaoui, 2015).

Juan and Yuan (2013) point out that current BPD tools lack essential functions such as defining, querying, and reusing existing processes. Grisold et al. (2022) identified a challenge in existing BPD tools, which often follow an inside-out logic, necessitating explorative BPD to enhance value creation by collaborating with customers to identify their needs. Abdulkader et al. (2020) also highlight the limitations of the current BPD, expressing concern over its heavy reliance on technological services, which has led to a neglect of traditional human interaction with customers.

Hrabal et al. (2021) attempt to address this gap by introducing co-design methods but have not fully incorporated traditional user experiences. Therefore, business processes should aim to create engaging customer experiences by incorporating products, services, and processes that involve users (Chang and Chiu, 2023), thereby enhancing the effectiveness and efficiency of business processes (Pratama and Utama, 2019).

7.1.1. BPD Tools

The pertinent tools within BPD are further explored to delineate their usage and necessity, explaining how each tool enhances user/customer experience. Due to their prominence and complexity in the reviewed studies, the BPD reviews presented in this paper highlight only a few tools.

- A. The value chain tool (Figure 17) is a strategic framework that analyses a company's internal activities to identify competitive advantages (Dieffenbacher, 2022). It breaks down primary activities, such as inbound logistics, operations, outbound logistics, marketing and sales, and service, along with support activities like procurement, human resource management, technology development, and firm infrastructure (Dieffenbacher, 2022; Pratama and Utama, 2019). By examining each step, organisations can streamline operations, reduce costs, and improve efficiency in delivering value to customers (Hafeez, 2020). Figure 17 uses Starbucks as an example, showing each step from sourcing high-quality coffee beans to roasting, packing, and providing excellent customer service (Dieffenbacher, 2022).

BPMN, a graphical and visual tool designed for analysts, developers, managers, employees, and process monitors (Juan and Yuan, 2013), standardises the documentation and representation of business processes (Hafeez, 2020). It incorporates events, tasks, gateways, and control flows to bridge the gap between process design and implementation (Pratama and Utama, 2019). The Customer Value Chain within BPMN illustrates stakeholder interactions and roles in service processes, tracking information flow from marketing to service delivery and encompassing all related activities (Pratama and Utama, 2019). Figure 18 details how the company's value chain connects with end-users, integrating with BPMN to document service delivery flow (Abdulkader et al., 2020).

BPD tools focus primarily on the programme and its specific processes, often neglecting the physical environment and the people involved. While people are considered, they are typically only included at the end when the service or product is delivered, resulting in a lack of attention to user experience (Figure 19).

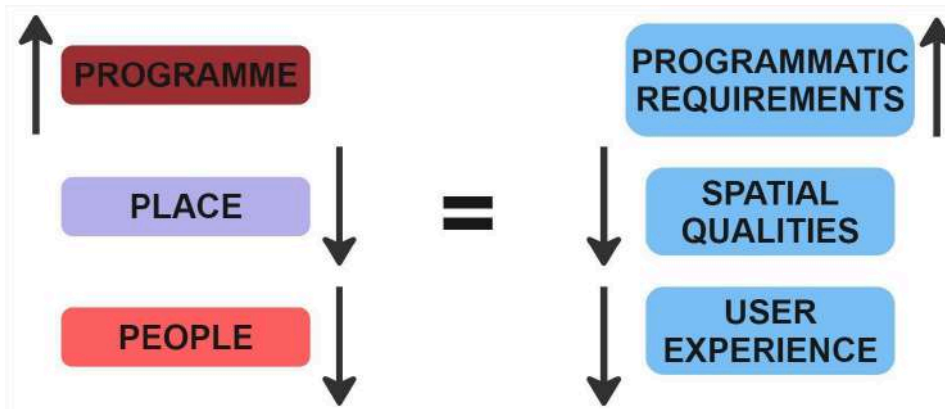


Figure 19: User Experience, Spatial Qualities and Programmatic Requirements within the Value Chain Tool (Author, 2024)

In essence, BPD uses tools that are the most customer-oriented, such as BPMN and Value Chains (Dieffenbacher, 2022; Pratama and Utama, 2019). While these tools differ significantly from those used in spatial design, they share a common focus with Service Design (SD) in creating customer-focused services. A significant limitation of BPD is its lack of engagement with the physical environment, resulting in a customer/user experience that lacks spatial qualities. However, BPD's strength lies in its structured process (Figure 20). It clarifies each step for everyone involved, from employees to managers, ensuring a clear understanding of the service delivery and requirements that meet the customer's identified needs (Dieffenbacher, 2022; Trkman et al., 2015). Interior spatial design (ISD) can benefit from business process design (BPD) tools by systematically documenting each stage of the pre-design phase defining programmatic requirements and user needs, thus enhancing the overall user experience. This will lead to improved processes, creating higher spatial quality in the physical environment for people.

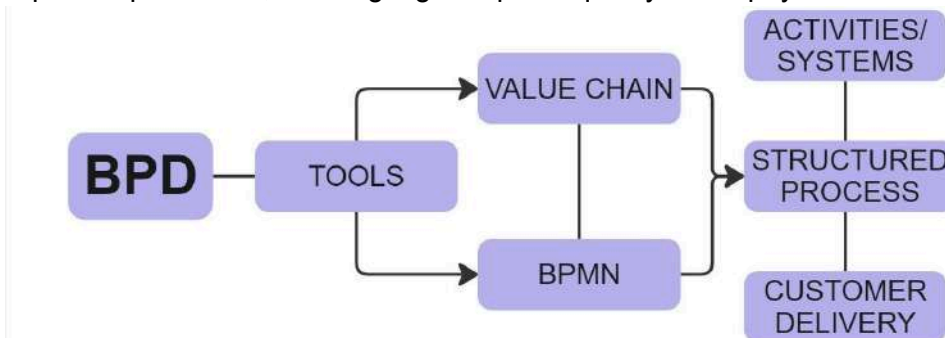


Figure 20: BPD diagram (Author, 2024)

7.2. Service Design Tools

Service design (SD) is an interdisciplinary field that aims to create functional, usable, and desirable services from the user's perspective (Collina et al., 2018; Marquez, 2015; Wilson and Davies, 2019). It coordinates various service elements, including the people involved (customers and employees) and the service process, to co-create desired customer experiences (Teixeira et al., 2012). Customer experience encompasses how individuals interact with a service and its impact, fostering a connection between people and their experiences in physical spaces (Unanue et al., 2021; Wang et al., 2019). The term "servicescape" describes the physical environment,

encompassing elements such as spatial layout, functionality, ambient conditions, signs, and symbols (Theron and Pelser, 2017).

Using design thinking principles, service design combines creativity, user input, visualisation, and user-centred approaches (Musulin and Strahonja, 2023). It closely connects with physical and digital environments, making it hard to separate from digital innovation (De Rosa, 2022). The evolving tech landscape greatly influences service design (Zurlo et al., 2018), focusing on creating smooth, user-friendly digital experiences through sketches and prototypes (De Rosa, 2022).

A service comprises touchpoints where people, information, and processes interact to deliver a user-oriented experience. Understanding users' needs and behaviours helps identify which service elements require focus (Wilson and Davies, 2019). Service design integrates user experience (UX), business process design (BPD), and interior spatial design (ISD), forming a comprehensive approach across these disciplines (refer to Figure 21). Relevant SD tools include User States & Contexts and Jobs to be Done, which express co-creation and engagement through sketches, illustrations, mapping, prototyping, and modelling (Rodda, Ranscombe and Kuys, 2022).

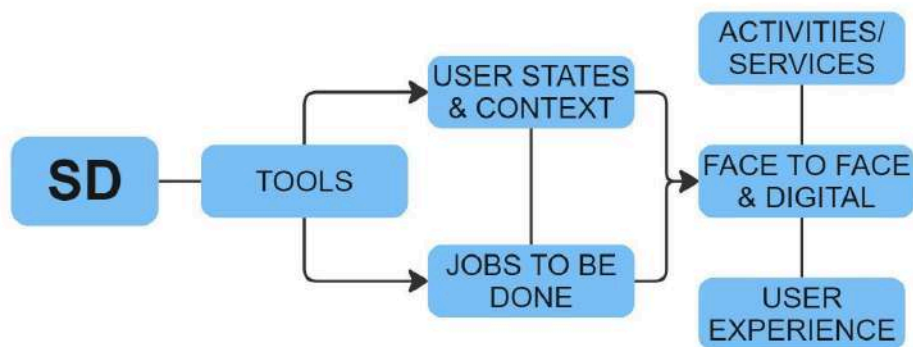


Figure 21: SD diagram (Author, 2024)

7.2.1. SD Tools

Further, essential tools in service design are examined, detailing their usage and importance and illustrating how each tool improves user and customer experience. The SD reviews presented in this paper highlight only a select few tools, such as user states, context, and jobs to be done, due to their user engagement and adaptability in the studies reviewed.

- B. The User States and Context tool (Figure 22) visually maps users' evolving needs over time, highlighting fulfilled needs at the centre and unmet needs at the periphery (Buhley, 2020). The closer the needs are to the centre, the more focused the final design will be on the user. It reveals patterns in how users interact with services and divides these needs into specific categories within the circle. Over time, it helps the design team better understand and improve user requirements (Monjo, 2013). This tool ensures that products or systems are usable by considering personal factors affecting use (State) and external factors (Context). By capturing different situations and contexts, it aims to clarify design considerations for all needs (Buhley, 2020; Monjo, 2013).

COMPLETE DESIGN REQUIREMENTS

SUSAN

LAUREN

PETER

ALBERT

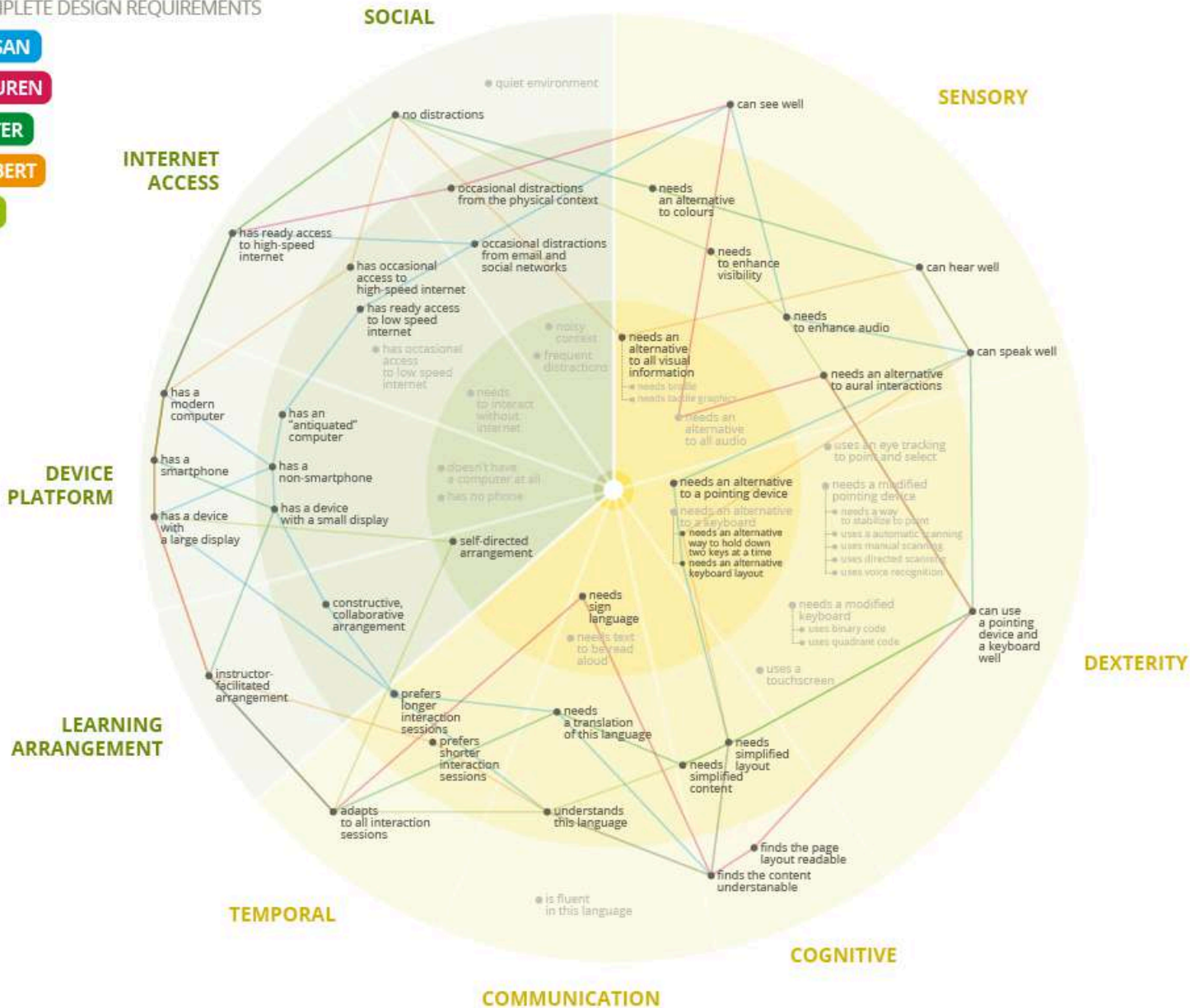


Figure 22: User states and context (Buhley, 2020).

C. Jobs to be Done (JTBD) (Figure 23) is a tool that focuses on meeting people's specific tasks or needs, aiming for effective and consistent accomplishment over time. Observing needs, customers, and markets enhances innovations' predictability and profitability (Ulwick, 2016). JTBD breaks down needs into specific process steps and structures them into phases with corresponding tasks, framing all design requirements systematically. This approach helps understand customers' motivations for purchasing a product or service by focusing on the tasks they want to accomplish (Ulwick, 2016). JTBD identifies functional, social, and emotional jobs customers need to fulfil, examines the circumstances they face, and maps out their needs. This helps businesses identify customer pain points and desires, guide product development, and better meet customer expectations. By grouping customers based on the jobs they want to accomplish, JTBD enhances product development, marketing strategies, and customer satisfaction (Ulwick, 2016).

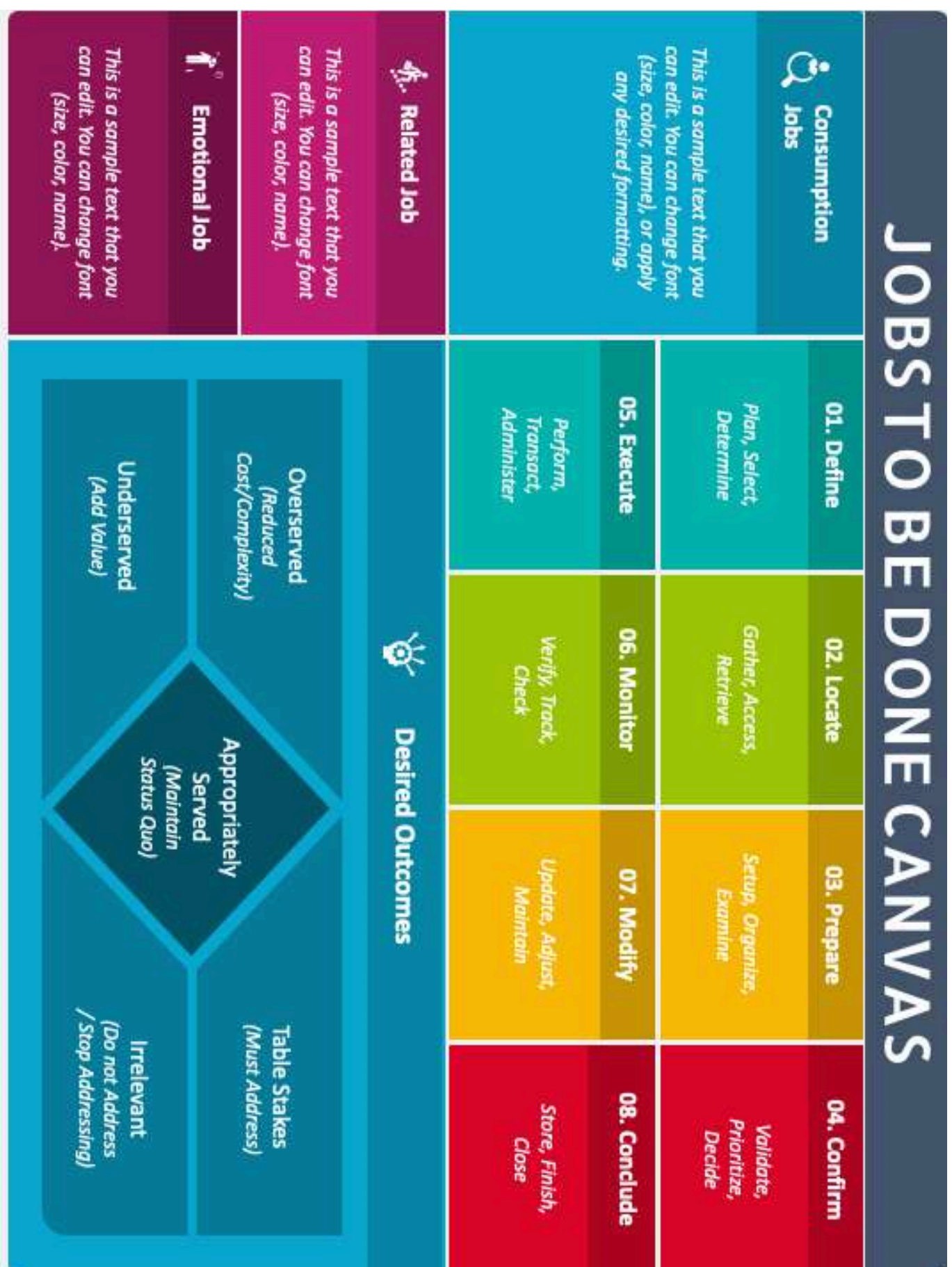


Figure 23: Jobs to be Done (Ulwick, 2016).

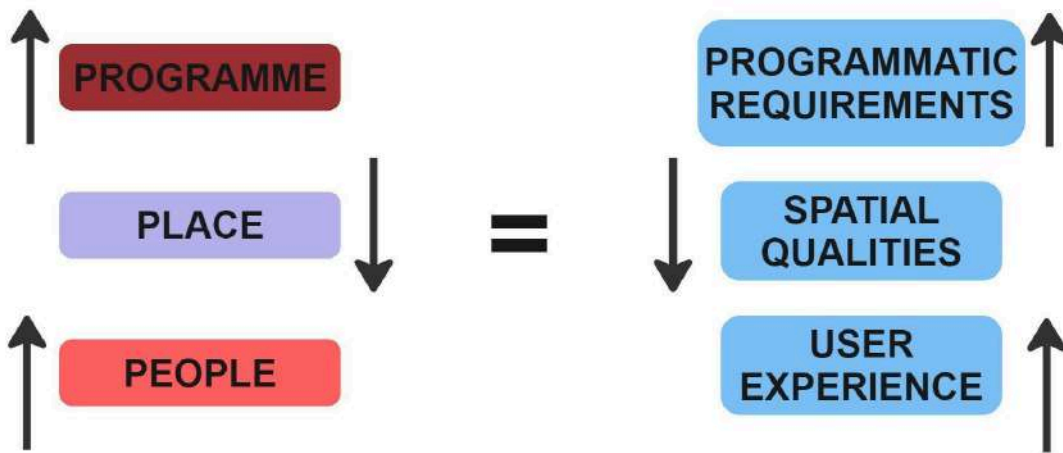


Figure 24: User Experience, Spatial Qualities and Programmatic Requirements within the User States & Context and Jobs to be Done Tools (Author, 2024)

The User States and Context and Jobs to be Done tools highlight user experience and programmatic needs, focusing on people's experiences and functional requirements. However, they emphasise spatial qualities less because they do not fully consider the physical environment.

These tools integrate with BPD and ISD, prioritising personas and user journeys to enhance customer and user experiences. The analysed findings indicate that service design is underutilised in interior design, interior architecture, and architectural design methods, underscoring the importance of integrating social design, user-centred design, co-creation, and participatory design approaches (van Geetsom and Wilkinson, 2021). Combining service and spatial design fosters a holistic, co-creative, and human-centred approach (van Geetsom and Wilkinson, 2021), recognising the interconnectedness between services and experiences, particularly in addressing users' emotional needs and exceeding expectations (Unanue et al., 2021). However, the extensive array of tools and methods of SD sometimes overshadows considerations of spatial qualities and the physical environment (Figure 24). Nonetheless, SD's structured approach ensures that user needs are consistently identified and met throughout the service or product development process (Unanue et al., 2021).

7.3. Interior Spatial Design Tools

Interior Spatial Design (ISP) has been incorporated into various design and project development stages, addressing aspects such as context, function, and setting. In enhancing user experience, co-design and collaborative methods are particularly effective in identifying user needs and crafting impactful interior spatial environments (Radder, Koekemoer, & Van, 2019). Interior Spatial Design has shifted from focusing solely on form and function to prioritising user experience (UX) (Girginkaya and Ergen, 2021). This shift involves exploratory processes that present and investigate projects in diverse ways (De Rosa, 2022). By incorporating tangible and intangible dimensions, including behaviour, emotions, and spirituality, the spatial design enhances UX, delving into users' needs and desires (Girginkaya and Ergen, 2021).

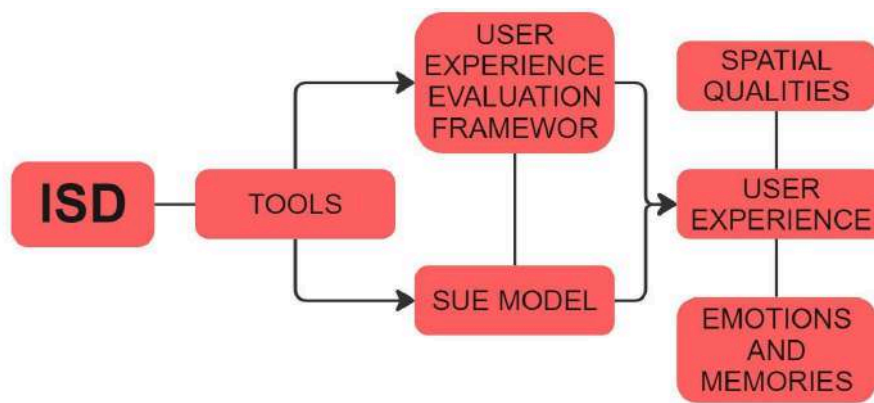


Figure 25: ISD diagram (Author, 2024)

Smith et al. (2020) highlight the impact of the physical environment on user behaviour and emotions. Spatial qualities like noise levels, lighting, materiality, colour, temperature, orientation, layout, ambience, furniture arrangement, access to nature, and perceived safety affect the user experience of the space (Girginkaya and Ergen, 2021; Nicolini, 2022). Environmental conditions encompass various measurable aspects of the physical environment, such as accessibility, scale, proportion, indoor environmental quality, sequence, ventilation, and lighting, directly and perceptibly impacting users (Gattupalli, 2023). Additionally, these parameters can influence intangible aspects like feelings of safety, happiness, and belonging, contributing to an overall positive user experience (Figure 25).

A "sense of place" correlates with user experience, as interactions within the environment contribute to a sense of belonging (Smith et al., 2020), which influences human conditions, addressing psychosocial needs, memory, comfort, desires, and indoor experiences (Ferdous, 2020). Smith et al. (2020) further state that these user-experience interactions occur in various settings and contexts. Spatial qualities must be adapted to meet these specific user needs (Girginkaya and Ergen, 2021; Lee, 2022; Nicolini, 2022).

7.3.1. ISD Tools

The pertinent tools within ISD are further examined to demonstrate their usage and necessity, explaining how each tool contributes to spatial qualities and user experience. The ISD reviews presented in this paper highlight only a few tools due to their user-centred approach and the consideration of user needs in the studies reviewed.

- D. The User Experience Evaluation Framework tool (Figure 26) thoroughly examines how users interact with products or services. It assesses usability, satisfaction, task performance, and emotional impact using methods like surveys, interviews, evaluations, and testing. By pinpointing issues and improving usability, it enhances user satisfaction (Dong and Liu, 2018). This framework promotes a user-centred design approach by systematically evaluating and refining user experiences, providing data-driven insights for continuous design enhancements. It also integrates texts, images, user scenarios, and sensory inputs to involve users in the design process, allowing for feedback incorporation to effectively adapt and optimize processes (Dong and Liu, 2018).

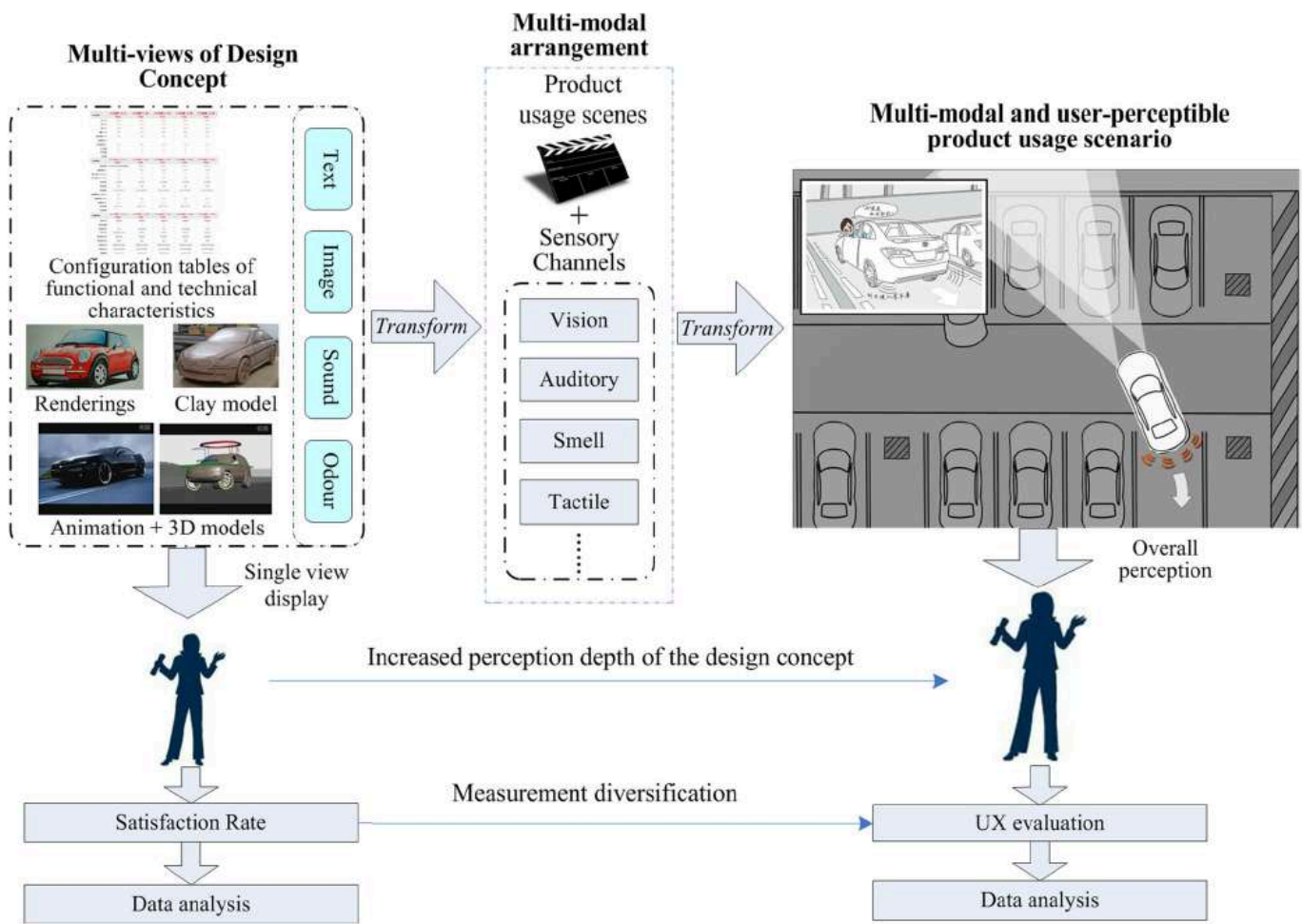


Figure 26: User Experience Evaluation Framework (Dong and Liu, 2018).

- E. The Spatial User Experience Model (SUE Model) (Figure 27), rooted in user experience principles, depicts the physical environment as an entity with which users engage, requiring comprehension, appreciation, and emotional involvement (Juliá Nehme et al., 2023). The model encompasses six key dimensions: spatial cognition, physical compatibility, environmental compatibility, emotional reaction, spatial appreciation, and proxemics. It explores both the physical and behavioural aspects of users to identify and establish the necessary design parameters for a project (Juliá Nehme et al., 2020).

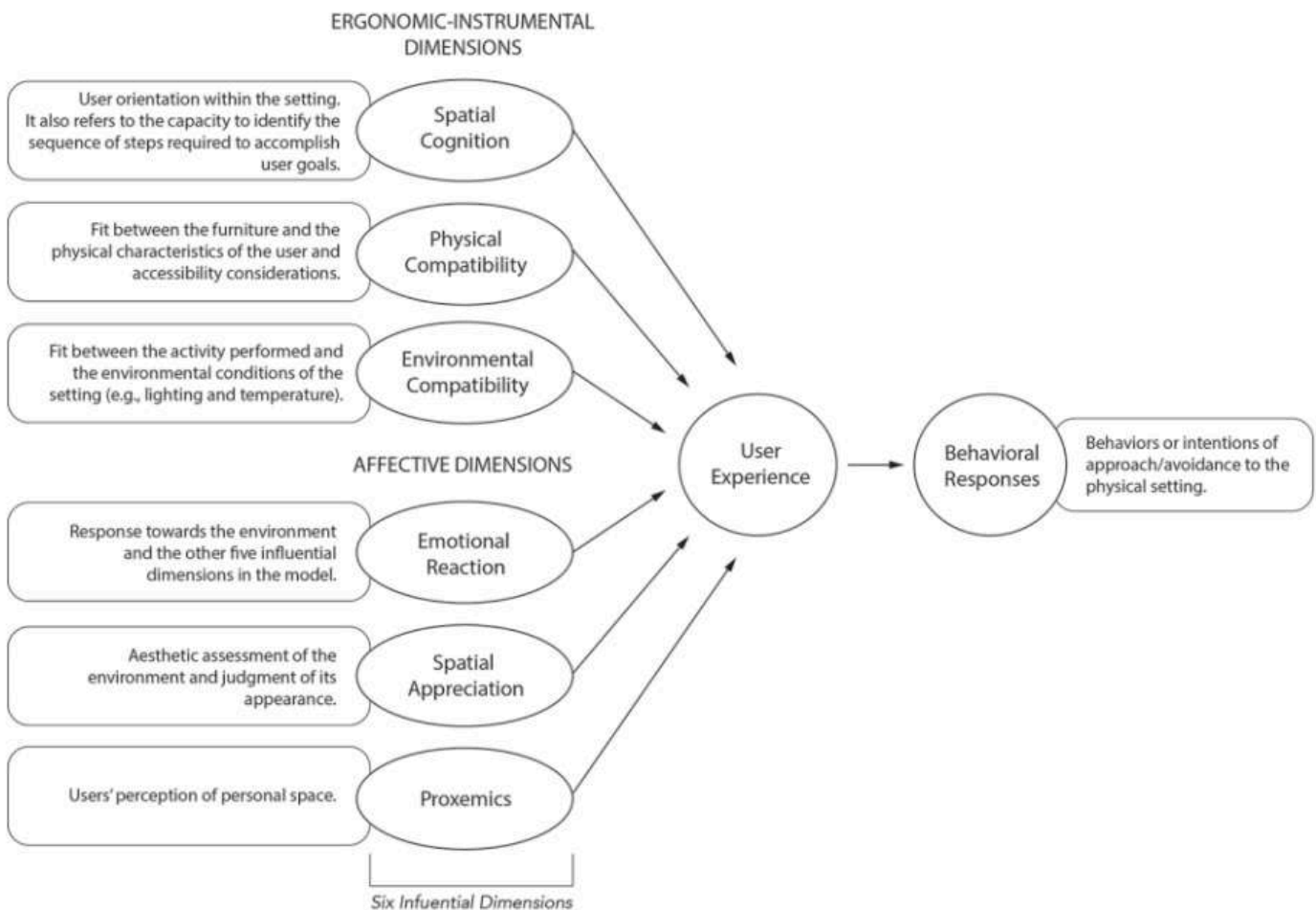


Figure 27: The SUE Model (Juliá Nehme et al., 2020).

Interior spatial design (ISD) extends beyond architectural spaces to include products, services, processes, and user journeys. Today's architectural design process must adapt to cater to the needs of various occupants by prioritising functionality informed by data-driven design decisions.

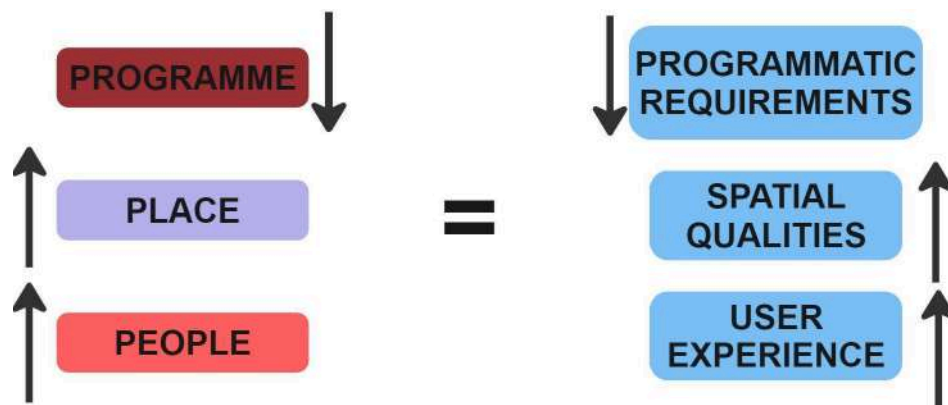


Figure 28: User Experience, Spatial Qualities and Programmatic Requirements within the User Experience Evaluation Framework and Sue Model Tools (Author, 2024)

The User Experience Evaluation Framework and Sue Model Tools concentrate on how people interact with and experience spaces. However, they fall short when addressing the space's functional aspects (programme). The programme suffers when specific needs and requirements are unclear before the design phase begins. Interior spatial design is integral to SD processes and requires robust tools to enhance and articulate user needs and experience (De Rosa, 2022). User

experience in spatial design should be prominently considered. Architects and designers need to emphasise how user experience can enhance the pre-design stage and the conceptual and programmatic requirements (Juliá Nehme et al., 2023). However, there is a significant gap in ISD tools regarding the holistic representation of the programmatic requirements and the documentation of the step-by-step processes. Many tools rely on 2D sketches, models, technical specifications, animations, videos, and 3D representations, which can fragment the presentation of services, making it challenging for users to envision the end product comprehensively (Dong & Liu, 2018).

ISD places a significant emphasis on user experience, but the pre-design phase is often overlooked (Chuang and Chien, 2021), leading to a neglect of user requirements (Baradaran Rahimi et al., 2018). There is a noticeable absence of a structured pre-design framework to facilitate the creation of user experiences within physical environments (Figure 28), highlighting a gap in architects' knowledge (Baradaran Rahimi et al., 2018).

7.4. Service Design and Interior Spatial Design Tools

- F. The Double Diamond (Figure 29) approach involves four distinct phases: discover, define, develop, and deliver (Wilson and Davies, 2019). First, a wide range of information about the context, existing services, and experiences is gathered. Then, this data is critically analysed to redefine design needs and challenges (van Geetsom and Wilkinson, 2021). These core values lead to another round of brainstorming user-centred solutions, refined and focused in the final stage. It is recommended to start with research as it offers practical guidance for designing spaces and services (Chang and Chuang, 2021; Wilson and Davies, 2019).

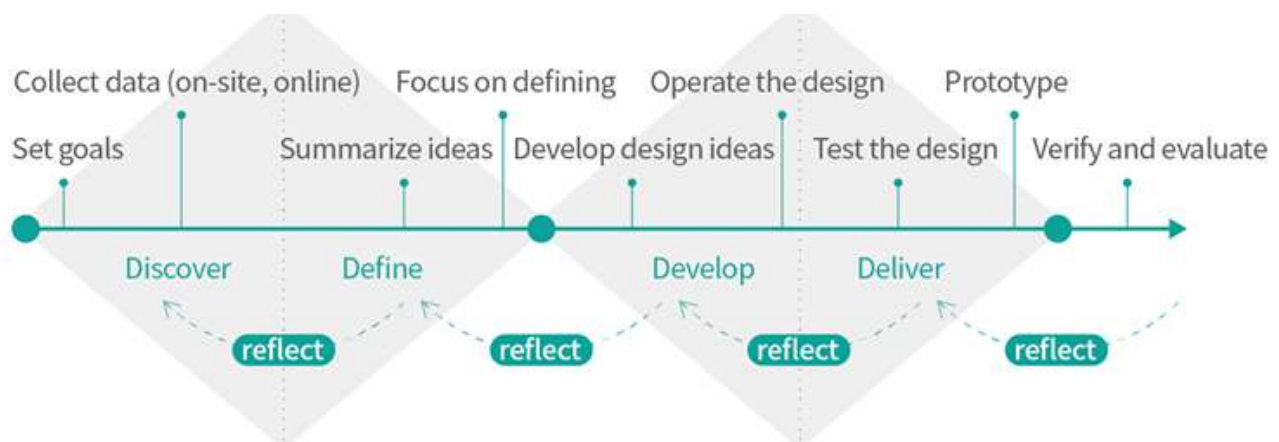


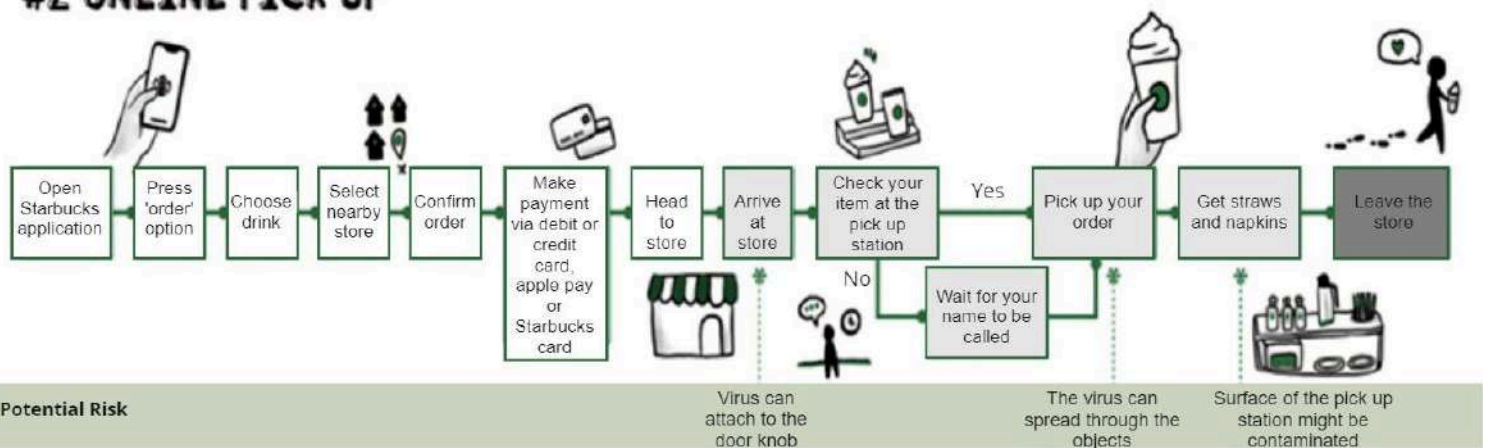
Figure 29: Double Diamond method (Chang and Chuang, 2021; Wilson and Davies, 2019)

- G. Customer Journey Mapping (CJM) is a visual tool that compares individual user experiences with planned processes in real-life settings. It informs spatial design projects by integrating user-centred design principles with customer experience thinking (Girginkaya and Ergen, 2021; Ladarola, 2023). CJM is a step-by-step process divided into sections and tasks, with phases tailored to relevant projects. Spatial maps in CJM (Figure 30-31) visually represent elements within the physical environment, while non-spatial maps organise phases chronologically without visual representation (Ladarola, 2023). Journey maps combine spatial and non-spatial techniques to capture user interactions, emotions, and thought processes, promoting human-centric design methods (Girginkaya and Ergen, 2021; Ladarola, 2023). These approaches effectively integrate user experience, spatial design, and service design (Nicolini, 2022).



Figure 30: Service Design (Online store) Customer Journey Mapping (Athuraliya, 2020).

#2 ONLINE PICK UP



#3 WALK-IN

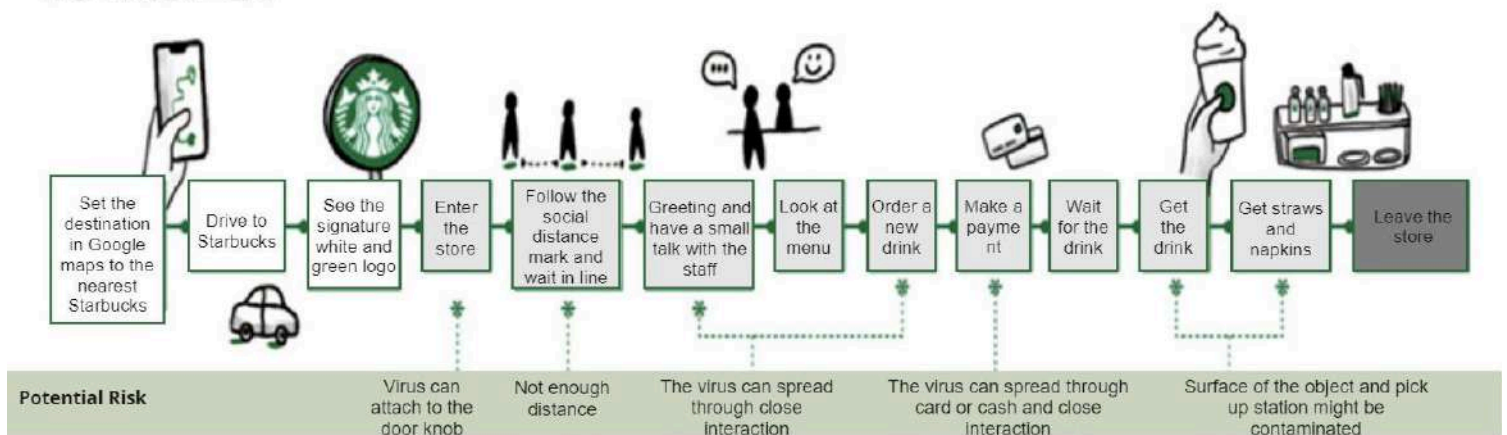


Figure 31: Spatial Design Customer Journey Mapping (online-spatial journey and spatial journey) (Athuraliya, 2020).

H. The Spatial Service System Map (Figure 32) identifies essential services and ongoing interactions among people, spaces, and objects (van Geetsom and Wilkinson, 2021). This tool effectively meets user needs by creating narratives for personas and stakeholders through scenarios. It estimates specific outcomes based on identified services from the outset (van Geetsom and Wilkinson, 2021), linking spatial analysis with services that illustrate the interconnected relationships among users, services, and the physical environment (Schoonderbeek, 2017).

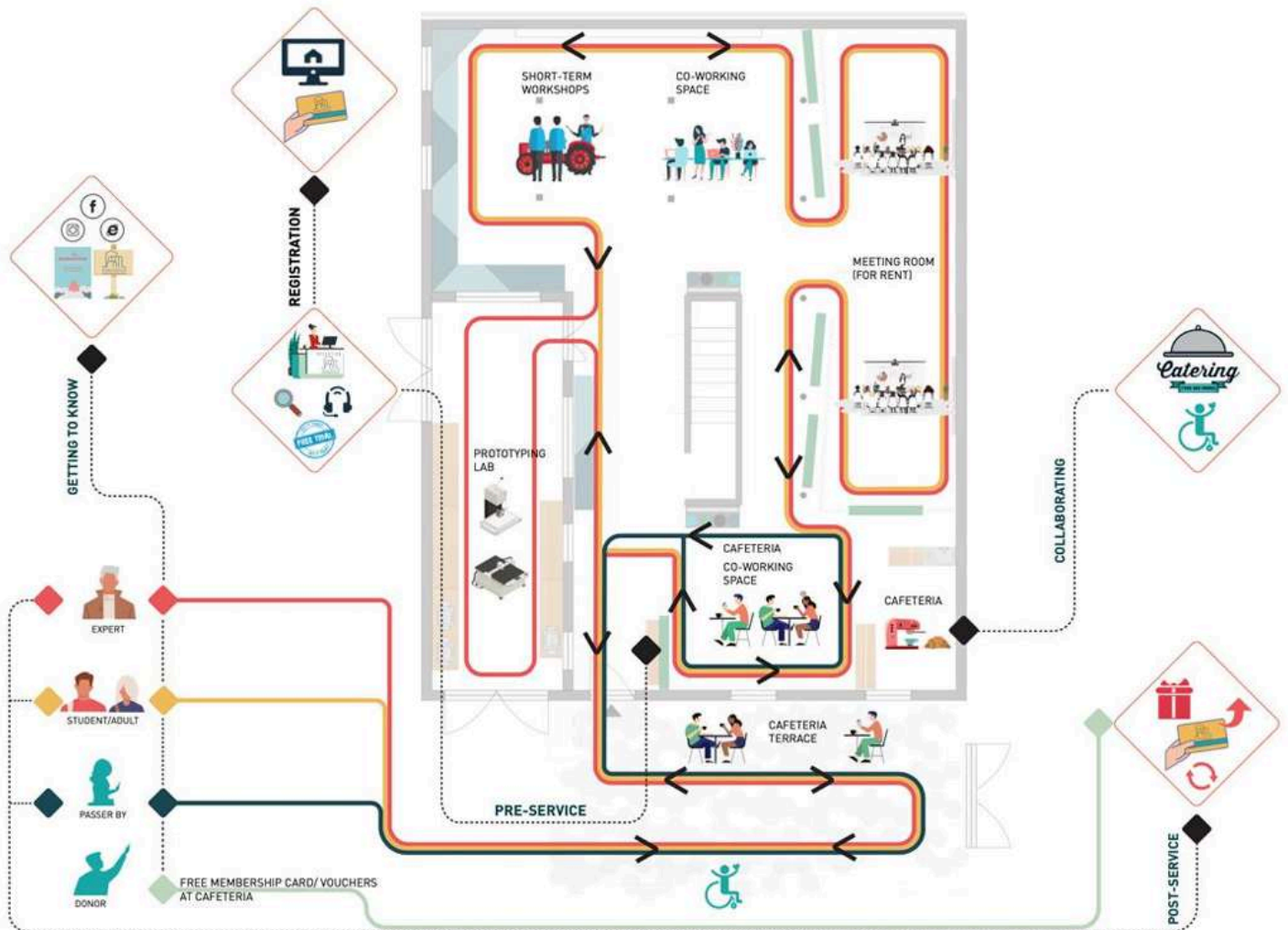


Figure 32: The Spatial Service System Map of Elderly Centre De Lisdodde documenting existing services (workshops, co-working spaces) and existing space. Identifying opportunities for new services and spaces (van Geetsom and Wilkinson, 2021)

I. Spatial walkthroughs (Figure 33) allow for assessing how spaces are used and measuring user preferences, helping users express their understanding of spatial features. They primarily focus on how space is used rather than why it is used. Tools like architectural drawings, interviews, and observations can document space usage and encourage users to share their preferences and dislikes (Chafi and Cobaleda-Cordero, 2022).

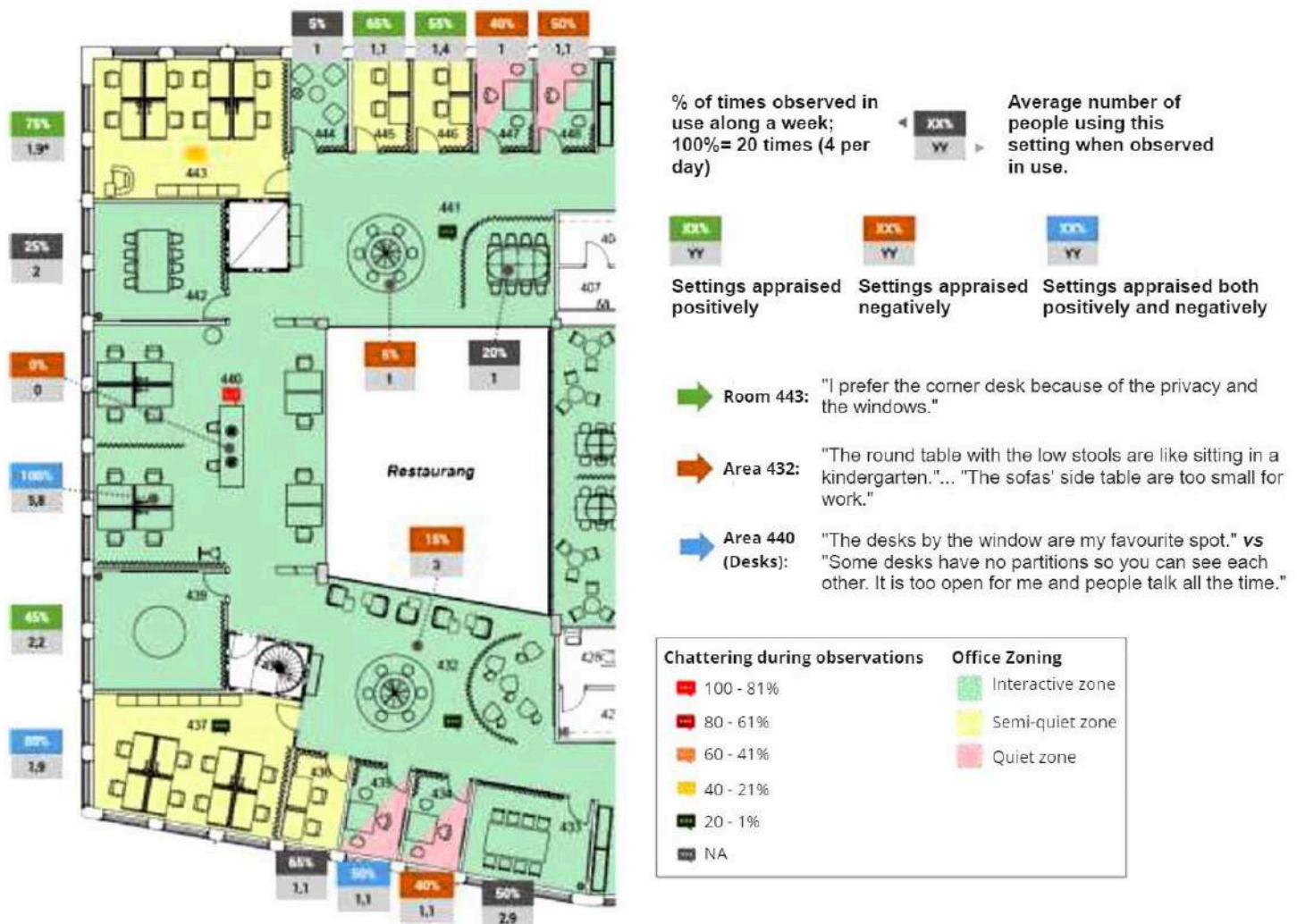


Figure 33: Spatial walkthroughs (Chafi and Coboleda-Cordero, 2022).

7.5. Business Process Design, Service Design and Interior Spatial Design Tools

Considering and evaluating the experience throughout all phases, steps, or stages within BPD, SD, and ISD tools is imperative to ensure enduring and positive experiences (Dong and Liu, 2018). User experience emerges as individuals interact with and immerse themselves in their physical environment, whether individually or collectively, leading to memorable experiences (Baradaran Rahimi et al., 2018). It encompasses ergonomic and affective dimensions, influencing user behaviour and intentions, such as the propensity to recommend or revisit a space (Bazley et al., 2016). User Experience (UX) implementation addresses users' contextual needs in their interactions with physical and spatial features (Law et al., 2009). The more substantial and positive this experience, the better the relationship between the customer and the company, the customer and the service, and the user and the built environment (Girginkaya and Ergen, 2021). Service blueprinting is a tool used in all three disciplines. It considers user needs and experiences (Marquez, 2015), programmatic requirements (Marquez, 2015), and the qualities of spatial environments (Ryzhakova et al., 2023).

- J. Service blueprinting (Figure 34-35) is a powerful tool with user-facing and back-of-stage layers, catering to service providers and users (Marquez, 2015). It serves as a comprehensive record of the service process, facilitating future reference and adaptation as needed, similar to laying the foundation for building structures (Marquez, 2015). This

reduces the time and effort required to develop new tools or methods for service delivery, as blueprints can be refined and adjusted to meet user needs. Service providers gain a holistic understanding of the process and can identify shortcomings through methods like ethnography, observations, and prototyping (Marquez, 2015).

As detailed by Trkman et al. (2015) and Ryzhakova et al. (2023), service blueprinting is a tool for designing and controlling service delivery, viewing services as processes rather than products. It emphasises that value is perceived through the customer's experience. Service blueprinting facilitates a collaborative creation process between customers and providers, enhancing understanding among customers, employees, and managers (Trkman et al., 2015). It allows for analysing customer perceptions, interactions, and experiences with the service and its processes (Ryzhakova et al., 2023). Figure 33-34 illustrates the flow and impact on end-user/customer experience in a step-by-step process within their specific categories.

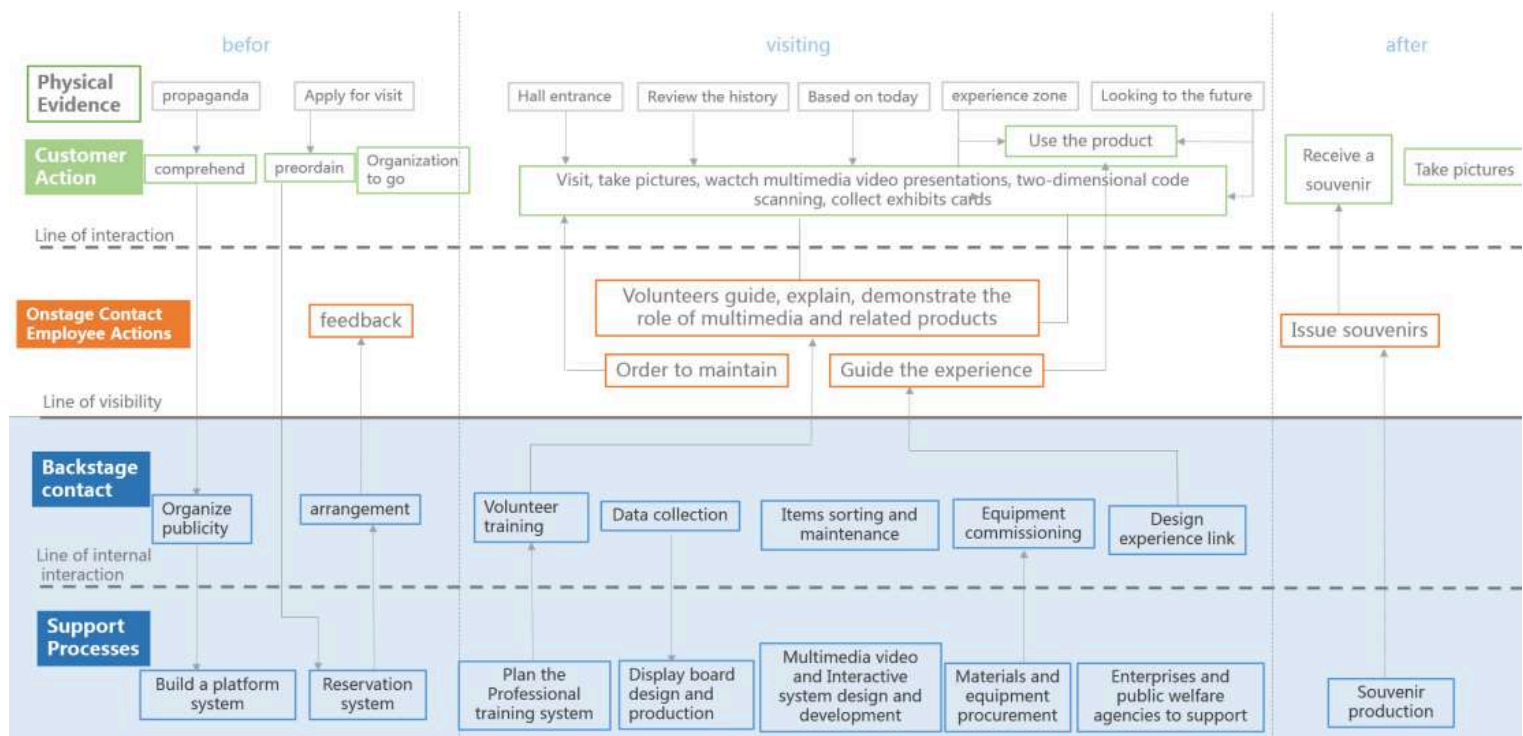


Figure 34: Service Blueprint shows all the steps and activities involved in a museum programme (Ou et al., 2017).

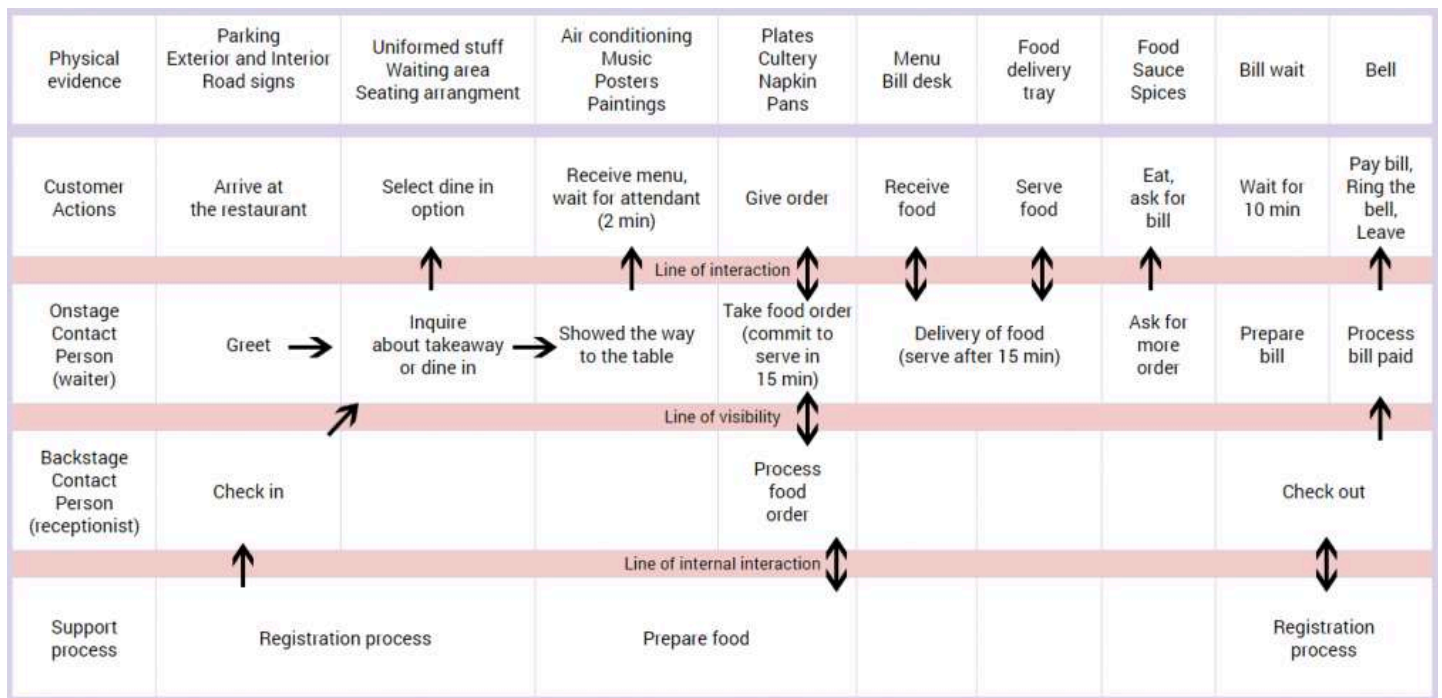


Figure 35: Service Blueprinting of a restaurant's spatial qualities and programmatic requirements (McCay, 2017).

This paper's analysis of BPD tools underscores their links with SD, focusing on process efficiency and service delivery. BPD places less emphasis on customer experience than SD (Ryzhakova et al., 2023). Business process tools within SD ensure structured service systems that align with strategic goals. BPD tools play a central role in integrating all aspects of the design process and enhancing customer interactions (Trkman et al., 2015). ISD's integration primarily involves the service blueprint tool, which identifies opportunities to engage customers and deliver value throughout the process.

SD tools seamlessly integrate with BPD and ISD tools, employing service blueprinting, spatial service system mapping, customer journey mapping, spatial walkthroughs, and the double-diamond method (Rodda, Ranscombe, and Kuys, 2022). These methods use visual aids, sketches, and collaborative co-design approaches to develop comprehensive service design frameworks. Despite the importance of service design in organisational processes, physical environmental considerations should be addressed (Abdulkader et al., 2020).

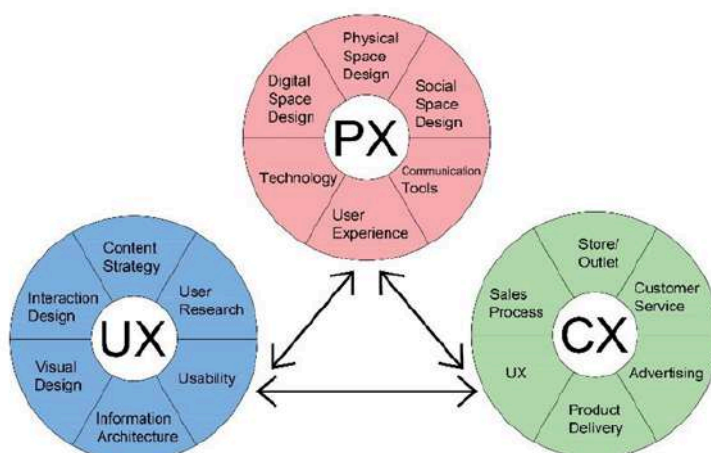


Figure 36: Relationship diagram of product experience (PX), user experience (UX) and customer experiences (CX) (Girginkaya and Ergen, 2021)

There are notable connections between service design and interior spatial design tools (Musulin and Strahonja, 2023). User responses in these fields are closely tied to behavioural aspects, creating unique values for user experience. Business process design and service design use systematic tools to communicate service or process essence to stakeholders, ensuring customer involvement. While interior spatial design and business process design often work independently, they overlap in prioritising the user or customer (Figure 37). Effective design or projects in architecture are determined by how well they meet user needs, leading to improved processes and structures in the pre-design phase (Ediae et al., 2022).

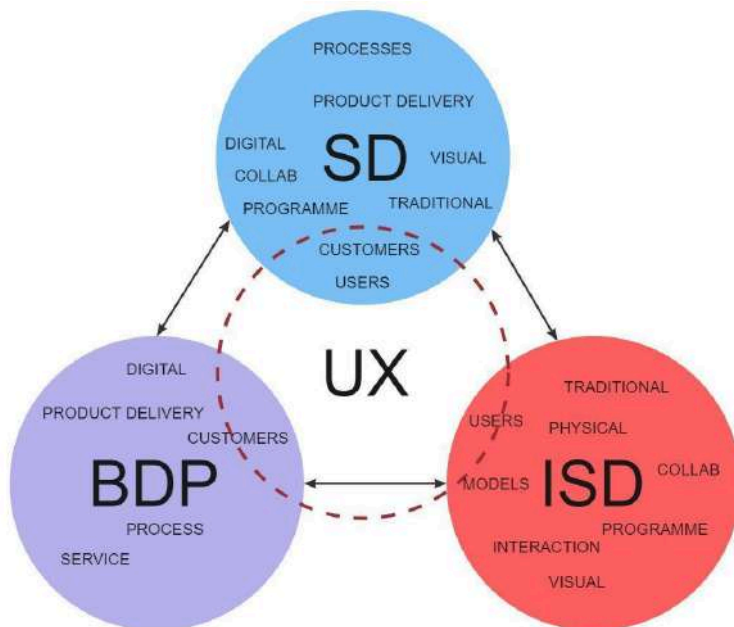


Figure 37: Relationship diagram within BPD, SD and ISD adapted from Girginkaya and Ergen (2021)

8. DISCUSSION

Step 4b: Synthesis (Lubbe et al., 2020)

This paper highlights the convergence of Business Process Design (BPD), Service Design (SD), and Interior Spatial Design (ISD) in both theory and practice while also identifying the need for a framework to align tools and concepts for improving user experience (Baradaran Rahimi et al., 2018). The analysis of BPD, SD, and ISD tools shows that they share methods aimed at improving user experiences, enhancing spatial qualities, and meeting programmatic requirements across various products, services, or designs.

The review of tools and methods across BPD, SD, and ISD shows significant overlaps between similar tools across these disciplines (Table 6). The most suitable user experience tools include BPMN (the Value Chain tool), Double Diamond, Customer Journey Map, Spatial Service System Map, User States and Contexts, Jobs to be Done, Service Blueprint, User Experience Evaluation Framework, and the SUE Model.

These tools and methods exhibit overlaps and synergies, often intersecting. For example, Value Chains (Pratama and Utama, 2019) and Customer Journey Mapping are integral to BPMN. User States and Context Mapping (Buhley, 2020) tracks changing user needs effectively. Jobs to be Done (Ulwick, 2016) focuses on performing specific tasks well. The User Experience Evaluation Framework (Dong and Liu, 2018) involves users improving services step by step. The SUE Model (Juliá Nehme et al., 2020) promotes understanding of how users interact physically and

emotionally. Customer Journey Mapping (Chafi and Cobaleda-Cordero, 2022; Girginkaya and Ergen, 2021) combines spatial and non-spatial methods to show how users experience services. The Spatial Service System Map (van Geetsom and Wilkinson, 2021) connects space analysis with improving services. Spatial Walkthroughs (Chafi and Cobaleda-Cordero, 2022) and Service Blueprinting (Marquez, 2015; Trkman et al., 2015; Zurlo et al., 2018) identify and document how services are used, ensuring they are efficient and user-friendly. These tools help create and improve spatial qualities, programmatic requirements and user experience, effectively meeting users' needs.

Table 6: Analysis & Evaluation of BPD, SD and ISD tools.

BPD- Business Process Design Tool

SD- Service Design Tools

ISD- Interior Spatial Design Tools

SD and ISD Tools

BPD, SD and ISD Tools

Tool	Reference	Summary	Strengths	Weakness	Opportunities
BPMN (+ Value Chain)	(Abdulkader et al., 2020; Pratama and Utama, 2019)	Graphical tool in BPD that documents business processes and illustrates how different players interact with flow.	-Process-oriented -Understanding the entire flow -Structured systems with defined programmes.	-Absence of user experience -Involvement of end-users -Lack of physical environment	-Can be made more spatially oriented. -Increase involvement of the end-user to enhance their experience. -Programmes implemented within a physical environment.
User States & Contexts	(Buhley, 2020)	An SD mapping tool that shows users' needs and how they change over time. It highlights fulfilled needs at the centre and unmet needs on the edge, revealing patterns in user-service interactions.	-Identify user requirements. -Prioritise these needs hierarchically. -Establish patterns between the service/space and the user.	-Diagrams can become intricate. -Lack of visual coherence, relying solely on text. -Programmatic needs and specifications	-Develop a flow diagram that visually charts the service or space for each user. -Separate overlapping needs into distinct mappings.
Jobs to be done	(Ulwick, 2016)	A structured SD tool that identifies user needs and develops tasks and phases in a step-by-step process to enhance user experience.	-A structured flow with sequential phases. -Categories are divided to outline a programme. -Specific instructions on actions to be taken.	-A process within a physical setting. -Presented in a block format, which is unsuitable for mapping. -Contains excessive text.	-Visualise -Incorporate sketches of the physical environment -Divide it into multiple pages instead of one.

User experience evaluation framework	(Dong and Liu, 2018)	This ISD tool combines product and scenario to improve user experience. It includes text, images, user senses, and scenarios for users to interact with and give feedback.	-Adaptability. -Visual and graphic tools. -Emphasis on user experience -Incorporates both people and the physical environment.	-The absence of a straightforward programme -Could continue indefinitely with constant user updates.	-Clearly outline the programme from the outset. -Specify stages or phases where user updates are permitted, including timing and extent.
SUE Model	(Juliá Nehme et al., 2020)	Focused on user experience, interaction between people, emotions and physical environment. This ISD tool identifies six dimensions to integrate into projects.	-Incorporates people, place, and user experience. -Includes spatial parameters and requirements. -Explores reactions and emotions.	-The six dimensions covering people, place, programme, and user experience are at a service level. -Lacks detail or visual elements.	-Elaborate on the six influential dimensions with specific details regarding requirements or specifications. -Visual tools can be incorporated.
Double Diamond	(Chang and Chuang, 2021; Wilson and Davies, 2019)	It consists of four phases: discover, define, develop, and deliver. Offers practical guidance and a structured framework for designing spaces and services for creative projects.	-Clearly defined stages. -Any tool can be incorporated into any phase. -A systematic and practical approach. -Includes tasks (programme) and spatial considerations.	-Does not adequately incorporate people. -Superficial explanation. -Becomes more of a design process without interference from other tools. -Does not address user experience adequately.	-Incorporate journey mapping tools to document user experience. -Utilise visual tools. -Integrate various tools from the three disciplines with ease.
Customer journey map	(Chafi and Cobaleda-Cordero, 2022; Girginkaya and Ergen, 2021)	Visually compares real-life user experiences with planned processes and strategies in spatial design projects.	-A step-by-step process with distinct phases -Includes people, place, programme, and user experience -Visual	-User needs and requirements are not demonstrated -User experience is mapped in a very statistical manner.	-Include a dedicated client/user section to incorporate needs and requirements. -Visually represent user experience in a spatial format.

		Capture user interactions, emotions, and thoughts, promoting human-centric design: SD and ISD tool.	-Adaptable -Capable of incorporating other tools.		
Spatial Service System Map	(van Geetsom and Wilkinson, 2021)	Identifies services and their interactions between people, spaces, and objects. It helps meet user needs. This SD and ISD tool illustrates the interconnected relationships of users, services, and the place.	-Visually represent the user journey. -Highlight spatial qualities. -Map different user journeys. -Display links and overlaps. -Show tasks or events.	-User needs and requirements are not demonstrated -It does not show the previous steps and details but goes directly into the experience and journey.	-List client/user needs and requirements on the page. -List requirements and spatial aspects. -Write out the programme.
Spatial Walk-Throughs	(Chafi and Cobaleda-Cardero, 2022)	This SD and ISD tool evaluates how spaces are used and measures user needs and desires. It lets users explain their understanding of space but mainly focuses on how the space is used.	-Enables face-to-face observation and interaction. -Direct engagement with the space. -Highlights spatial qualities. -Indicates where updates and changes occur.	-Absence of a defined programme -No experiences mapped out -No established goals, requirements, or needs	-List client/user needs and requirements on the page. -List requirements and spatial aspects. -Write out the programme. -Map user experience with spatial layout.
Service Blueprint	(Marquez, 2015; Trkman et al., 2015; Zurlo et al., 2018)	The Collaborative step-by-step creation process involves the provider and customer evaluating their interactions and experiences using BPD, SD, and ISD tools.	-Organised process -Reduces time and effort -Adjustable to meet user needs	-Physical spatial environment -Detailed step-by-step process to define a specific project	-Visual quality -Include the physical environment with spatial qualities and programmatic requirements mapped out.

The relationship between ISD and BPD shows significant gaps due to the lack of consideration for the physical environment (Popov and Goza, 2016), highlighting the need for a new pre-design spatial framework to connect these disciplines effectively. More research is needed to develop or adapt tools and methods that explain the characteristics and intersections between ISD and SD (De Rosa, 2022).

These tools have overlapping parts that develop into clear categories:

1. Interaction between the user and the process (Client).
2. The physical environment (Site Analysis).
3. Programme needs and requirements (Building Analysis).
4. Detailed process with spatial specifications and programmatic requirements (Pre-Design programme analysis).
5. A clear and comprehensive brief (Schematic Phase/Next Phase).

User experience is vital in all stages, mapping users' and clients' experiences (Ediae et al., 2022). These categories form the stages for a new pre-design spatial framework, as discussed in detail in the following section.

8.1. Spatial Framework Development

This paper introduces a proposed pre-design spatial framework (PDSF) to offer new insights and methodologies for approaching architectural projects and designs. The PDSF addresses the often-overlooked pre-design phase (Chuang and Chien, 2021) by emphasising the involvement of the user/client throughout the entire process. By integrating user experience analysis from the outset, the framework aims to enhance the user experience, ensuring that their needs are understood and met from the beginning. Ediae et al. (2022) believe that the fulfilment and effectiveness of user needs and desires determine the design project's success. As previously mentioned, the pre-design phase entails site visits, surveys, data analysis, budget, timeline, conversations, and meetings with the client or end-user to determine their needs, desires, habits, and ideas that can improve the end product (Girginkaya and Ergen, 2021; Erebor et al., 2019).

Tools were identified, evaluated, selected, and combined to create a structured framework, integrating methods such as Jobs to be Done, Customer Journey Mapping, the Double Diamond method, and Service Blueprinting (Trkman et al., 2015) into a phased process, clearly outlining step-by-step requirements and goals for the pre-design phase. Using Spatial Walkthroughs (Chafi and Cobaleda-Cordero, 2022), the Spatial Service System Map (van Geetsom and Wilkinson, 2021), and Value Chain to generate visual spatial graphics for each phase and document spatial qualities and programmatic requirements along the journey map. The User Experience Evaluation Framework (Dong and Liu, 2018), SUE model (Juliá Nehme et al., 2020), and User States and Contexts are incorporated at each stage, adapting as user and client needs evolve, to document the user experience within each phase and step.

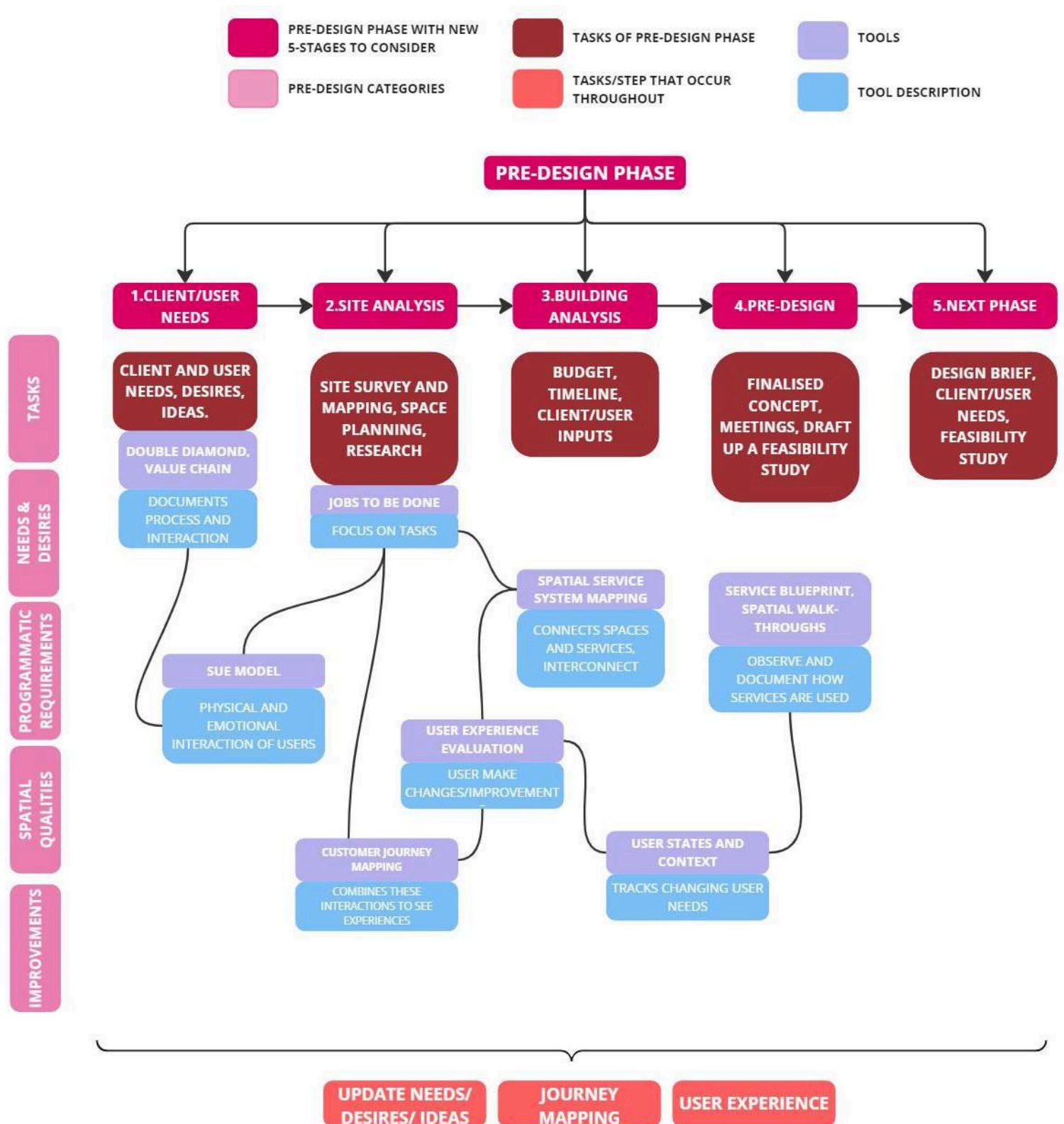


Figure 38: Proposed Spatial Framework stages and categories with suggested tools (Author, 2024)

Figure 38 creates an overview and forms a basic framework. The framework is composed of five relevant stages to ensure thorough analysis during the pre-design phase. These stages are: 1. Client and User, 2. Site Analysis, 3. Building Analysis, 4. Pre-Design, and 5. Schematic Design. The stages are categorised into five areas: Tasks and Programmatic Requirements, Needs and Desires, Spatial Qualities, User Experience and Improvements/Updates. These categories guide the process of each stage and specify the requirements of both the user and the project lead

(Figure 38). To explore this framework and understand its workings, it's essential to discuss how each stage interacts with specific categories. The framework is explained step by step:

Stage 1: Client and User

- In the client and user stage, focus is placed on understanding their needs and desires, capturing their ideas, and tracking their journey. For simplicity, we'll use the term "user" to refer to the client, user, or group of people involved in the process excluding the designer and architect.
- Tasks Category: Documenting the user's desires, needs, wants, and ideas ensure a thorough record of their thoughts. It's important to consider the different users involved, as they may have varying needs and requirements. The user initiates the programme for the specific space, defining the requirements and spatial qualities.
- Improvements Category: This area allows for updating and recording any changes or updates to the user's ideas and wants, ensuring that each decision is captured.
- Journey Mapping Categories: These categories map the user's experience during the pre-design phase. They track behaviour and feedback, showing how users perceive the process and identifying areas for improvement. They also highlight any feelings of exclusion or confusion. It's important to consider both the user, as their perspectives might differ.
- These behavioural categories are crucial as they influence each stage and category, ultimately aiming to enhance user experience and involvement in the design process. The end goal of this framework is to improve and enrich the user journey by ensuring active user participation throughout the design process.
- At this initial stage, the Double Diamond and Value Chain tools are integrated to document and establish the foundation for the pre-design process, to address user needs from the outset.

Stage 2: Site Analysis

- The client and user stage transitions into the site analysis stage while maintaining user involvement. During this phase, the user remains engaged in the backstage aspect, where their desires and ideas continue to be considered, while the architect or designer facilitates decisions and the next steps in the front stage.
- The SUE Model integrates the client and user stage and site analysis stage, documenting and incorporating the user's interactions capturing their physical and emotional actions.
- The architect or designer conducts a thorough site analysis, which includes performing a SWOT analysis (strengths, weaknesses, opportunities, and threats), examining relevant regulations and legislations, and addressing any heritage considerations or environmental qualities that need careful handling.
- The next step maps services and site qualities, such as access routes, ground levels, ground quality, building quality, scale, and orientation. It is important to note that site and building analysis are distinct stages interlinking closely.
- After completing the analysis, a meeting is arranged with the user to discuss the way forward. The architect or designer presents a design idea that aligns with the site and the existing building (if applicable).
- The Jobs to be Done tool documents these tasks and events.
- The user is then informed about the progress of the site analysis and any necessary meetings, including potential onsite visits with the architect or designer.
- The user's journey is crucial during this stage, as their role shifts backstage, potentially making them feel out of the loop. It is essential to bridge the gap between the site analysis and the user by involving them throughout.
- Mapping out the site plan or building plan to illustrate the relevance and importance of each step ensures that the users understand the process. This approach aims to deliver the best outcome and reinforces their sense of being part of the team.
- Considering the site's current functions, activities, or events can guide the design's spatial qualities.

- A contract is established to protect the architect or designer and prevent unnecessary work. The user is informed about the contract details and requirements during the pre-design phase.

Stage 3: Building Analysis

- Identifying the building's scale, orientation, and access is crucial, whether dealing with an existing structure or designing a new one. This ensures that lighting, natural ventilation, and climate considerations are met.
- Spatial qualities influence the users, programme, and design of a space.
- These factors help the architect/designer align the project with the user's needs and programmatic requirements.
- The spatial Service System Map tool connects these factors of spaces and service actions.
- The user's input on decisions and necessary changes is vital. People inform the physical environment as well as the programme.
- Regular updates and improvements are made as the project progresses, and these are documented on the site or building plan to keep a record of new and old ideas.
- Customer Journey Mapping and the User Experience Evaluation Framework tools capture the user's experience throughout the entire process. This approach involves users so profoundly that they can actively contribute/be involved as the process unfolds.
- This step can overlap with the previous site analysis stage, as programmatic requirements may vary.
- Throughout this process, journey mapping is used to track the user's experience through the User States and Context tool, ensuring their journey is continuously monitored and understood.

Stage 4: Pre-Design

- This step aims to consolidate the work from previous stages and categories to develop a more finalised initial concept design with defined ideas that enhance user experience, spatial qualities, and programmatic requirements. Considering people, place and programme.
- The Service Blueprint and Spatial Walkthrough tools create visual diagrams that systematically document services and spaces. These tools help finalise design ideas that can be taken forward to the next stage of development.
- Records of meetings and improvements are analysed to determine the best possible solutions that meet the user's needs.
- The users participate in this process to ensure that their ideas and needs are addressed.
- A feasibility report is then created, incorporating the analysis and aligning it with the user's requirements and ideas for the design.
- An overview timeline and budget are also established, providing the user with an understanding of the project scope, including potential delays and weather considerations.
- A subsequent meeting is held with the user to address any final queries and discuss the project scope in detail.
- Following this, a meeting with the user, contractor, and stakeholders is arranged to discuss the project and the feasibility study.

Stage 5: Schematic/Next Phase

- This phase establishes a clear and comprehensive design brief based on the user's needs, ideas, and feasibility study.
- While certain aspects, such as prices and calculations, may change, the core brief provides a stable foundation.
- The design begins with the user's input, allowing for iterative development.
- Each phase of architecture and design includes specific contract terms and payment schedules, which should be communicated to the user.
- Subsequently, the schematic phase advances further.

8.2. Future Development

Wilson and Davies (2019) suggest that a framework should be a flexible guideline rather than a rigid protocol. This framework thus provides a foundation and structure for the pre-design phase to enhance user experience. Since projects may vary, additional tools or methods may be necessary to measure or document specific aspects. By balancing and integrating various tools within this framework and considering detailed levels of development and available resources (Wilson and Davies, 2019), a comprehensive and impactful user experience can be achieved.

9. CONCLUSION

This paper uses an integrative literature review (ILR) to thoroughly analyse and synthesise existing research (Lubbe et al., 2020). Following a five-step ILR process, it examines interdisciplinary topics of Business Process Design (BPD), Service Design (SD), and Interior Spatial Design (ISD) from an interior architecture perspective. Addressing the gap between research and practice in architecture, this paper aims to enhance user experience in the pre-design phase by defining its scope and incorporating concepts and tools from BPD, SD, and ISD (De Rosa, 2022).

By understanding how the concepts of people, place, and programme influence user experience, the paper integrates narrative theory and space syntax to provide insights into how physical environments impact users (De Rosa, 2022; Salama et al., 2024). This interdisciplinary approach ensures that environments are functional and behaviourally impactful, enhancing user satisfaction and efficiency within programmes (Musulin and Strahonja, 2023; Samreen and Jha, 2024). Among the user experience tools identified, Value Chain (BPMN), Double Diamond, Customer Journey Map, Spatial Service System Map, User States and Contexts, Jobs to be Done, Service Blueprint, User Experience Evaluation Framework, and the SUE Model, are most suitable for forming the foundation of the pre-design phase spatial framework. Combined, these tools independently meet the selection criteria for user experience within a physical environment and offer a stable basis for the framework (Ediae et al., 2022). This strategic combination establishes a straightforward process for outlining specific stages, organising them along a timeline, and highlighting key areas essential for optimal user experience in architectural design. The developed framework focuses on user experience, programmatic requirements, and spatial qualities (Girginkaya and Ergen, 2021; De Rosa, 2022). Integrating BPD, SD, and ISD is crucial for improving user experience and creating satisfying environments for end users.

In conclusion, this integrative literature review (Lubbe et al., 2020) provides a comprehensive analysis of tools used in BPD, SD, and ISD to improve user experience, spatial qualities, and programmatic requirements during the pre-design phase (Baradaran Rahimi et al., 2018). The framework aims to create a more effective and adaptable design process by integrating these tools. The study highlights the need for a new pre-design spatial framework to connect these interdisciplinary fields better, emphasising the importance of considering people, place, and programme within the physical environment (Gebbru, 2018). Future research should further develop and refine these tools to enhance their application in interior architecture.

10. REFERENCES

1. Abdulkader, B. et al. 2020. 'Aligning firm's value system and open innovation: a new framework of business process management beyond the business model innovation', *Business Process Management Journal*, 26(5), pp. 999–1020. Available at: <https://doi.org/10.1108/BPMJ-05-2020-0231>.
2. Athuraliya, A. 2020. Customer Journey Map: Definition with Examples. Available at: <https://creately.com/guides/what-is-a-customer-journey-map/> (Accessed: 24 June 2024).
3. Babb, B. 2020. 'Business Process Design (BPD): Definition & Tips', Pipefy, 29 December. Available at: <https://www.pipefy.com/blog/business-process-design/> (Accessed: 11 June 2024).
4. Babb, M. et al. 2015. 'Instruments to measure patient experience of healthcare quality in hospitals: a systematic review', *Systematic Reviews*, 4, p. 97. Available at: <https://doi.org/10.1186/s13643-015-0089-0>.
5. Baradaran Rahimi, F. et al. 2018. 'Human behaviour and cognition of spatial experience; a model for enhancing the quality of spatial experiences in the built environment', *International Journal of Industrial Ergonomics*, 68, pp. 245–255. Available at: <https://doi.org/10.1016/j.ergon.2018.08.002>.
6. Beattie, M. et al. 2015. 'Instruments to measure patient experience of healthcare quality in hospitals: a systematic review', *Systematic Reviews*, 4, p. 97. Available at: <https://doi.org/10.1186/s13643-015-0089-0>.
7. Bilgin, Y. 2023. 'Systems Approach and Concepts in Architectural Design', Medium, 3 September. Available at: <https://medium.com/@yasirbil/systems-approach-and-concepts-in-architectural-design-2350d649531c> (Accessed: 11 March 2024).
8. Buhley, L. 2020. 'Understanding users by going beyond personas and demographics'. Say Yeah!, 24 March. Available at: <https://sayyeah.com/digital-insights/understanding-users/> (Accessed: 16 May 2024).
9. Chafi, M.B. and Cobaleda-Cordero, A. 2022. 'Methods for eliciting user experience insights in workplace studies: spatial walkthroughs, experience curve mapping and card sorting', *Journal of Corporate Real Estate*, 24(1), pp. 4–20. Available at: <https://doi.org/10.1108/JCRE-12-2020-0069>.
10. Chang, T.-Y. and Chiu, Y.-C. 2023. 'Exploiting Service Design in Service Quality: Escorting the Customer's Experiential Value in the Journey of a Star-Rated Hotel', *Systems (Basel)*, 11(4), pp. 206–. Available at: <https://doi.org/10.3390/systems11040206>.
11. Chang, T.Y. and Chuang, Y.J. 2021. 'Cultural Sustainability: Teaching and Design Strategies for Incorporating Service Design in Religious Heritage Branding', 13(6), p. 3256. Available at: <https://doi.org/10.3390/su13063256>.
12. Cheng, H. 2019. 'How does interaction design affect user experience through online shopping interfaces?', *IOP Conference Series. Materials Science and Engineering*, 573(1). Available at: <https://doi.org/10.1088/1757-899X/573/1/012076>.
13. Chuang, C.-L. And Chien, S.-F. 2021. Facilitating Architect-Client Communication in the Pre-Design Phase, *Proceedings of the 26th International Conference*. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://papers.cumincad.org/data/works/att/caadria2021_415.pdf (Accessed: 2024).
14. Collina, L. et al. 2018. 'Spatial and Service Design: Guidelines Defining University Dormitories', in, pp. 14–26. Available at: https://doi.org/10.1007/978-3-319-91797-9_2.
15. Cullis, J. 2021. Subject and Research Guides: Systematic Reviews: Step 6: PRISMA Flow Diagram & Screen. Available at: https://libguides.mq.edu.au/systematic_reviews/prisma_screen (Accessed: 19 April 2024).
16. Dieffenbacher, S. F. 2022. 'Michael Porter Value Chain Analysis Model: Examples & Applying Steps'. Digital Leadership. Available at: <https://digitalleadership.com/unite-articles/porters-value-chain/> (Accessed: 24 June 2024).
17. De Rosa, A. 2022. Spatial design + service design: Framing a transdisciplinary perspective. Available at: <https://doi.org/10.21606/drs.2022.656>.

18. Dong, Y. and Liu, W. 2018. 'Research on UX evaluation method of design concept under multi-modal experience scenario in the earlier design stages', *International Journal on Interactive Design and Manufacturing (IJIDeM)*, 12(2), pp. 505–515. Available at: <https://doi.org/10.1007/s12008-017-0393-0>.
19. Dunzer, S. et al. 2024. 'Design Principles for Using Business Process Management Systems', in, pp. 217–228. Available at: https://doi.org/10.1007/978-3-031-50974-2_17.
20. Ediae, O.J., Abeng, F.J. and Egbudom, J.C. 2022. 'User Experience of Architectural Promenade in Art and Cultural Centres in Calabar, Crossriver State, Nigeria', *IOP Conference Series. Earth and Environmental Science*, 1054(1), p. 012029. Available at: <https://doi.org/10.1088/1755-1315/1054/1/012029>.
21. Erebor, E. et al. 2019. 'Pre-design process and opportunities for sustainability: A study of stakeholders in Abuja', *International Journal of Civil Engineering and Technology*, 10, pp. 2524–2547.
22. Ferdous, F. 2020. 'Positive social interaction by spatial design: A systematic review of empirical literature in memory care facilities for people experiencing dementia: *Journal of Aging and Health*', *Journal of Aging and Health*, 32(9), pp. 949–961. Available at: <https://doi.org/10.1177/0898264319870090>.
23. Galvin, R. and Singer, D.L. 1996. 'Business process design: The new common sense', *Association Management*, 48(2), p. 50.
24. Girginkaya, S. and Ergen, A. 2021. 'Customer Journey Maps for Physical Experience Design: Conceptual Design Case of a Gas Station', 5, pp. 172–184.
25. Gebru, H.M. .2018. Space programming requirements representation, analysis and visualisation at a large scale architectural firm. University of British Columbia. Available at: <https://doi.org/10.14288/1.0371253>.
26. Gibbons, S. 2017. Service Blueprints: Definition, Nielsen Norman Group. Available at: <https://www.nngroup.com/articles/service-blueprints-definition/> (Accessed: 24 June 2024).
27. Grisold, T. et al. 2022. 'The Five Diamond Method for Explorative Business Process Management', *Business & Information Systems Engineering*, 64(2), pp. 149–166. Available at: <https://doi.org/10.1007/s12599-021-00703-1>.
28. Groß, S. et al. 2020. 'The Business Process Design Space for Exploring Process Redesign Alternatives', *Business Process Management Journal*, 27, pp. 25–56. Available at: <https://doi.org/10.1108/BPMJ-03-2020-0116>.
29. Hafeez, K. 2020. 'Business process transformation in financial market: A hybrid BPM-ELECTRE TRI for redesigning a securities company in the Iranian stock market', *Knowledge and Process Management [Preprint]*. Available at: https://www.academia.edu/113639588/Business_process_transformation_in_financial_market_A_hybrid_BPM_ELECTRE_TRI_for_redesigning_a_securities_company_in_the_Iranian_stock_market (Accessed: 2 April 2024).
30. Havey, M. 2005. *Essential Business Process Modeling*. O'Reilly Media, Inc.
31. Hong, S. 2020. 'Bernard Tschumi's Research on "Event Architecture" and Its Design Strategy', *Frontiers in Art Research*, 2(7). Available at: <https://doi.org/10.25236/FAR.2020.020705>.
32. Hrabal, M. et al. 2021. 'Human factor in business process management: modelling competencies of BPM roles', *Business Process Management Journal*, 27(1), pp. 275–305. Available at: <https://doi.org/10.1108/BPMJ-04-2020-0161>.
33. Iadarola, A. 2023. 'Journey mapping', in, pp. 181–195. Available at: <https://doi.org/10.1201/9781003289845-13>.
34. Juan, Y. and Yuan, K. 2013. 'Control Flow Pattern Recognition for Bpmn Process Models: *International Journal of Electronic Business Management*', *International Journal of Electronic Business Management*, 11(2), pp. 133–143.
35. Juliá Nehme, B., Rodríguez, E. and Yoon, S.-Y. 2020. 'Spatial User Experience: A Multidisciplinary Approach to Assessing Physical Settings', *Journal of Interior Design*, 45(3), pp. 7–25. Available at: <https://doi.org/10.1111/joid.12177>.
36. Juliá Nehme, B. et al. 2023. 'Assessing Spatial User Experience for Design Guidelines: A Comparative Study of Outpatient Waiting Rooms with Conventional Versus Modern

- Features', *HERD Health Environments Research & Design Journal*, 16. Available at: <https://doi.org/10.1177/19375867231163338>.
37. Karimi, K. 2018. 'Space syntax: consolidation and transformation of an urban research field', *Journal of Urban Design*, 23(1), pp. 1–4. Available at: <https://doi.org/10.1080/13574809.2018.1403177>.
 38. König, R. 2015. An imaginal interpretation of interior design's methods of cultural production: towards a strategy for constructing meaning.
 39. Lee, K. 2022. 'The Interior Experience of Architecture: An Emotional Connection between Space and the Body', *Buildings*, 12(3), p. 326. Available at: <https://doi.org/10.3390/buildings12030326>.
 40. Le Loarne, S. and Maalaoui, A. 2015. 'International Perspectives on Business Innovation and Disruption in Design', in, pp. 209–226. Available at: https://doi.org/10.1007/978-3-319-18872-0_14.
 41. Lubbe, W., Ham-Baloyi, W. ten and Smit, K. 2020. 'The integrative literature review as a research method: A demonstration review of research on neurodevelopmental supportive care in preterm infants', *Journal of Neonatal Nursing*, 26(6), pp. 308–315. Available at: <https://doi.org/10.1016/j.jnn.2020.04.006>.
 42. Mace, V. 2016. 'A phenomenological approach to primary research in Spatial Design', *Spark: UAL Creative Teaching and Learning Journal*, 1(2), pp. 115–121.
 43. Marques, T. et al. 2020. 'Human resources management and leadership styles in family firms', *Journal of Family Business Management*, 10(4), pp. 327–351. Available at: <https://doi.org/10.1108/JFBM-10-2019-0070>.
 44. McCay, A. (2017) 'Create Service Blueprint in UXPressia', *UXPressia Blog*, 10 May. Available at: <https://uxpressia.com/blog/service-blueprint-many-birds-with-one-stone> (Accessed: 2 July 2024).
 45. Miro. 2024. Visual Creation. Available at: https://miro.com/app/board/uXjVNjlbEIE= (Accessed: 25 June 2024).
 46. Monjo, T. 2013. 'User states and contexts' - Fluid - Fluid Project Wiki. Available at: <https://fluidproject.atlassian.net/wiki/spaces/fluid/pages/11608331/Floe+User+states+and+contexts> (Accessed: 25 June 2024).
 47. Musulin, J. and Strahonja, V. 2023. 'User Experience, Business Models, and Service Design in Concert: Towards a General Methodological Framework for Value Proposition Enhancement', *Sustainability*, 15(16), p. 12509. Available at: <https://doi.org/10.3390/su151612509>.
 48. Ndovela, X., Olalere, F.E. and Reynolds, M.C. (2022) 'Design for Social Innovation: A Value Creation for Intensifying Interior Design's Social Compact', *The International Journal of Design Management and Professional Practice*, 16(2), pp. 53–75. Available at: <https://doi.org/10.18848/2325-162X/CGP/v16i02/53-75>.
 49. Nicolini, E. 2022. 'Built Environment and Wellbeing—Standards, Multi-Criteria Evaluation Methods, Certifications', *Sustainability (Basel, Switzerland)*, 14(8), pp. 4754-. Available at: <https://doi.org/10.3390/su14084754>.
 50. Ou, Y. et al. 2017. 'Exhibition Space Design Research Based on Service Design Thinking: Viewing the Beijing Rehabilitation Technical Aids for Aging Exhibition Hall as an Exemplar', *Art and Design Review*, 5, pp. 152–161. Available at: <https://doi.org/10.4236/adr.2017.53012>.
 51. Pratama, J. and Utama, A.A. 2019. 'Business Process Analysis for Transfer Payment Transaction Case Study: An LPG Distributor Company in Bandung', *International Journal of Business and Administrative Studies*, 5(2), pp. 84–96. Available at: <https://doi.org/10.20469/ijbas.5.10004-2>.
 52. Radder, L., Koekemoer, E. and Van, E.M. 2019. 'The off-line retail experience: a suggested integrated framework', *The Retail and Marketing Review*, 15(2), pp. 29–38. Available at: <https://doi.org/10.10520/EJC-1a769b2e83>.
 53. Rodda, J., Ranscombe, C. and Kuys, B. 2022. 'A method to explore strategies to communicate user experience through storyboards: an automotive design case study',

- Artificial Intelligence for Engineering Design, Analysis and Manufacturing: AI EDAM, 36. Available at: <https://doi.org/10.1017/S0890060421000287>.
54. Russell, C. 2005. 'An overview of the integrative research review', *Progress in transplantation* (Aliso Viejo, Calif.), 15, pp. 8–13. Available at: <https://doi.org/10.7182/prtr.15.1.0n13660r26g725kj>.
 55. Salama et al. 2024. *People–Place Narratives as Knowledge Typologies for Social Sustainability: Cases from Urban Contexts in the Global South* - ProQuest (no date). Available at: <https://www.proquest.com/docview/3046788779/25D93C69FA6241A8PQ/21?accountid=14717&sourcetype=Scholarly%20Journals> (Accessed: 12 May 2024).
 56. Samreen, M. and Jha, G. 2024. 'Enhancing User Experience Through Wayfinding in Educational Buildings', *Urbanism. Arhitectura. Constructii*, 15(2), pp. 169–182.
 57. Schoonderbeek, M. 2017. 'A Theory of "Design by Research"; Mapping Experimentation in Architecture and Architectural Design', *Ardeth. A magazine on the power of the project*, (1), pp. 63–79.
 58. Seamon, D. 2002. "Phenomenology, Place, Environment, and Architecture: Review of the Literature", Retrieved October 4, p. 2007.
 59. Shields, J. 2023. 'Phenomenology and Architecture: Examining Embodied Experience and Graphic Representations of the Built Environment', in, pp. 285–304. Available at: https://doi.org/10.1007/978-3-031-26074-2_15.
 60. Sime, J.D. 1986. 'Creating places or designing spaces?', *Journal of Environmental Psychology*, 6(1), pp. 49–63. Available at: [https://doi.org/10.1016/S0272-4944\(86\)80034-2](https://doi.org/10.1016/S0272-4944(86)80034-2).
 61. Smith, D., Metcalfe, P. and Lommerse, M. 2020. 'Interior architecture as an agent for wellbeing', *Journal of the Home Economics Institute of Australia*, 19(3), pp. 2–9. Available at: <https://doi.org/10.3316/informit.110497649976857>.
 62. Smith, M. 2003. 'Business process design: Correlates of success and failure', *The Quality Management Journal*, 10(2), pp. 38–49.
 63. Teixeira, J. et al. 2012. 'Customer experience modelling: from customer experience to service design', *Journal of Service Management*, 23(3), pp. 362–376. Available at: <https://doi.org/10.1108/09564231211248453>.
 64. Theron, E. and Pelser, A. 2017. 'Using servicescape to manage student commitment towards a higher education institution', *South African Journal of Higher Education*, 31(5), pp. 225–245. Available at: <https://doi.org/10.28535/31-5-1506>.
 65. Trkman, P. et al. 2015. 'From business process management to customer process management', *Business Process Management Journal*, 21(2), pp. 250–266. Available at: <https://doi.org/10.1108/BPMJ-02-2014-0010>.
 66. Torraco, R. 2016. 'Writing Integrative Reviews of the Literature: Methods and Purposes', *International Journal of Adult Vocational Education and Technology*, 7, pp. 62–70. Available at: <https://doi.org/10.4018/IJAVET.2016070106>.
 67. Ulwick, A.W. 2016. *Jobs to be Done: Theory to Practice*. First Edition. Houston, TX: Idea Bite Press.
 68. Unanue, M. et al. 2021. 'The Consumer Experience in Retail Spaces: Contributions of Marketing, Architecture, and Service Design', *The International Journal of Design Management and Professional Practice*, 15(2), pp. 19–36. Available at: <https://doi.org/10.18848/2325-162X/CGP/v15i02/19-36>.
 69. User States and Contexts | The Inclusive Design Guide the Inclusive Design Guide (no date). Available at: <https://guide.inclusivedesign.ca/tools/user-states-and-contexts/> (Accessed: 16 May 2024).
 70. van Geetsom, N. and Wilkinson, A. 2021. Design culture (of) resilience. Space & Service design taxonomy, overcoming undefined space & service design contexts.
 71. van Rensburg, A. 2014. 'Supporting Business Process Design Through a Business Fractal Approach', *South African Journal of Industrial Engineering*, 25(1), pp. 50–61.
 72. Wang, S.-M. 2014. 'Public service space remodelling based on service design and behavioural maps', *Journal of Industrial and Production Engineering*, 31(2), pp. 76–84. Available at: <https://doi.org/10.1080/21681015.2014.887595>.

73. Wang, Z., Zhou, M. and Liu, X. 2019. 'Research on the Effectiveness of Service Design Based on the Quantitative Method of Kansei Engineering—Taking the LANNA Coffee Service Process as an Example', IOP Conference Series. Materials Science and Engineering, 616(1). Available at: <https://doi.org/10.1088/1757-899X/616/1/012035>.
74. Wheele et al. 2023. A Narrative Literature Review Using Placemaking Theories to Unravel Student Social Connectedness in Hybrid University Learning Environments - ProQuest (no date). Available at: <https://www.proquest.com/docview/2779535887/25D93C69FA6241A8PQ/5?accountid=14717&sourcetype=Scholarly%20Journals> (Accessed: 12 May 2024).
75. Wilson, K. and Davies, U. 2019. Design methods for developing services, The Design Council. (Accessed: 2024).
76. Yamu, C., van Nes, A. and Garau, C. 2021. 'Bill Hillier's Legacy: Space Syntax—A Synopsis of Basic Concepts, Measures, and Empirical Application', Sustainability, 13(6), p. 3394. Available at: <https://doi.org/10.3390/su13063394>.
77. Xiao, L. and Zheng, L. 2012. 'Business process design: Process comparison and integration', Information Systems Frontiers, 14(2), pp. 363–374. Available at: <https://doi.org/10.1007/s10796-010-9251-3>.
78. Галина, P. et al. 2019. 'The Innovative Technology for Modeling Management Business Process of the Enterprise', International Journal of Recent Technology and Engineering (IJRTE), 8, pp. 4024–4034. Available at: <https://doi.org/10.35940/ijrte.D8356.118419>.
79. Zurlo, F. 2018. 'Envisioning and evolving: Future evolution of the concept and the practice of service design'. Available at: https://www.academia.edu/80053407/Envisioning_and_evolving_Future_evolution_of_the_concept_and_the_practice_of_service_design (Accessed: 9 March 2024).

11. APPENDICES

Appendix A: Keyword strings and combinations

Search terms that were used in each database included:

"Business process management" "AND" workflow "AND" design "or" interior [All Fields]. "Business process management" "AND" workflow "AND" design. Tools "AND" Business process modelling "AND" User experience "AND" Programmatic processes. User experience "AND" BPM "AND" Tools/Methods. "Business process management" "AND" "(tools OR methods OR techniques)" user experience. Business process "AND" innovative technology "AND" (methodological AND analytical tool) "AND" interaction design. Business Process Management "AND" Customer Experience "AND" Tools/Methods "AND" Service Design. "Business process management" "AND" workflow "AND" design. "Business process management" "AND" "(tools OR methods OR techniques)" "AND" design. User experience "AND" BPM "AND" Tools/Methods. User experience "AND" BPM "AND" Tools/Methods "AND" design. "Business process management" "AND" "(tools OR methods OR techniques)" "AND" user experience. "Business Process Management" "AND" "(Tools Or Methods Or Techniques)" "AND" User Experience [All Fields].

Service Design "AND" Methodology "AND" Tools "AND" Spatial Design [All Fields]. Service Design "AND" Spatial Design. User Experience "AND" Interface Design "AND" Tools "AND" Interaction Design. Service Design/Customer Experience "AND" Tools "AND" Systematization "AND" Multidisciplinary Design. Service Design "AND" User Experience "AND" Interior Architecture. User Experience "AND" Spatial Qualities "AND" Design/Tools/Methods "AND" Pre-Design. User Experience "AND" Service Design "AND" Design/Tools/Methods. Service Design "AND" Physical Environment "AND" Tools/Methods "AND" Spatial Design. User Experience "AND" Service Design "AND" Design/Tools/Methods. "(Tools Or Methods Or Techniques)" "AND" User Experience "AND" Service Design "AND" "(Program Or Activity Or Function)". User Experience "AND" Tools "AND" Service Design "AND" Human Centric Design. Service Design "AND" User Experience "AND" Interior Architecture. Service Design "AND" Tools "AND" Pre-Design. Service Design "AND" Physical Environment "AND" Tools "AND" Interior Design. Service Design "AND" Physical Environment "AND" Tools/Methods "AND" Community Design. Service Design "AND" User Experience "AND" Behaviour. User Experience "AND" Service Design "AND" Design/Tools/Methods "AND" Pre-Design. User Experience "AND" Service Design "AND" Design/Tools/Methods. Service Design "AND" User Experience "AND" Interior Architecture. Service Design "AND" Physical Environment "AND" Tools "AND" Spatial Design. User Experience "AND" Service Design "AND" Tools/Methods. Service Design "AND" "(Tools Or Methods Or Techniques)" "AND" User Experience. Interior Architecture "AND" Systems "AND" Characteristics "AND" Interaction Design. "(Tools Or Methods Or Techniques)" "AND" User Experience "AND" Spatial Design [All Fields].

User Experience "AND" Physical Environment "AND" Tools/Methods "AND" Design [All Fields]. "(Tools Or Methods Or Techniques)" "AND" User Experience "AND" Spatial Design "AND" "(Program Or Activity Or Function)". User Journey Maps "AND" Spatial Design "AND" Characteristics. User Journey Maps "AND" Spatial Design "AND" Characteristics "AND" Human Centred. Conceptual Framework "AND" Interior Design "AND" Design Thinking "AND" Tools. Spatial Design "AND" User Experience "AND" Behaviour. User Experience "AND" Physical Environment "AND" Tools/Methods "AND" Architecture. User Experience "AND" Physical Environment "AND" Tools/Methods "AND" Interior Design. User Experience "AND" Physical Environment "AND" Design. Tools/Methods "AND" Interior "AND" Design. "(Tools Or Methods Or Techniques)" "AND" User Experience "AND" Design. Design "AND" "(Tools Or Methods Or Techniques)" "AND" User Experience. Spatial Design "AND" "(Tools Or Methods Or Techniques)" "AND" User Experience. People "AND" Place "AND" Program/Process "AND" User Experience [All Fields]. * All databases.

Appendix B: Critical Appraisal checklist for the literature reviewed

SECTION/TOPIC	#	CHECKLIST ITEM
TITLE		
Title	1	Determine whether the report is an integrative, systematic, or a combination of both.
ABSTRACT		
Structured summary	2	Provide a structured summary that covers what is known so far, what the study aims to find out, where the data comes from, how studies and data were chosen, what methods were used to review and combine them, what was found, any limitations, conclusions and what the findings mean, and if the review was registered.
INTRODUCTION		
Rationale	3	Explain why the review is needed based on what is already known about the topic.
Objectives	4	Clearly state the specific questions about participants, treatments, comparisons, outcomes, and study methods this review aims to answer (using the PICOS framework described by Lubbe et al., 2020).
METHODS		
Protocol and registration	5	State if a review plan is available and where it can be found (e.g., website link), and, if applicable, give registration details such as the registration number.
Eligibility criteria	6	Clearly state the details about the studies (like PICOS criteria and how long they were followed) and the reports (like what years were included, what languages, and if they were published), explaining why these criteria were used.
Information sources	7	Explain where all the information came from (like databases and when they were used, or talking to the study authors to find more studies), and tell when the last search happened.
Search	8	Show how you searched for information on at least one database, including any rules you followed, so someone else could do it the same way again.
Study selection	9	Explain how studies were chosen, including how they were checked, which ones were appropriate for the systematic review, and if any were used in a meta-analysis.
Data collection process	10	Explain how information was extracted from reports (like using practice forms, doing it separately, and twice) and any steps for getting and ensuring information from researchers was correct.
Data items	11	Write down and explain everything you were looking for data about (like PICOS and interdisciplinary tools) and any assumptions made.
Risk of bias in individual studies	12	Explain how the reliability of each study was assessed, specifying whether this was done for the entire study or specific outcomes, and describe how this information will influence the synthesis of data.
Summary measures	13	State how results were summarised (such as risk ratio or mean difference).
Synthesis of results	14	Describe how data were managed and combined results from different studies, if applicable.
Risk of bias across studies	15	Specify any evaluation of bias that might affect the overall evidence, such as publication bias or selective reporting within studies.
Additional analyses	16	Explain any additional analyses performed, such as sensitivity tests or subgroup examinations, indicating which were planned.

RESULTS		
Study selection	17	Provide the total number of studies screened, evaluated for suitability, and included in the review, detailing why some were excluded at each stage, ideally using a flowchart.
Study characteristics	18	For each study, present key characteristics from which data were extracted (such as study size, PICOS criteria, and follow-up duration), and cite the sources.
Risk of bias within studies	19	Display data on bias risk for each study and, if available, any assessments of outcomes at that level (refer to item 12).
Results of individual studies	20	For all outcomes studied (benefits or harms), show (a) simple summary data for each intervention group and (b) estimates of the effects with confidence intervals, ideally using a forest plot.
Synthesis of results	21	Present findings from each meta-analysis conducted, including confidence intervals and measures of consistency.
Risk of bias across studies	22	Provide results from any bias assessment across studies (refer to item 15).
Additional analysis	23	Present findings from additional analyses, such as sensitivity tests or meta-regression (refer to item 16).
DISCUSSION		
Summary of evidence	24	Summarise the main findings, considering the strength of evidence for each key outcome and discussing their relevance to essential groups like healthcare providers, users, and policymakers.
Limitations	25	Discuss limitations at both the study and outcome levels, such as bias risks and broader issues in the review process, like incomplete retrieval of identified research or reporting bias.
Conclusions	26	Offer a general interpretation of the results with existing evidence and discuss implications for future research.
FUTURE RESEARCH		
Future research	27	Describe what further research is needed and evaluate how applicable future studies might be.

From: Beattie, M. et al. (2015) 'Instruments to measure patient experience of healthcare quality in hospitals: a systematic review', *Systematic Reviews*, 4, p. 97. Available at: <https://doi.org/10.1186/s13643-015-0089-0>.

Appendix C: Critical Appraisal Example

CRITERIA	DESCRIPTION
Background What is article about? What has been studied BPD, SP OR SPD? What tools are discussed?	BACKGROUND: Development of a new space and service design taxonomy model through maximum variation sampling. The taxonomy model supported the development of more suitable tools and facilitated the choice of the tools for the design of services and spaces. The goal was not to provide more tools -more of the same- but to create tools that offer practical advice regarding the research process and therefore also the learning process. RESEARCH QUESTION: - Which tools can facilitate the phases of the design process and include both spaces and services? - Drawing from literature, the service system design is seldom explicitly incorporated into conventional interior design, interior architecture or architectural design methods, though social design, user-centered design, co-creation and participatory design are often used in contemporary design project of public spaces and buildings (Di Prete, Crippa & Leonardo, 2015; Pool, Van Acker & De Vos, 2015; Camocini, Petrillo, Rebaglio, 2015; Lucas, 2016; Wagne & Watch, 2017). WHAT? - Shifting from traditional spatial emphasis, the focus is on the user-centeredness and systems of spaces and services, addressing touchpoints as spaces, communication systems, objects and the intangible scenarios, interactions and experiences. - The article describes a space and service design process of "the Make Learn Space" for the city of Leuven, a project in line with two societal innovation challenges, namely Design for New Learning Environments and Design for Circular Economy. - Space and service design is an emerging discipline, triggered by social innovation and focusing on these contemporary social-cultural-economic challenges through design (Fassi, Galluzzo, & De Rosa, 2018). - Throughout the design process, designers equally address the touchpoints - including spaces, broader context, wayfinding, communication systems, furniture, objects - as the intangible scenarios, interactions and experiences (Van Geetsom, 2018).
Methodology How they collected data? Case Studies, Questionnaires, Studies?	
Tools Definitions? What tools they used? Used for what? PPP?	DEFINITIONS Spatial design is no longer considered as designing well-shaped containers but as an essential element; as important as the design of the services and as important in supporting organisations, people and activities (Felix, 2011 a and b). - Spatial design stimulates the ongoing use of intangible services and it is these tangible features that evidence the existence of the service. - The spatial service system identifies the services and defines the scenarios for continuous interaction between people, spaces, objects and communication tools. - These evidence-based and holistic designs of spaces, objects (e.g. furniture), communication tools and services are jointly capable of fulfilling the user's need (Van Geetsom, 2018). By using the tools, new challenges emerged: which tool is appropriate for which situation? By working with real-life clients, public service organizations and NGOs, the baseline situation of the project was often different. The Taxonomy of Service Spaces is an analysis method to overcome the indetermination of the space and service design context and problem. 1. *EXAMPLE OF EXISTING SITE WITH SERVICES "Is there an existing building that needs to be used?", "Is there a certain space or specific spatial objects that should be used?", "Is there a specific outdoor area that was determined?", - If the questions are affirmatively answered by the (future) service provider (Fig. 2), the next question is suggested: "Are there already services offered in the allocated space that need to be taken into account?", - If this is the case, the current spaces and services need to be examined, evaluated and improved or expanded. - The service provider operated from an existing building, offered existing services and wished to improve both or complement existing services with new ones. 2. EXISTING SITE WITH NO SERVICES - A service provider can be in the possession of a space, but the necessary services and scenarios must be designed from scratch and the designated spaces, objects and communication tools, must be evaluated and adapted to the requirements of the service, the service provider's expectations, and the needs of the users. 3. NO DESIGNATED SPACE OR OBJECTS, EXISTING SERVICE - No designated building, assigned room or touchpoints, nor an allocated outdoor space within the broader service context. - Here, the same questions as in the previous situation will be posed: "Are there already services offered by the service provider?" In this situation, current services need to be investigated, assessed and improved 4. NO DESIGNATED SPACE OR OBJECTS, AND NO EXISTING SERVICE - The last baseline situation is one in which there is no determined space, nor a developed service. - In this case an organization or start-up wishes to establish a service, hence there is a need to assist with the development of the service and the relevant touchpoints. - These touchpoints can be places, spaces, objects and communication elements.
Findings Did it work? What models or frameworks were found? What is the relationships? The opportunities/challenges/failures?	The baseline situation influences the choice of tools - Once the baseline situation is determined, the design team can select the suitable tools for the different phases of the design process: design problem discovery, design challenge definition, the development phase and the delivery phase. - Design thinking tools are used to find, in a structured and effective way, solutions to wicked problems (Curedale, 2017) but should leave enough freedom to be creative (von Thienen, Meinel & Nicolai, 2014). In the Double Diamond method (Design council, 2015), - divergent thinking and converging thinking is used twice. - By broadening the spectrum and gathering as much information as possible about the context and existing services and experiences, critical analysis of this data can be continued in the second phase. - This results in reformulating the design needs and the relevant design challenges. - These core values form the basis for diverging again; in search of varied user-centered solutions, the last convergence heads towards the final, appropriate, tailor-made and preferably tested outcomes. 1/ Tangible situation and offered services need to be examined as well as the relationship between both. 2/ The data is visualized by context maps and storyboards appointing qualities and shortcomings of both the tangible features as well as the intangible services. 3/ Checklists enumerating all essential aspects of the design of services and spaces can help to avoid gaps in the investigation of such complex projects 4/ dimensions and proportions, construction and techniques; the existing/ available/ sustainable material and the site orientations and buildings' views can be investigated through traditional methods such as observations and measuring. - Tools which identify and bring into view both the tangible and intangible are required. The research question concerning the status of the tangible and intangible context was divided into nine sub questions: - addressing the current tangible interior/exterior spaces, - the broader city context, - the current vision, - organizational structure, - services and stakeholders of SOM, - the experience, - perception and the future expectations of by-passers, - best practices of urban learning services and - urban learning spaces, circular economy theory and concepts.
Conclusions What did the author(s) learn overall?	- The teams visualized the pre-service, service and after service in customer journeys within the available spaces. They offered narratives about future spatial scenarios, models, mock-ups of touchpoints and VR experiences aiming at offering the client realistic estimations regarding the intended output and emphasised the difference between what is the space looking now and how it will be used in the future. FIG 4 - Spatial design has evolved into a Space and Service Design field with new applications and social-cultural-economic interpretations. - Based on service design's as well as spatial design's core characteristics, it combines participatory, multidisciplinary, user centered, interaction and social design approaches. - Using the Double Diamond as a reference, the methodology addresses both space and service and provides (student) designers a strategy to respond to complex baseline situations and design challenges.

Appendix D: Characteristics of the studies analysed/evaluated for this ILR (N = 60).

Author, year of publication	Research Summary	Name of tool or overview of topic	Response format & methods	Limitations or Contributions
(Dunzer et al., 2024)	Business Process Management Systems (BPMS) use software to manage workflows and engage participants, ensuring flexibility. Evolving from Workflow Management Systems (WfMS), BPMS can operate alone or in tandem with designs accommodating unpredictable outcomes.	BPMS, whether standalone or integrated, may face challenges in employee technology adoption due to perceived complexity. BPM design principles focus on clear process discovery, sustainability, and effective guidance.	–Case Study: WomOut initially configured workflows and notifications by using Jira as a BPMS for software testing. Later, automation enhanced test case management, reducing manual workload.	The study's bias as an ADR study towards BPM solutions may have overlooked alternative IT designs.
(Juan and Yuan, 2013)	Business process models use control flow patterns like Parallel Split, Synchronization, Exclusive Choice, and Simple Merge for better readability and reuse. Traditional tools must be able to define, query, and reuse these patterns effectively.	-Control Flow Patterns: Essential for defining process semantics and improving model comprehension. -BPMN: A standardised language bridging process design and implementation, evaluated to represent workflow patterns.	-Define and identify control flow patterns in BPMN models, understanding their relationships. -Develop methods to identify patterns and establish their relationships. -Create a system to represent BPMN models using identified patterns.	Challenges include formally defining BPMN-based patterns, recognising them in models, and understanding their interrelationships to enhance model representation and analysis.
(Havey, 2005)	BPM involves designing and executing business processes, which are step-by-step algorithms for achieving business objectives. These processes can be effectively visualised using flowcharts and are executed by a process engine.	Process: Fundamental algorithm or behaviour. Process Instance: Specific occurrence of a process, e.g., a travel reservation for a particular customer. Activity/Task: Step within a process. Manual Activity/Task: Step performed by a human. Queue: List of activities assigned to a user or group.	-Formalise Existing Processes: Enhances understanding and improves current processes. -Facilitate Automated Efficient Workflow: Increases efficiency by automating process flows. -Increase Productivity: Achieves more with fewer resources. Empower -Problem-Solving: Allows focus on complex problems.	-Good Architecture: Vital for effective BPM implementation. -Solution Quality: Ensured by selecting optimal components. -A business analyst designs processes executed by an engine incorporating Enterprise Application Integration (EAI) and human interaction capabilities.

(Hrabal et al., 2021)	This paper underscores the human aspect of Business Process Management (BPM) and presents research on key BPM roles and their competencies. Typical roles identified include process owner, process analyst, and industrial engineer. While competency requirements are similar across small and large organisations, role positioning may differ between SMEs and larger companies.	The study proposes competence models for process owners, process analysts, and industrial engineers, which are pivotal for documenting processes, standardising procedures, approving improvements, and ensuring changes do not adversely affect processes or employees.	Methodologically, the research combined a questionnaire survey, interviews, and case studies in Czech companies. It involved a literature review, goal and methodology formulation, sample selection, empirical data collection, and data analysis to synthesise competence models. The research highlighted a tendency in BPM to overlook the human factor in favour of technical aspects.	Competencies crucial for effective performance encompass traits, motives, self-concept, knowledge, and skills. Effective performance management aligns job demands with personal talents, vision, and organisational environment. Competencies in BPM were analysed across basic, interpersonal, organisational, process approach, and technical layers.
(Trkman et al., 2015)	This paper fills gaps in the literature by guiding organisations in systematically engaging with customer processes.	It combines classical BPM with service blueprinting to enhance technical and functional aspects of customer-perceived quality.	The study explores servitisation, summarises BPM literature, explains service blueprinting, and presents a case study using extended blueprinting.	It emphasises optimising customer and internal processes, introducing "customer process owners" to streamline interactions and enhance service delivery. Integrating BPM with service blueprinting, encompassing customers' internal processes, is vital for improving customer orientation and service effectiveness.
(Галина et al., 2019)	Innovative business process modelling technology enhances management by improving tools for assessing, selecting, and regulating enterprise project portfolios. This approach streamlines operations, accelerates employee interactions, optimises processes, and enables quick adaptations to changing business conditions, improving economic analysis and decision-making	ISO 9000:2000 categorises operational processes across nine project management knowledge areas. A hierarchical structure defines roles and user groups, with substitution rules for task executors.	Executable business processes integrate control flow, data, resources, and operational perspectives. Traditional processes aim for valuable outcomes, while process management views them as adaptable resources.	This technology formalises complex business processes and supports effective management during transformational changes. Transitioning from functional and matrix-divisional management systems and facilitating economic and organisational adjustments is essential.

(Pratama and Utama, 2019)	This research focuses on analysing business processes at an LPG distributor using iGrafx simulation and proposing solutions to operational challenges. The objective is to address undetected transfer payments caused by information handling inefficiencies between divisions, aiming to improve customer service capacity and operational efficiency.	BPMN and iGrafx are essential for modelling and simulating business processes. The study employs Customer Value Chain Analysis (CVCA) to trace the process from customer order to payment, identifying issues in transfer payment detection due to delayed information flow between divisions.	Using iGrafx simulation, the study models current processes and evaluates proposed solutions. It includes a literature review, methodology description, business issue analysis, simulation results, and comparison with prior research, concluding with recommendations.	-Implementing instant messaging for faster information sharing. Introducing a delivery order website for streamlined processes and improved service. -Developing a mobile app for delivery orders with e-payment and real-time management for increased sales and reduced wait times.
(Le Loarne and Maalaoui, 2015).	Business Process Modelling (BPM) in high-tech ventures often emerges as a "bricolage" process rather than following a predefined plan. This study investigates the emergence of business process models in early-stage high-tech ventures, focusing on how entrepreneurs adapt BPM amidst technological advancements and market demands.	-Bricolage: Creatively using available resources to develop business processes. -Strategy as Practice (SAP): Emphasises how individuals shape strategy through interactions and resource utilisation.	Drawing on a sociological approach, we conducted in-depth interviews with 40 entrepreneurs from a French network, including 20 high-tech entrepreneurs. The interviews explored how entrepreneurs organise their businesses and evolve BPM over time.	The study provides a sociological perspective on BPM development in entrepreneurial contexts, complementing traditional engineering approaches.
(Hafeez, 2020)	KBK Securities Co., a small Iranian firm, is reengineering its business processes in the stock and mercantile markets. This study aims to establish a process-based performance evaluation system and identify key processes for reengineering to enhance operational efficiency and financial outcomes.	-Business Process Management (BPM): Systematic management of processes to achieve organisational goals. -ELECTRE TRI Method: Semi-quantitative decision-making approach for identifying critical business processes.	Using a hybrid approach that integrates BPM, Multi-Criteria Decision Making (MCDM), and the ELECTRE TRI method, we evaluated and categorised 103 financial and stock market processes for optimisation.	This research showcases a multi-method approach to BPM in the financial sector, providing insights into process optimisation and re-engineering to enhance business performance, particularly in complex markets like the Iranian stock exchange.

(Grisold et al., 2022)	Business process management (BPM) enhances organisational efficiency through continuous process discovery, execution, analysis, and redesign. The Five Diamond Method, developed under the design science research (DSR) paradigm, facilitates explorative BPM by integrating business and technology trends into innovative processes with new value propositions.	The Five Diamond Method employs divergent and convergent thinking across five diamonds—Purpose, Business, Technology, and Integration—to innovate and model processes aligned with organisational goals and emerging opportunities.	Explorative BPM: Proactively seeks new value propositions through redesigned or new business processes. Exploitative BPM: Reactively enhances existing processes to deliver improved value.	Expanding traditional BPM, this method integrates innovation opportunities from business and technology trends into new process designs, enhancing organisational responsiveness in dynamic markets. It provides a structured approach to incorporating emerging opportunities into business processes, fostering explorative BPM practices.
(Abdulkader et al., 2020)	Business process management (BPM) is crucial for enhancing organisational value in a dynamic environment challenged by open innovation (OI) ecosystems. This study explores the integration of OI principles into BPM frameworks to foster value co-creation and capture within ecosystems.	The BPMI model facilitates strategic value creation and innovation transfer between firms by linking ABS and OI ecosystem dynamics.	The study introduces a Business Process Management Innovation (BPMI) model that integrates strategic and operational frameworks to optimise process design, implementation, and execution. BPM aligns business activities to optimise processes, gain competitive advantage, and create value.	The BPMI model enhances competitive advantage by leveraging ecosystem interactions, emphasising shared value creation and integration with external innovation networks.
(Babb, 2020)	Business process design (BPD) creates new workflows to achieve company goals, ensuring scalability and replicability. BPD establishes best practices and clarifies business processes.	Examples of BPD include finance department procedures for expense reimbursement and HR processes for employee onboarding and offboarding.	BPD implements new processes, enhances existing ones, and introduces efficiencies to streamline operations.	-Identify the Need: Understand motivations and goals. -Map the Process: Visualize workflows using tools. -Test the Process: Pilot new processes. -Automate: Enhance efficiency. Effective BPD optimises workflows aligned with business objectives, promoting efficiency and growth.
(Galvin and Singer, 1996)	In postmodern organisations, customer satisfaction is prioritised. Association	In this context, "quality" is redefined as meeting customer expectations, with	As work paradigms evolve, direct customer engagement takes precedence over	By clarifying processes, aligning commitments with stakeholder expectations, and closely monitoring performance, CEOs foster

	executives emphasise effective member interactions, attentive listening, and delivering compelling services to ensure member satisfaction and support. These organisations reject traditional, control-based management in favour of flexible, adaptable structures that treat organisations as networks designed to satisfy customers.	business processes seen as networks designed to deliver consistent satisfaction. CEOs are critical in articulating organisational commitments to enhance member trust and satisfaction.	technology-based efficiency. Communication, member-centric service, and agile structures are essential for association executives.	trust, enhance organisational effectiveness, and drive sustained growth and influence.
(Smith, 2003)	Business Process Design (BPD) is complex and often combined with other changes, leading to a low success rate of 23%. Middle management's sponsorship is more crucial for success than top executives. BPD typically aims to address costs, product issues, and process control, with successful projects relying on quantitative performance measures.	Strong sponsorship A capable project team Effective stakeholder management Continuous communication Barriers to success include leadership breakdowns and strong existing cultures.	For effective BPD, it's essential to: Guide managers Ensure sponsors develop support and organise project infrastructure Maintain detailed project plans and progress tracking Align executive and departmental leadership Plan for overcoming barriers and replacing key players	Comparing research on BPD is difficult due to varying focus areas, but leadership, project management, and stakeholder management are consistently identified as critical for success.
(van Rensburg, 2014)	The text discusses the importance of business process design and introduces the concept of a business fractal as an alternative approach to designing business processes. It highlights business fractals' static and dynamic dimensions, focusing on patterns, content, memory, and volatility.	Business process design is crucial for translating business strategy into operational workflow practices. Business fractals offer an alternative approach to understanding the complexity of business systems and designing processes. Simulation models can be used to study the impact of business processes and make informed decisions.	A case study on credit card application processes is used to demonstrate the application of business fractals in designing and optimising business processes.	Understanding the memory and volatility of business systems is essential for effective business process design.

Xiao and Zheng, 2012)	This paper proposes a framework for business process design based on process comparison and integration. The paper discusses traditional shortcomings in business process design and introduces a new approach to address these issues. The paper also discusses the integration of different models to form a more complete model.	The framework, Collaborative Business Process Design (Collaborative-BPD), allows process stakeholders to model business processes collaboratively, enhancing efficiency and effectiveness. The framework allows process stakeholders to collaborate and share knowledge about business processes directly, improving the efficiency and completeness of models.	Conflicts between different models of the same business process can be identified by applying process comparison, allowing stakeholders to collaborate and improve their models. Process comparison helps identify conflicts between different models, enabling stakeholders to improve their models systematically.	The integration of models results in a more complete understanding of the business process. Semantic annotations could be incorporated into the framework to enhance the clarity of characteristics of activities.
(Groß. et al., 2020)	The authors introduce the Business Process Design Space (BPD-Space) as a structured approach to guide process redesign projects in this article. Process designers are nudged towards innovative ways of conducting processes by focusing on design dimensions.	The Business Process Design Space (BPD-Space) organises process design dimensions to facilitate process redesign projects. The BPD-Space covers various dimensions, such as customer, product/service, organisation, and technology, to support exploring alternative process designs.	The BPD-Space outlines 19 business process design dimensions grouped into layers, offering a comprehensive framework for exploring alternative process designs. By utilising the BPD Space, organisations can enhance their understanding of process redesign alternatives and receive support in creating new process designs.	The BPD-Space encourages exploration and rethinking of processes to generate innovative redesign solutions. Guidelines have been provided to support users in effectively exploring design alternatives using the BPD-Space.
(van Geetsom and Wilkinson, 2021)	The project aimed to develop a taxonomy model for space and service design using varied sampling methods. It focused on selecting practical tools for designing services and spaces, emphasising user-centric systems, including spaces, communication systems, objects, and intangible aspects like scenarios,	The article discusses the "Make Learn Space" design process in Leuven, addressing societal challenges like designing for new learning environments and the circular economy. It highlights how space and service design are evolving disciplines that tackle contemporary socio-cultural-	Existing tools were selected and tested to address both space and service aspects, mapped to specific phases in the Double Diamond process. Researching both tangible and intangible contexts is essential to define the design challenge, requiring different methods and tools based on the starting points.	Testing the tools revealed new challenges in determining the appropriate tool for each situation. Real-life projects with public service organisations and NGOs often presented different baseline situations. The Taxonomy of Service Spaces is a method to address the indeterminate context and problem in space and service design.

	interactions, and experiences.	economic issues through innovative design methods. These include integrating social, user-centred, co-creation, and participatory design approaches into public space and building projects.		
(Collina et al., 2018)	Exploring how spatial and service design can interact and influence each other, particularly in university dormitories, to achieve complexity, capability, and synergy. Viewing dormitories, university campuses, and schools as urban community hubs that foster synergistic relations between the institution and the surrounding neighbourhood.	-Welcome Kit: Introduces dormitory and local context rules and procedures upon check-in. -Digital Platform: Facilitates virtual communication between students, administration, and among students. -Video Series: Provides information on dorm regulations and connects dormitory life with the local neighbourhood.	Three dormitories were examined, designed, and prototyped as models for future dormitories. Guidelines include a universally comprehensible communication system that addresses the needs of all cultures and proposes improvements to products, services, systems, spaces, environments, and experiences inside and outside the dorms.	Designing inclusive, socially cohesive dormitories that promote interaction among different social groups and urban populations. These multifunctional spaces must accommodate both social and private modes, adapting to various user needs.
(Teixeira et al., 2012)	Customer Experience Modelling (CEM) supports the holistic nature of customer experience, providing a systematic portrayal of its context. It shifts the focus from individual experience elements to their orchestration. To address the research gap and provide a robust toolset for service designers, this study introduces CEM as a method to capture the complex elements shaping customer experiences.	-Customer Experience: Defined as the internal and subjective response customers have to any contact with a company. It encompasses every aspect of a company's offering. -Service Design: A multidisciplinary field that orchestrates elements such as the physical environment, people, and service delivery processes to help customers co-create their desired experiences.	The CEM method involves interviewing customers about their activities to understand the lower-level actions, contextual elements, and values. This allows designers to trace decisions from overall goals to single interactions. CEM systematises and represents customer experience to support service design efforts, providing a common framework for multidisciplinary teams to envision solutions.	CEM provides a modelling tool that abstracts complex realities, facilitating the creative transition to service design solutions. It supports the holistic nature of customer experience, considering physical artefacts, technology-enabled systems, and actors involved in each activity throughout a customer journey. Transitioning from understanding customer experience to devising service solutions is crucial, and models can facilitate this process.
(Unanue et al., 2021)	The article aims to illustrate different understandings of consumer experience	-Customer Journey Map: Highlights interaction points	-POS Basis: Enhances purchase desire by impacting consumer elements.	Through omnichannel marketing, physical and digital channels are interconnected, creating a

	in physical retail spaces, offering a holistic view and aiding the development of new approaches in design services and physical spaces. It examines perspectives from Marketing, Architecture, and Service Design, focusing on service and product, physical space, touchpoints, processes, perception, and senses.	between user and service. -ServiceBlueprint: Extends the Customer Journey Map, detailing processes and actions involved in service delivery. -Interdisciplinary Approach: Integrating Marketing, Architecture and Service Design to create enriched experiences.	Designing from the consumer's viewpoint is essential for real. Service Design Goals Include being useful, usable, and desirable. It considers all users of physical space, including consumers and other stakeholders. -Sensory Experience: Physical elements evoke senses differently, creating emotional connections	continuous experience. Identifying touchpoints is crucial for planning the consumer experience in retail spaces.
(Rodda, Ranscombe and Kuys, 2022)	This study develops a method to explore strategies for communicating UX through storyboards early in the design process. The method links storyboarding to theoretical UX attributes and is applied in a case study with Ford Design Asia Pacific. This application identifies how theoretical UX attributes manifest and highlights those that are difficult to convey in the early design phases.	Storyboarding is a key method for visually representing events and interactions in early product design. Experience Maps provide static UX contexts with detailed analysis, examining UX through product-user journeys. Design tools like digital sketching, 3D modelling, clay modelling, and emerging technologies such as Augmented Reality (AR) and Virtual Reality (VR) are crucial in modern design practices.	A storyboard Ford Design Asia Pacific created visualises user scenarios for a smart, fully integrated service experience for mobility. Comprising 17 sketches, it illustrates conceptual designs for the vehicle interior and user interactions. The storyboard includes captions and sketches to establish locations and times, using symbolic references to communicate interactions embodying UX attributes like Meaning or Popularity.	This study provides a method for connecting theoretical UX properties with storyboarding, better-preparing designers for clear and comprehensive UX communication early in the design process. New tools and techniques are needed to consistently communicate sketched interactions as intended.
(Theron and Pelser, 2017)	This study focuses on a medium-sized fashion company that initially used spreadsheet software for software testing processes before adopting existing issue-tracking systems (ITS). It aims to develop design principles to enhance the utility of a Business Process	The term "servicescape" refers to the physical environment where services are provided. It encompasses spatial layout and functionality, ambient conditions affecting sensory stimuli such as scent, noise, temperature, and	The study collected data from registered students at South African higher education institutions using a self-administered questionnaire. The questionnaire included items selected from previous studies to measure constructs relevant to the research objectives.	Due to its diverse cultural and economic landscape, the physical and virtual aspects significantly influence students' commitment to service providers in South Africa. Neglecting physical cues could harm student commitment, suggesting a need for further research on the social servicescape's conceptualisation and effects, offering

	Management System (BPMS).	lighting, and signs, symbols, and artefacts that communicate explicit messages and reflect the organisation's image.	Data validity was assessed through factor analysis, and the reliability of the measurement instrument was determined using Cronbach's alpha.	opportunities for marketing scholars
(Wang, 2014)	This study uses behavioural maps and designed elements of public service spaces to document five human factors: physical, cognitive, social, cultural, and emotional reactions/adaptations. Prototypes of a smart bench and a green trellis were placed in the case study area to assess user reactions.	Observing people's spatial behaviour in public service spaces indicates successful service design and reveals potential inefficiencies. Behavioural mapping records detailed observations of user activities to derive data.	Observations revealed several key user experiences: -Confusion when losing direction. -Boredom while waiting. -Happiness during social interactions. -Wonderment at the NTUT ecological corridor. -Annoyance with heavy luggage or searching for MRT cards.	The integration of behavioural maps and service design defined human factors and user needs in the case study area, guiding the creation of a supportive public space environment.
(Chang and Chuang, 2021)	This study focuses on integrating service design into the branding of Taiwan's religious culture. The government has transformed temples into cultural tourism brands through online marketing and multilingual introductions. Temples offer spiritual sustenance and cultural tourism experiences. By integrating service design, various touchpoints enhance interactions between temples and tourists, promoting cultural sustainability.	Three core steps in design thinking: -Inspiration: Searching for solutions. -Ideation: Developing and testing ideas. -Implementation: Charting a path to market. Service design combines system thinking and design thinking to form a holistic method. It employs tools like personas, customer journey maps, blueprints, and stakeholder maps to examine consumer groups and identify problems.	The study applies service design to plan creative teaching and design strategies in a religious tourism project. It aims to educate the public and positively market religious culture. By systematically planning religious experiences, significant economic benefits can be generated, and the sustainability of religious cultures can be reinforced.	The study suggests creating a brand in stages, considering local reactions, and ensuring designs reflect cultural connotations and social responsibility. Historical notes and guidelines for architectural decoration are provided to avoid misapplying culture. Future research could explore different scales of religion, religious cultures, or durations, considering cultural sustainability in teaching processes.
(Radder, Koekemoer and Van, 2019)	The study introduced an experience framework with three core components: the experiencescape, personalisation, and co-creation. These elements are	Customer experience encompasses interactions throughout the decision-making and consumption process, involving	This study aimed to comprehensively explore and define the concept of customer experience, identify its fundamental components, and	This approach supports retailers in meeting diverse customer preferences, whether through active participation and immersion or passive observation and absorption, thereby

	designed to foster a stimulating environment that elicits desired customer emotions and responses, thereby enhancing the entertainment, educational, aesthetic, and escapist aspects of the experience.	cognitive, emotional, sensory, and behavioural responses. The physical environment plays a crucial role in shaping customer emotions, with sensory stimuli influencing emotional responses and overall experience.	propose a framework to assist offline retailers in creating memorable experiences.	effectively tailoring experiences to meet individual needs and preferences.
(Musulin and Strahonja, 2023)	This study developed the Service Design experience in a Business Model (SD-X-BM) framework, integrating UX, BM, and service design concepts. This methodological framework aims to enhance managerial tools for digital services by emphasising UX as a value co-creation element among people, technology, and value propositions.	The SD-X-BM framework aligns UX, BM, and service design, structuring business approaches at strategic and operational levels. It highlights digitalisation's role in sustainable service solutions, like metaverse exhibitions and automated shuttle buses, emphasising UX's critical role in innovating BMs and service systems.	The UX model covers user perceptions, emotions, and responses during product use, categorised into context, user, and system elements. The BM model provides a structured representation of business elements, complementing visual and intuitive service design methods. The SD-X-BM framework integrates UX, BM, and service design segments to guide a comprehensive design process to enhance customer value and operational efficiency.	This integrated framework contributes to business design knowledge by bridging diverse design perspectives (UX, BM, service design) into a cohesive approach. It supports businesses in strategically integrating UX as a key driver of customer value and competitive advantage.
(Zurlo et al., 2018)	The paper discusses the evolution of Service Design from an emerging field to a more mature stage. It reflects on the roots and recent evolution of service design in terms of fundamental concepts, methods, and outcomes, considering the papers in the Envisioning and Evolving track.	Service Design methods are evolving to facilitate value-co-creating interactions. Service Design is evolving from an emerging field to a more mature stage. Multidisciplinary is essential for the development of Service Design.	The paper considers the growing interrelation between close fields of service research and the potential of service design to bring life to technical and entrenched systems. The text also explores the multidisciplinary nature of designing for service and the role of service design within wider fields of service science and service research.	Digital innovation is transforming the modes and potential of service provision, requiring service designers to adapt their processes and methods to address the implications of technological advancements.
(Ferdous, 2020)	This systematic review discusses key	The key spatial design factors	The physical environment and staff	Further research is needed to establish causal

	spatial design factors that influence positive social interaction in memory care facilities for individuals with dementia.	include the Physical Environment and Setting, Accessibility, Legibility and Layout, Social Environment and Network, and Staff-Resident Ratio and Care Philosophy. These factors impact social interaction and well-being in long-term care facilities.	interactions play a crucial role in promoting the well-being of individuals with dementia in long-term care facilities. Positive social interactions, person-centred care, and empowerment of residents are essential for enhancing their quality of life.	relationships between environmental factors and quality of life in individuals with dementia.
(Chafi and Cobaleda-Cordero, 2022)	This research paper explores three methods for eliciting user experience insights in workplace studies: spatial walkthroughs, experience curve mapping, and card sorting.	Spatial walkthroughs enable participants to indicate preferences and dislikes within office spaces, offering valuable insights into design features. Experience curve mapping tracks changes over time in user experiences. Card sorting aids in understanding users' ideal office environments and assesses the alignment with actual office conditions.	The detailed application of these methods in different case studies offers a comprehensive understanding of users' workplace experiences.	These methods provide valuable insights into users' workplace experiences and preferences in flexible office environments.
(Nicolini, 2022)	The article discusses the importance of Indoor Environmental Quality (IEQ) in the built environment, emphasising the shift towards a holistic approach focusing on user-centred design. It compares popular building environmental certifications like LEED, BREEAM, and WELL, highlighting the need to consider users' perceptions	-WELL focuses on social sustainability and user health while -LEED v4.1 O + M emphasises resource conservation. -Both certifications aim to improve building performance and user well-being, with WELL emphasising user involvement.	The research underscores the importance of considering users' needs and perceptions in evaluating living environments. The shift towards holistic, user-centred design in architecture beyond traditional green building practices. Comparison of building environmental certifications like LEED, BREEAM and WELL in evaluating user perceptions and well-being.	A more harmonised, inclusive approach to building evaluation that considers users' needs and preferences is needed. WELL certification emphasises social sustainability and user health, while LEED focuses on resource conservation.

(Ladarola, 2023)	This paper explores the use of experience journey mapping (JM) in workplace design, highlighting the need for flexible environments to improve worker satisfaction, productivity, and well-being. It contrasts non-spatial and spatial JM methods, illustrated through a case study of a commercial bank branch redesign.	Experience journey mapping (JM) is an effective method to design workplace experiences by visualising user interactions with the workspace. JM can align organisational goals with worker needs, creating value for both parties.	The paper highlights the benefits of adopting JM in workplace design and management to create user-centric and strategic workplace solutions. Workplace design must adapt to the increased flexibility in work arrangements to enhance worker satisfaction, productivity, and well-being.	Combining spatial and non-spatial journey mapping approaches can provide a comprehensive understanding of the interplay between physical space and user experience. JM serves as a guideline for workplace redesign, enabling evidence-based decision-making and strategic workplace solutions
(Ndovela et al., 2022)	Design for Social Innovation in interior design aims to improve social impact by addressing social issues. Design for Social Innovation integrates CSR into business practices, creating corporate social innovation.	This study explores the landscape of socially responsible design, emphasising the role of interior designers in socially innovative projects. Key approaches include design thinking, collaboration, and education to prepare designers to contribute to social change.	There is often a disconnect between CSR efforts and core business operations. Interior design is crucial in social innovation and integrates design thinking for socially responsible solutions. Collaboration with social players is essential to address social challenges.	Future research should focus on integrating social innovation into interior design processes for greater social value.
(Baradaran Rahimi et al., 2018)	The paper discusses human behaviour and cognition of spatial experience, aiming to enhance the quality of spatial experiences in the built environment.	It presents a model with three stages: encouraging, enabling, and enclosing. It asserts that enhanced spatial experiences involve strategies like persuasion, design for meanings, and inclusion of concepts. The model focuses on cognitive aspects, emotion, and engagement in spatial experiences.	The models discussed in the paper focus on encouraging, enabling, and enclosing aspects of spatial experiences. The essential components of spatial experiences are people, context, and activity. Enhancing spatial experiences involves creating unexpected quality through strong links between people, context, and activity.	The paper emphasises the importance of understanding human response to environmental stimuli in architectural design. It highlights the need for interdisciplinary collaboration between architects and scientists to enhance spatial experiences.
(Ediae et al., 2022)	The research analysed the user experience of architectural promenades in Art and Cultural Centres in Calabar, Nigeria,	The study found that users were mostly female, under 24 years old, with an income level of 100,000-299,999 naira, and reported	Most Calabar Cultural Centre and National Museum users were female and under 24 years old. The frequency of visits to the centres was	Recommendations included renovating facilities to improve the architectural promenade and offering educational programs to increase awareness.

	focusing on the Calabar Cultural Centre and National Museum.	no physical impairment. Most users visited the centres very rarely. The findings suggested a need for improvements in the architectural promenade to enhance user experience.	mostly very rare, indicating low patronage. Users expressed dissatisfaction with elements like vehicular movement, facade, and interior aesthetics.	
(Samreen and Jha, 2024)	The study explores wayfinding in university buildings, highlighting its impact on user experience for students, faculty, and visitors. It investigates factors like signage, lighting, layout, and technology. Effective wayfinding improves user experience, enhances safety, and supports sustainability in educational settings.	Effective wayfinding design ensures easy navigation, aided by technologies like digital signage and online maps. First-time visitors often struggle more, emphasising the need for intuitive solutions.	Case studies of university buildings are presented to show how efficient wayfinding can improve user experience. The paper concludes with guidelines for educational institutions to improve wayfinding in their buildings with the help of signage and enhance user experience.	Incorporating sustainable practices in wayfinding design can enhance the user experience and reduce the environmental impact.
(Dong and Liu, 2018)	The research focuses on developing a UX evaluation method for design concepts in the earlier stages of the design process. It introduces a framework based on multi-modal and user-perceptible experience scenarios, aiming to improve user perception depth of design concepts.	The study involves constructing an evaluation framework, establishing multi-modal expression mechanisms, generating multi-modal experience scenarios, and proposing a UX evaluation method based on semantic differences. A case study is presented to validate the proposed method.	The study introduces a novel approach using multi-modal and user-perceptible experience scenarios for design concept evaluation. The framework integrates various sensory channels to enhance user perception of design concepts.	The research emphasises the importance of user experience evaluation in design concept development.
(De Rosa, 2022)	The paper explores the relationship between Spatial Design and Service Design, aiming to develop a transdisciplinary approach. It discusses the integration of spatial	In both disciplines, the authors analyse key dimensions such as design processes, representations, production processes, materials, dimensionality,	Spatial Design and Service Design share common ground but speak different languages. Transdisciplinary innovation is needed to address the complexity of design challenges.	The integration of spatial and service design processes can lead to a more holistic and effective design practice. Developing powerful tools and methods for understanding and characterising design disciplines is essential for

	and service design and outlines a preliminary framework for a possible Spatial Design + Service Design (S+S) scenario.	aesthetic focus, and deliverables. The goal is to bridge the gap between the two fields and highlight the potential for a more integrated design approach.	The relationship between Spatial Design and Service Design requires a shift towards interdisciplinary and transdisciplinary approaches.	the future of S+S approaches.
(Marques et al., 2020)	This paper explores service design as a methodology for assessing and creating library services holistically. It emphasises co-creation with library staff and patrons to enhance service relevance and effectiveness.	Service design allows libraries to assess and refine services based on user needs and expectations. Prototyping, journaling, and observation are essential components of service design methodology.	The methodology involves observing, understanding, and implementing solutions through tools like service blueprints, prototyping, and ethnographic research. The methodology emphasises a user-centred approach, involving stakeholders in the co-creation of services.	Service design helps libraries understand the entire service ecology and improve user experiences. Implementation of service design can lead to more efficient and effective service delivery.
(Wilson and Davies, 2019)	This document introduces service design and a selection of service design tools, focusing on design methods for developing services. It covers the double diamond design process, tools and methods for each phase, and the importance of design in developing great services.	User Journey Mapping, User Personas, and Experience Prototyping are critical for understanding user needs and crafting effective service experiences. These tools help visualise and refine service concepts. The double diamond design process—comprising Discover, Define, Develop, and Deliver phases—offers a structured approach to guide the entire service development journey, from initial exploration to final implementation.	The document also highlights why working with a designer is beneficial, emphasising user understanding, prototyping, and collaboration. Additionally, it discusses the use of design to develop usable, easy, and desirable services, emphasising the importance of understanding user behaviours and needs.	Design methods are essential for developing services and ensuring they are user-friendly, desirable, and effective. Working with a designer can provide valuable insights, such as understanding user needs, prototyping ideas, and fostering collaboration.
(Girginkaya and Ergen, 2021)	The article explores the integration of customer journey maps in the conceptual design of	Spatial design is evolving to focus on user experience (UX) in physical spaces.	The study focuses on the adoption of the customer experience (CX) approach during the development of	Multidisciplinary perspectives lead to innovative design processes.

	gas stations to enhance the customer experience. It discusses how architects and interior designers incorporate alternative UX research methods to create human-centric spaces.	Customer journey maps are valuable tools for understanding and improving service experiences. Integrating CX approaches can enhance the design of physical spaces.	gas stations in Turkey. The findings emphasise the importance of multidisciplinary perspectives and methodologies in design processes to improve user experiences in physical spaces.	Human-centric design practices are essential for creating competitive advantages.
(Shields, 2023)	Architecture delves into the mental and existential aspects of life beyond material and functional properties. Phenological concepts influence graphic representations, shaping our perception of the built environment.	Affordances, multi-sensory perception, and memory impact our experience of architecture. Visual representations play a crucial role in how we interact with and understand architectural spaces.	The distinction between the objective world and our subjective experience shapes our understanding of architecture. Graphic representations mediate our perception of the built environment, influencing our Umwelt. Affordances, multi-sensory perception, and memory play key roles in our architectural experience.	Different types of visual representations, like line drawings and renderings, offer unique attributes and impact interpretation. Eye-tracking studies provide insights into how people visually perceive architectural representations, informing space design.
(Schoonderbeek, 2017)	The article discusses the theory of "Design by Research" and mapping experimentation in architecture and architectural design. It argues that architectural research should aim to break new theoretical ground by formulating an implied "discursive whole" through cartographic means.	The article highlights mapping as essential for exploring spatial conditions and guiding architectural design. It discusses the evolving role of research in architecture, emphasising shifts in architectural production. Mapping serves as a pivotal tool, offering instrumental, operational, and conceptual insights to inform architectural design processes.	The article explores how mapping can inform architectural construct by identifying three principles of activation: instrumentalisation, operationalisation, and conceptualisation.	The article highlights the Border Conditions & Territories (BC&T) architectural research program at Delft University of Technology as an example of integrating research and design.
(Smith et al., 2020)	The text discusses the role of interior architecture in promoting well-being through socially	Interior architects play a crucial role in creating environments that promote well-being	Case studies illustrate how these attributes are applied in projects focusing on cultural sensitivity, community	The text underscores the importance of interior architecture in creating environments that enhance

	responsible design. It emphasises the impact of the physical environment on individuals and communities. The attributes of interior architects, such as understanding how the environment influences behaviour and identity, are highlighted.	through socially responsible design. Understanding how the environment influences behaviour, identity, and social interactions is essential for interior architects.	engagement, and sustainable design. The text concludes by emphasising the importance of interior architecture in creating environments that enhance quality of life and promote social sustainability.	quality of life and promote social sustainability. Collaborative interdisciplinary work is essential for addressing complex societal challenges through design.
(Mace, 2016)	Valerie Mace's article discusses a phenomenological approach to primary research in Spatial Design, focusing on site-specific documentation and evaluation to enhance students' learning experiences.	Primary research in spatial design involves site-specific studies that require students to be fully immersed in the site to observe, record, and understand. Introducing practices informed by academic research enhances students' learning experiences in spatial design education.	The London College of Communication project focused on utilising sensory-driven design solutions to enrich commuters' experiences at Wimbledon train station. Students used innovative tools, such as the sensory slider, to document sensory stimuli within a site, leading to a holistic understanding of spatial environments.	Students learned to capture multi-sensory environments through a phenomenological perspective, challenge body-space separation, and develop a heightened sensitivity to spatial qualities and human psychological needs.
(Juliá Nehme et al., 2020)	The text discusses the importance of ergonomic dimensions in interior design, highlighting how emotions vary based on factors like lighting and ambience	The User Experience (SUE) model integrates ergonomic and affective dimensions for comprehensive understanding. Designers can create positive experiences by considering factors like spatial cognition and emotional reactions.	Emotional reactions in a setting depend on factors like lighting, ambience, and colours. Spatial appreciation influences user emotions and overall experience. Proxemics, or personal space, impacts user comfort and privacy.	
(Lubbe et al., 2020)	The Integrative Literature Review (ILR) is a research method that offers new insights and summarised knowledge on a specific topic by incorporating various types of evidence beyond primary research findings.	The ILR process involves formulating a review question, sampling literature, critical appraisal, data extraction, and synthesis. Librarians ensure reliability using Boolean operators and expertise in search strategy	This paper outlines a 5-step process for conducting an ILR, focusing on neurodevelopmental supportive care in preterm infants.	

		development. Multiple evidence sources, including databases and grey literature, are utilised, and librarians are crucial in enhancing search strategies. Ethical considerations remain essential throughout the ILR process.		
(Karimi, 2018)	The article discusses Space Syntax, a set of theories and methods for modelling and analysing cities using space as the fundamental generator. It was founded in the 1970s and 1980s by Bill Hillier and colleagues and has since evolved to describe the logic of society through spatial systems.	The article explores how spatial configuration directly impacts how people perceive, move through, and use spaces, ranging from small domestic areas to large cities. It highlights the relationship between spatial configuration and urban functions, emphasising the importance of analysing spatial configuration for effective urban design and planning.	Space Syntax theory examines how spatial configuration influences urban functions, providing a framework for designing and shaping cities based on human behaviour and spatial organisation. It links physical space with societal dynamics, offering insights into optimising urban environments.	Various sub-theories within Space Syntax have been developed to explain different aspects of urban systems, such as natural movement, movement economy, and pervasive centrality. Academic researchers have developed new tools and methods within Space Syntax, expanding its application to various fields such as transport planning, urban regeneration, and environmental cognition
(Erebor, 2019)	The study focuses on the pre-design process and opportunities for sustainability in Abuja, Nigeria. It highlights the importance of sustainability in project delivery methods and the benefits of incorporating sustainable principles in construction projects.	The research explores the involvement of stakeholders like architects, clients, project managers, and financiers in adopting sustainability strategies during the pre-design phase. The findings reveal the extent to which sustainability attributes are used in design, factors influencing sustainability decisions, and the significance of sustainability at the pre-design stage.	The pre-design phase is crucial for achieving sustainable building designs as it sets the framework for the entire project. Architectural firms in Abuja are more involved in the pre-design phase than other phases of project delivery. Sustainability attributes related to resources, biodiversity, pollution, and quality of life are predominantly used in design.	Improvements are needed in sustainability strategies, attributes, and opportunities to enhance sustainability in construction projects. Factors like environmental quality, indoor building quality, and improvement in the quality of life influence the use of sustainability in designs.

(Wheele et al., 2023)	This narrative literature review explores the impact of the hybrid university learning environment (HULE) on student social connectedness using placemaking theories. The study aims to develop a framework to understand social connectedness in the HULE, focusing on socialising, social support, and a sense of belonging.	The review seeks to bridge the gap in understanding the relationship between people and place in the HULE by applying placemaking principles.	Integrating digital and physical interactions in learning environments is important for student social connectedness. Challenges of organising the HULE for student experiences.	The emphasis is on incorporating placemaking principles into the design process of hybrid learning environments. Further empirical research is needed to enhance social connectedness in hybrid learning environments.
(Salama, 2024)	The study explores social sustainability in urban contexts in the Global South through five case studies, emphasising the interplay between people and their environments. It focuses on inclusive public spaces, affordable housing, cultural preservation, and community engagement to foster social sustainability.		The impact of neighborhood-specific strategies on enhancing residents' well-being. The role of youth inclusivity and spatial justice in promoting social sustainability.	The importance of social equity and community resilience in urban development. The significance of inclusive public spaces and affordable housing in promoting social sustainability. There is a need for cultural sensitivity in urban planning to preserve local values.
(Chuang and Chien, 2021)	This research focuses on improving communication between architects and clients during the pre-design phase by employing machine learning techniques. Two communication mediums, language and sketch, were studied.	A naive Bayesian Classifier (LA) to classify architectural design vocabularies and a Generative Adversarial Network (SA) to produce high-quality images from architects' sketches. Its goal was to improve architect-client communication through visual aids and enhance overall communication efficiency.	Architects and clients face communication challenges in design due to language differences, mitigated by visual aids like sketches. Machine learning models such as Naive Bayesian Classifiers and Generative Adversarial Networks enhance communication clarity and reduce misunderstandings in early design stages.	Understanding the client's preferences and requirements is essential for architects to create accurate designs and foster effective communication. Training machine learning models with relevant data and labels can help transform verbal and nonverbal communication into actionable information for architects.
(Lee, 2022)	This paper explores the emotional connection between space and the body in interior	The emotional connection between space and the body is crucial in interior architecture.	Case studies of projects by Peter Zumthor and Kengo Kuma showcase how the body, senses, and	The phenomenological perspective emphasises sensory experience and emotional connections to

	architecture, emphasising the significance of interior experience. It investigates how people interact with interior space, highlighting elements such as materiality, sensory effects, and cultural symbolism that enhance spatial and emotional experiences.	Materiality, sensory effects, and cultural symbolism are key elements in creating multi-sensory spaces. The integration of the body, materiality, and emotional connection can evoke spiritual, meditative, and cultural experiences in interior design.	emotions shape spatial perception, underscoring the importance of considering the interior experience in architecture.	enhance interior design quality. Interior spaces can stimulate emotional connections and offer transformative experiences by engaging the body and materiality.
(Russell, 2005)	The integrative literature review provides a comprehensive overview of the benefits and process of conducting such a review. It helps evaluate the strength of scientific evidence, identify research gaps, generate research questions, and explore successful research methods.	The review process involves problem formulation, data collection, evaluation, analysis, and interpretation of results. Maintaining scientific integrity and addressing threats to validity are crucial throughout the review process.	Integrative reviews maintain current knowledge in a research area by defining the purpose, problem, and research questions. Data collection includes identifying the population, setting inclusion criteria, and developing a collection tool. Data evaluation involves critically judging the study's data elements. Analysis and interpretation reduce data points into a unified statement, often using statistical techniques.	
(Gebru, 2018)	The text addresses challenges in managing space programming requirements in architecture. It introduces innovations like a smart Microsoft Excel® template, a visual computational script, and a Microsoft PowerBI® dashboard, validated through expert reviews. It critiques current manual practices for being time-consuming, error-prone, and	Automating the space programming process could improve efficiency and accuracy. The study focused on optimising space programming through computational tools, with designers' positive feedback on the potential time and cost savings. Future work includes addressing limitations to enhance efficiency and accuracy in space programming.	Current space programming processes in architectural projects are time-consuming and lack automation, leading to inefficiencies and potential errors. Automating space programming through computational tools can improve efficiency and accuracy, as shown by the positive feedback from designers in the study.	To enhance the tools' effectiveness, limitations such as manual data validation and inconsistency in room names need to be addressed. Future work involves generalising the tools for broader project applicability and further improving efficiency and accuracy in space programming compliance.

	inefficient, risking compliance issues.			
(Seamon, 2002)	This chapter explores the phenomenological aspects of architecture, focusing on buildings as lifeworlds, architectural atmospheres, and environmental and place wholeness. It discusses how buildings encompass a range of user experiences and actions, emphasising the importance of architectural flexibility and user regard.	The text also delves into the temporal aspect of buildings, highlighting the role of architectural components in a building's lifespan. It touches on the ineffable nature of architectural atmospheres and the connection between architectural atmospheres, natural symbols, and human experience.	Buildings are explored as lifeworlds, representing a constellation of experiences and actions for users. Architectural atmospheres are essential to a building's uniqueness, highlighting the invisible character of a building.	The connection between architectural atmospheres, natural symbols, and human experience is crucial for understanding the spirit of place. Space syntax theory and spatial configuration significantly shape human interactions within a building.
(Wang et al., 2019)	The research focuses on the effectiveness of service design based on Kansei Engineering, using the LANNA Coffee service process as an example. The study analyses consumers' perceptual demands for coffee shop services and service elements and evaluates service design effectiveness through quantitative methods.	The research tools include stakeholders map, journey map, shadowing practice, business model canvas, 4PS, SWOT analysis, and linear regression. The study concludes that convenience is the most important factor in coffee service effectiveness, emphasising the importance of efficiency and accessibility.	Kansei Engineering can be combined with service design to prioritise service elements and improve efficiency. Multivariate linear regression can help establish the relationship between service elements and effectiveness. Convenience plays a crucial role in the effectiveness of coffee service design.	The study provides insights into improving service quality and understanding user demands in the coffee industry.
(Yamu, van Nes, and Garau, 2021)	The article discusses the space syntax method and its application in understanding the spatial properties of sustainable cities. It covers key concepts such as convex space, axial line, and axial integration and presents a case study of Rotterdam to demonstrate practical application.	Space syntax analysis reveals the importance of spatial configuration in influencing movement and economic activities in cities, highlighting the role of foreground and background networks in shaping urban structure and accessibility.	Space syntax analysis helps us understand how spatial configuration influences urban form and function. Cities have both foreground and background networks of streets, each serving different purposes. Applying space syntax to urban design can enhance spatial integration and functionality.	Understanding the spatial features of cities through space syntax analysis can lead to more sustainable urban planning and design practices. The theory of spatial combinatorics and urban transformation processes explain the relationship between space and society.

(Cheng, 2019)	This article discusses how interaction design affects user experience through online shopping interfaces. It analyses the usability and efficiency of eBay and Amazon interfaces, highlighting factors such as feedback, Fitts' law, navigation, and time.	Interaction design is crucial in influencing user experience in online shopping interfaces. Usability and efficiency are key principles in user experience design. Factors like navigation simplicity, time considerations, Fitts' law, and feedback impact user experience.	The research aims to optimise user experience by improving interface design.	Design improvements can enhance user experience by simplifying operations and increasing usability. Web analytics and usability testing are essential methods for optimising online shopping interfaces.
(Chang and Chiu, 2023)	The study explores service design integration to enhance guest experiential value in star-rated hotels. It categorises hotel servicescape attributes and recommends investing resources in key areas to enhance customer satisfaction.	Service touchpoints were identified by analysing online reviews, creating a customer journey map, and using a Kano questionnaire, and service design ideas were incorporated.	Utilising service design tools can help hotel managers optimise service processes, improve customer satisfaction, and gain a competitive edge. The research focused on analysing customer satisfaction and dissatisfaction with services provided by a local star-rated hotel, identifying areas for improvement based on customer satisfaction coefficients.	Continuous monitoring of customer needs and service improvements is essential to stay competitive in the industry. Investing in key areas like room environment and well-trained staff can enhance customer satisfaction.