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Unlocking collaboration: enabling effective knowledge transfer between service design and architectural design in workplace development

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Abstract

Purpose – This study investigates the collaboration between service design and architectural design in user-centred workplace development projects, aiming to address knowledge management challenges and facilitate effective knowledge transfer. The primary goal is to identify operational environments that encourage interdisciplinary collaboration between service design and architectural design professionals.

Design/methodology/approach – This study uses qualitative research based on 26 comprehensive interviews with leading service design practitioners in Finland's Built Environment sector, conducted before and after the COVID-19 pandemic. The grounded theory method is used to analyse the data, focusing on strategies for effective knowledge transfer.

Findings – This research identifies substantial challenges in knowledge management that arise from discontinuities in interdisciplinary interactions. The study outlines two primary organisational scenarios in the studied design projects: linear progression and concurrent design phases. It underscores the advantages of concurrent design phases in promoting effective knowledge transfer and collaboration. Key practices recognised for enhancing knowledge transfer include documentation, interaction and mediation.

Practical implications – Implementing the insights from this study can enhance interdisciplinary collaboration in workplace development, resulting in more innovative, efficient and user-centred work environments.

Originality/value – This study provides new insights into integrating service design with architectural design in workplace development, emphasising tailored knowledge transfer practices that enhance interdisciplinary collaboration. It contributes to a more comprehensive understanding of knowledge management in interdisciplinary design projects.

Keywords Service design, Architectural design, Knowledge management, Workplace development, Interdisciplinary collaboration, Collaborative practices

Paper type Research paper

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Introduction

The COVID-19 pandemic has significantly changed the way we work, disrupting traditional office settings. Many professionals, now accustomed to operating remotely, are reluctant to return to conventional workplaces (Kniffin *et al.*, 2021). To attract employees, facility managers must adapt office spaces to meet the changing needs of knowledge workers. Currently, experts are examining these requirements, the evolving role of the office, and the future of Facilities Management overall (Fiorentino *et al.*, 2022; Tagliaro and Migliore, 2022; Nenonen *et al.*, 2023). These studies highlight the critical importance of adopting a user-centred approach for effective workplace development.

Creating a contemporary workplace begins with identifying user needs and aligning them with organisational goals within a design brief (Smith, 2005; Heywood and Smith, 2006; Smith and Love, 2011). Research shows that viewing the brief as a dynamic, co-created artefact rather than a static document enhances the continuity from user needs to design solutions (Blyth and Worthington, 2001; Jensen, 2011). Since there is no universal standard for collaborative briefing, facility managers have adopted various user-centred design approaches, including lean-led design, evidence-based design and integrated design (Forgues *et al.*, 2018). In Finland, service design (SD) has become central to workplace development, especially in government sectors (Rasila *et al.*, 2014). However, integrating SD into established architectural design (AD) practices presents significant methodological and organisational challenges.

This study addresses a gap in the existing literature by examining the collaboration between SD and AD in workplace development. Although interdisciplinary approaches have been widely recognised, little is known about how specific design process configurations enable SD insights to inform AD. We contribute by demonstrating how organisational settings and knowledge management practices shape the interaction context between the two disciplines.

Most prior research relies on individual case studies, limiting the generalisability of findings (De Rosa, 2022). In contrast, this paper draws on insights from leading industry experts in Finland to provide a broader understanding of interdisciplinary interaction. Our research question (RQ) is:

RQ1. How can the collaboration between SD and AD be enhanced to address knowledge management challenges and facilitate effective interdisciplinary interactions in workplace development projects?

To answer this, we investigate project scenarios in Finnish real estate development, explore the integration of SD and AD and analyse the knowledge management practices used in these projects.

The structure of the paper is as follows: firstly, we examine the origins of interest in user experience within workplace development and explain why SD is an appropriate approach to uncover user needs despite its integration challenges with AD. We then discuss the methodology used for data collection and analysis, followed by a presentation of our findings and their implications. Finally, we offer recommendations for future research.

Theoretical background: user experience, servitisation and design integration

Interest in user experience within workplace development and the broader built environment sector emerged in the late 1990s and the early 2000s, driven by two ground-breaking concepts: the experience economy and service-dominant logic.

The Experience Economy, introduced by Pine and Gilmore in 1999, redirected the emphasis of customer value from goods and services to experiences. This perspective

quickly permeated architectural discourse, redefining cities as "brandscapes" and buildings as destinations (Klingmann, 2010). As the importance of physical environments in shaping experiences became more evident, scholars began promoting a user-centred approach in the built environment. This approach prioritises user experience over conventional business drivers, such as market conditions, financial profit, construction processes and technology (Vischer, 2008). In workplace design, this change marked a transition from function-driven spaces to environments that encourage innovation, creativity and productivity (Nenonen *et al.*, 2009). Overall, the focus on user experience has fundamentally transformed workplace design, resulting in more engaging office environments.

Concurrently, an alternative framework emerged that redefined the understanding of value: service-dominant logic. Rather than emphasising experiences, this approach posits that value is co-created through service interactions. It reframes customers as active partners in value creation and positions businesses as facilitators of this collaborative process (Vargo and Lusch, 2004). Consistent with this paradigm, the concept of offices has evolved into service offerings, commonly referred to as "servitisation", enabling facility management to adopt service-oriented models that more effectively address tenants' evolving needs (Petrulaitiene *et al.*, 2018). This perspective continues to influence contemporary workplace strategies, fostering innovative design solutions.

Today, facility management is placing greater emphasis on user needs, informed by the principles of the experience economy and service-dominant logic. SD can serve as a link between these frameworks, balancing experiential ambitions with the practical realities of service delivery (Stickdorn and Schneider, 2011; Stickdorn *et al.*, 2018). In Finland, SD has become integral to workplace design. Research shows that its application can enhance organisational performance, service quality, employee experience, well-being and overall business value, while supporting efficient and sustainable work environments (Larsen *et al.*, 2007; Rasila *et al.*, 2009, 2014). Consequently, SD helps create workplaces that support both organisational success and employee satisfaction.

While SD offers significant advantages, integrating it within established workplace development practices introduces complexities that require careful consideration. These challenges are particularly evident in the interaction between SD and AD. Ideally, SD would seamlessly guide AD, yet in practice, incorporating new specialised knowledge into AD can be challenging. A similar phenomenon was observed in a study on early sustainability adoption in architecture, which highlighted difficulties with interdisciplinary collaboration. Design teams often operated within defined roles: architects focused on design, while engineers carried out sustainability analyses. Although structured, this approach sometimes led to silos, restricting interaction and knowledge exchange. Successful collaboration depended on professional relationships among experts and thrived on close teamwork (Trebilcock *et al.*, 2006). The interaction between SD and AD mirrors the architect−engineer relationship, with SD emphasising service delivery and user experience, and AD focusing on spatial and structural design. Understanding this dynamic is crucial for optimising outcomes and managing the challenges of integrating SD into workplace development.

Carlile's research on knowledge boundaries provides valuable insights into interdisciplinary collaboration, helping to understand and address these challenges. The knowledge boundary framework highlights that various professional communities have distinct knowledge, interests and dependencies, which form three types of boundaries: syntactic (differences in language), semantic (differences in meaning) and pragmatic (differences in interests and consequences). These boundaries hinder direct knowledge transfer (Carlile, 2002, 2004). Therefore, effective collaboration requires more than just sharing knowledge; it involves translating it to ensure understanding across diverse groups and transforming it to adapt to new objectives. This

concept is particularly relevant to collaboration between SD and AD, where all three boundary types are likely to be present.

The theoretical background situates workplace development within a broader shift from product-focused to experience and service-oriented value creation (Pine and Gilmore, 1999; Vargo and Lusch, 2004). Servitisation redefines the office as a service, using SD to uncover and express user needs. Carlile's knowledge boundary framework highlights ongoing integration challenges: syntactic, semantic and pragmatic differences between professional communities that require translation or transformation rather than mere transfer (Carlile, 2002, 2004). This perspective guides our analysis of how organisational scenarios and specific practices enable SD knowledge to inform AD in workplace projects.

Methodology

In exploring the collaboration between SD and AD, we encountered a complex phenomenon closely linked to knowledge management practices and the concept of "knowledge transfer". Understanding its ambiguous and multifaceted nature required a flexible approach. After careful consideration, we chose to use the grounded theory method (GTM).

GTM stems from grounded theory, a qualitative research methodology focused on developing theories grounded in data rather than relying on predefined hypotheses (Glaser and Strauss, 1967). GTM, refined by Strauss and Corbin, 1990, includes open coding, axial coding, selective coding, memo writing and theoretical sampling. This systematic yet adaptable framework is well-suited for exploring, describing or understanding complex phenomena, even if the goal is not to create a new theory. Therefore, we selected GTM over other qualitative methods, such as thematic or content analysis, because it supports a rich and nuanced exploration of dynamic, interdisciplinary collaborations. Unrestricted by categories or themes, we were able to investigate the phenomenon in depth and with flexibility, uncovering nuanced insights and revealing patterns essential to understanding interdisciplinary collaboration.

The study was conducted in two phases to ensure it was comprehensive and relevant, particularly considering the COVID-19 pandemic. During the first phase, from November 2019 to March 2020, we conducted 18 interviews with 19 participants, including one paired interview. We used purposive sampling to select participants, focusing on professionals with practical experience or observational insights into applying SD within the built environment, such as workplace design or similar contexts. Snowball sampling was additionally used to enhance diversity in experiences, as participants recommended other professionals for the interview. Data collection continued until we reached theoretical saturation, indicating no new significant insights were emerging.

Recognising shifts caused by the pandemic, we conducted follow-up interviews from October 2024 to February 2025. We invited the original participants and included new professionals identified over the five-year gap between the studies. After completing eight interviews in this phase, data saturation was achieved again. The second round confirmed initial findings while highlighting changes brought about by the pandemic, ensuring the ongoing relevance of our results.

The interviews were conducted in Finnish, the participants' native language, and typically lasted between one and two hours. During these interviews, participants responded to inquiries about the application of SD within the built environment, their specific roles, professional identities, prevailing attitudes, the complexities of their design processes and the challenges encountered in their professional practice. The interviews were transcribed and analysed in Finnish to maintain linguistic and contextual nuances.

Our sampling did not target specific backgrounds, but it did reveal significant variation. Participants' training included architecture, interior architecture, landscape architecture,

design, urban studies, engineering and economics. Table 1 summarises the educational backgrounds, professional roles and interview durations for each interviewee. The quotations included in this article are translations of the original Finnish texts, with the numbers in brackets indicating the interviewee's number in Table 1.

Findings

Our research highlights challenges in knowledge management that stem from discontinuities in interdisciplinary interactions between service and architectural designers. We examine organisational scenarios and temporal factors that set the stage for interdisciplinary interaction within workplace design, assess the practices of knowledge transfer and explore how these elements can be integrated to improve collaboration. Additionally, we offer insights into the changes brought about by the COVID-19 pandemic, which have further influenced both traditional and emerging workplace development practices.

Organisational scenarios

Organisation of SD and AD tasks influences the success of interdisciplinary interactions. We identified two main scenarios: *linear progression*, in which design phases occur sequentially, with SD typically preceding AD, and concurrent design phases, in which processes overlap

Table 1. Summary of the interviews

Interview #	Education	Working role	Interview length
Interview round 1: autumn 2019 to spring 2020			
1	Interior architecture	Service designer	03:00:12
2	Graphic design	Service designer	02:17:06
3	Architecture	Service designer	04:24:33
4	Architecture	Service designer	02:16:37
5	Architecture	Service designer	02:44:30
6	Architecture	Service designer	01:30:58
7	Architecture	Service designer	01:18:29
8	Interior architecture	Service designer	01:14:10
9	Interior architecture	Client	01:57:12
10	Landscape architecture	Service designer	01:50:23
11	Urban studies	Service designer	02:16:46
12	Engineering	Service designer	01:50:11
13	Economics	Service designer	01:39:50
14	Architecture	Client	01:46:41
15	Interior architecture	Client	02:10:07
16	Interior architecture	Service designer	01:46:04
17	Design	Service designer	01:55:39
18 (double)	Architecture, interior architecture	Service designer, service designer	02:09:24
Interview round 2: autumn of 2024 to spring 2025			
19 (1)	Design	Service designer	01:47:23
20 (2)	Economics	Service designer	00:51:50
21 (3)	Architecture	Service designer	00:34:34
22 (4)	Engineering	Service designer	01:25:00
23 (5)	Interior architecture	Service designer	00:59:06
24 (6)	Urban studies	Service designer	01:23:16
25 (7)	Architecture	Service designer	01:18:53
26 (8)	Architecture	Service designer	01:24:33

to promote ongoing collaboration. Linear progression simplifies management but hampers knowledge continuity, requiring extra strategies for effective knowledge transfer. Concurrent phases enable continuous information exchange, fostering better collaboration and improving design outcomes.

Figure 1 illustrates the organisation of SD and AD phases within interdisciplinary design processes, highlighting options for linear progression, concurrent design phases and a "mixed scenario". The linear progression scenario includes three schematic variations: AD immediately follows SD; a temporal gap introduces additional challenges; SD occurs while AD pauses. Though each variation presents unique knowledge transfer challenges, limited interaction among actors remains a consistent concern. In contrast, concurrent design phases foster interdisciplinary collaboration by creating overlap periods that make user insights from SD readily available for architectural decisions. Whether SD and AD start simultaneously, or SD precedes AD, running in parallel enhances collaboration dynamics. The "mixed scenario" represents a poorly planned project with multiple SD and AD phases, featuring overlaps and temporal gaps. This scenario leads to fragmented communication and the loss of valuable insights despite brief opportunities for collaboration.

Our research findings demonstrate that concurrent design scenarios, characterised by overlapping SD and AD phases, significantly enhance interdisciplinary collaboration and improve knowledge management efficiency. This approach fosters a dynamic, collaborative process, allowing architects to actively engage in SD tasks and acquire first-hand knowledge of user requirements. Service designers contribute during AD, ensuring knowledge retention and supporting design decisions with user insights.

Temporal dynamics

Our research indicates that three temporal factors influence the effectiveness of knowledge transfer from SD to AD: the *duration of individual design phases*, the *chronological order* of these phases and the *overall duration* of the design process. Their careful management optimises knowledge transfer.

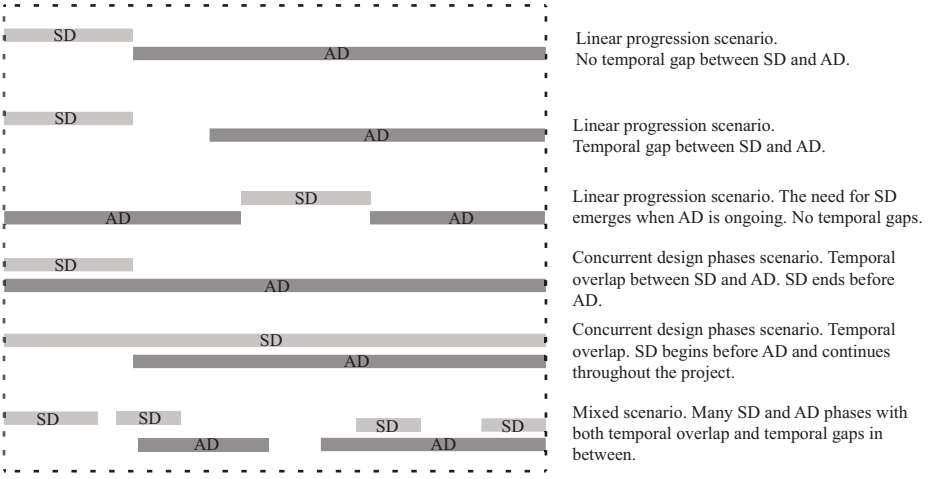

Figure 1. Organisation of SD and AD phases within interdisciplinary design processes

Source(s): Figure by authors

The design process comprises individual phases that vary in length. The duration of individual phases influences actor behaviour, leading them to prioritise activities that either facilitate or hinder collaboration. Tight schedules force designers to focus on core tasks rather than on knowledge transfer activities. Conversely, longer timelines increase the risk of losing accumulated knowledge due to staff turnover and the natural fading of details over time. Moreover, knowledge may become obsolete as project requirements evolve. Carefully managing the length of each design phase is thus crucial to retaining knowledge.

The order of tasks is vital for effective knowledge transfer. A well-sequenced project fosters ongoing collaboration, while poor sequencing may impede interactions and hinder interdisciplinary exchange. Although scheduling SD and AD tasks depends on the project, our research shows that specific arrangements are more challenging; for example, incorporating SD knowledge into an almost-completed AD can be complicated and may require extensive redesign. Therefore, careful planning of the task sequence is needed to promote efficient knowledge management.

Optimising the overall process duration is essential for maintaining continuity of knowledge. The objective is to achieve a balance between haste and delay, and to prevent overcomplicating the design process. To illustrate this, an informant reflected on the inherent complexity of real estate development: "[…] the process is so long that the people involved change over time. So, if I have been involved in the early project phases, like the needs assessment and goal setting, helping define development objectives that are reflected in the concept, then that gets handed over to the next phase. And if the new person does not understand what those objectives are or how to use them, they will not apply them – they will just come up with their own. If, for instance, a new service designer joins, they might create their own design drivers together with the user groups. […] These projects are so long, and with people changing in between, it becomes really challenging to carry those objectives across the whole project". (1) These real-life project limitations necessitate adaptive strategies to mitigate their impact. In this study, we observed participants applying specific knowledge transfer practices to assist the integration of user insights into architectural design.

Knowledge transfer practices

Effective knowledge transfer practices are essential for addressing interdisciplinary challenges. Figure 2 below illustrates how the study results were inductively derived from interview data. The initial stage concentrated on the *witnessed activities* reported by the study participants. From these descriptions, we discerned the broader *theme of witnessed activity*, which encompasses recurring patterns across individual accounts. Ultimately, these themes enhanced our understanding of *knowledge transfer practices*, identified in the study as documentation, interaction and mediation.

Documentation. The first knowledge transfer practice is documentation. It serves two purposes: *retaining knowledge* and *communicating* it. Documentation aimed at retaining knowledge involves systematically recording information to create a tangible reference base that supports communication between SD and AD. To document information, interviewees use personal notes, archive email conversations, maintain meeting agendas and keep design logbooks. However, the large volume of this knowledge makes transfer challenging, requiring a format that is suitable for sharing. Addressing this challenge, interviewees discussed documentation specifically designed to facilitate communicating knowledge between the two design phases.

The primary document used for knowledge transfer is the service design report produced at the end of the SD phase. Participants shared a clear view of what makes such a report

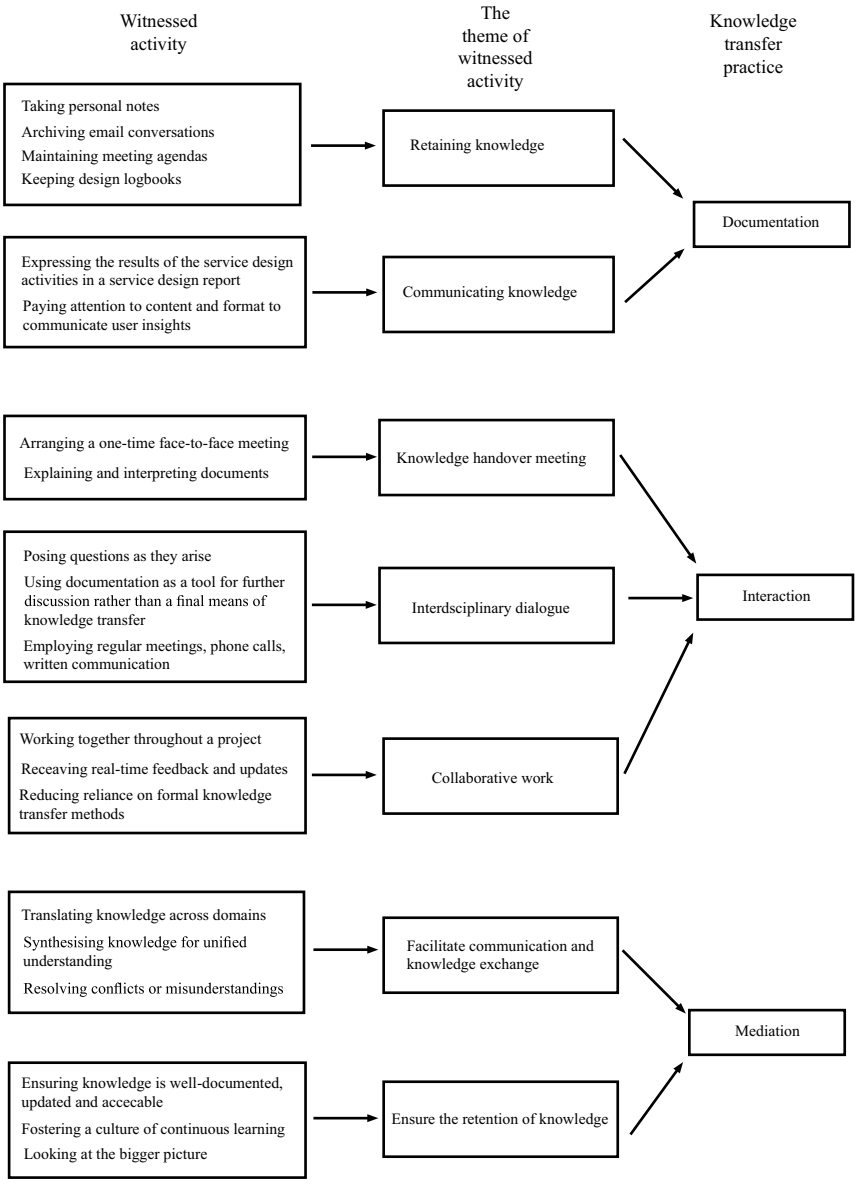

Figure 2. Data analysis process illustration
Source(s): Figure by authors

effective, and those with architectural design experience reflected on working with poor-quality documents and suggested ways to improve them. Both content and format were seen as critical to the report's success. Interviewees emphasised that user insights are most accessible when presented through a combination of concise text and supporting visuals.

One participant noted: "I always aim for it to look good, be well-summarised and structured. It should guide the reader forward through the topic. It sets the stage, presents the actual content and communicates the outcomes. It should also be easy to read and linger on – in other words, well-crafted material". (16)

Participants also stressed the need to avoid SD jargon, as architects may not be familiar with it. To remain useful for AD, the report should focus on needs, actions, processes and affordances rather than proposing spatial solutions. As one interviewee explained: "The challenge there is often that service design documentation is done with the design solutions first, and in my opinion, the solution would be to document more from the perspective of needs and use cases – to describe the functionality and the kinds of needs there are, but not how they should be solved". Because at that point, the architect looks at it and thinks, "Someone has quickly and clumsily come up with solutions that do not fit my design, so I have to throw them out". (5)

Despite its importance, relying solely on documentation for knowledge transfer can lead to significant knowledge loss and misinterpretation. The same person explained this by saying, "Documentation is very laborious, reading the document is very laborious, and probably 90% of the knowledge is lost along the way". (5) Analysing the SD report alone does not give architects enough insight, as they may struggle to understand its relevance. The informant recalled, "So actually, I ended up here partly because, in a previous life about ten years ago, I got a service design document on my desk, and I did not understand any of it. It did not make sense to me because it was a written document, but if we had even had a three-hour presentation where it was walked through, and the people themselves explained what it was about, it would have been a totally different thing". (5) Therefore, documentation should be viewed as a tool that supports discussion among the actors.

Interaction. Interaction between SD and AD actors is the next step towards effective knowledge transfer. Our study revealed three types of such interaction: *knowledge handover meetings*, *interdisciplinary dialogue* and *collaborative work*. Interaction reinforces documented insights, ensuring that all actors understand and use them.

At the lowest level of interaction intensity, only one meeting may be organised between the service and architectural designers, which we refer to as a knowledge handover meeting. During this interactive session, participants review user insights documented in the service design report and develop a shared understanding of the project requirements. Face-to-face communication enhances knowledge retention, making these meetings indispensable for knowledge integration.

If the project design permits, a knowledge handover meeting may initiate interdisciplinary dialogue: a more intensive interaction, enabling designers to pose questions as they arise during the project. Dialogue may be facilitated through regular meetings or less formal channels, including telephone calls or written communication. Proper resourcing ensures that designers can participate in these essential interactions, thereby securing a consistent exchange of information.

The most active interaction occurs when SD and AD professionals work together throughout a project. Collaborative work promotes a natural flow of knowledge, minimising reliance on formal knowledge transfer methods. As one study participant explained, "In the best case, no documentation is needed at all – the process itself is enough". (5) Reflecting on their interdisciplinary experience, another interviewee noted, "We have designers from different fields, people from various disciplines. We work on projects where we are involved in all phases, and we aim to ensure that the final outcome − such as the designed space − reflects what was discovered and developed during the service design phase, among others, and throughout all the other phases as well". (7) Collaboration enables actors to update the

design based on real-time feedback and insights. An interviewee summarised this by saying, "The best possible knowledge transfer is when there is no transfer at all, because all parties have been involved from the very beginning". (5)

Overall, interaction is essential for effective knowledge transfer. Without it, knowledge becomes fragmented, and opportunities for collaborative problem-solving do not emerge. Our findings show that knowledge handover meetings, continuous dialogue among stakeholders and collaborative work effectively bridge the gaps between SD and AD in interdisciplinary workplace development projects.

Mediation. Our analysis revealed a distinct practice in interdisciplinary design projects: knowledge mediation. Knowledge mediation refers to the activities conducted *to facilitate communication and knowledge exchange* among actors, as well as *to ensure the retention of knowledge*. Often, mediation directs documentation and interaction, while introducing an additional dimension to the overall process.

Mediation may not be present in all projects, but its role in improving knowledge transfer is crucial. One interviewee highlighted the challenges that mediation could address: "So the user has to be very active at every stage, and they have to be able to comment on absolutely everything, and that causes an overwhelming amount of strain for the user. And, in a way, there is no link in between. I am often that link in projects, I might gather user data, then filter it a bit, challenge the user, and on the other hand challenge the architect, and then pass on that information in a way that makes me the glue in between. Which, in my opinion, is also typically the role of a service designer, to some extent, and to create an understanding of the bigger picture". (1) Without effective mediation, SD and AD professionals may struggle to engage efficiently. We note that participants often experience a need for knowledge mediation and may actively seek to facilitate this process.

We identify the actor guiding mediation as *a knowledge mediator.* This role is not always explicitly assigned and may emerge organically, undertaken by project managers, principal designers, service designers and management consultants. Our research indicates that knowledge mediators are usually individuals, not groups.

Knowledge mediation serves two goals. Firstly, a mediator facilitates communication and knowledge exchange between the SD and AD, as well as other stakeholders. This entails synthesising different forms of knowledge to develop a unified understanding that guides the design work, often rendering complex phenomena comprehensible for non-experts. Mediator also helps prevent or resolve conflicts and misunderstandings arising from differing knowledge bases, perspectives and objectives. Secondly, a mediator ensures knowledge retention by guiding the documentation process and fostering a culture of continuous learning in which knowledge is regularly referenced, updated and refined. One informant described their experience as a knowledge mediator: "Well, my own role has maybe been to look at the bigger picture – the content of the service design and how it transitions into spatial design. And that is really a dialogue. If I have been on the client side, then I have guided the design process and to some extent sparred with and given feedback on the solutions". (15) Overall, the transfer of knowledge is significantly improved when mediation is combined with other knowledge transfer practices.

Knowledge transfer through documentation, interaction and mediation

Documentation, interaction and mediation collectively contribute to the effective knowledge transfer in interdisciplinary design projects. Each component plays a distinct yet complementary role in facilitating knowledge exchange and integration. Documentation provides a tangible reference that systematically records insights and decisions, helping maintain transparency and continuity throughout the project. As written records are prone to

misinterpretation, interaction reinforces documented insights and fosters a shared knowledge construction. Mediation, facilitated by a knowledge mediator, further enhances this process by managing diverse knowledge, resolving conflicts and bridging gaps between SD and AD professionals. The mediator ensures that exchanges remain dynamic, promoting a collaborative and innovative design process. Together, these practices create a synergistic effect that significantly enhances knowledge management, driving better project outcomes and ensuring user needs are met.

Integrating organisational scenarios with knowledge transfer practices

Understanding the inherent challenges of interdisciplinary collaboration between service and architectural designers is crucial to advancing effective knowledge management in design projects. The organisational scenarios we identified (linear progression and concurrent design phases) each present unique dynamics that affect the flow and retention of knowledge between actors. Integrating these scenarios with suitable knowledge transfer practices can address the structural discontinuities and enhance interdisciplinary collaboration.

In linear progression, each design phase ends before the next one begins, with SD typically preceding AD. This straightforward yet disconnected workflow may impede effective knowledge transfer, as insights from the SD phase might not be adequately communicated to the AD team due to limited collaboration. To address this, knowledge transfer strategies emphasise comprehensive documentation of the SD findings, alongside interactive activities such as knowledge handover meetings and interdisciplinary dialogue. The appointment of a knowledge mediator to facilitate transition between phases may further enhance knowledge transfer and project cohesion. Although documentation remains the primary instrument, incorporating interactive and mediating activities ensures a more accurate understanding of the findings. Overall, our research indicates that the linear progression of design phases presents significant challenges for knowledge transfer.

In contrast, concurrent design phases facilitate collaboration by overlapping SD and AD, making interaction the primary mechanism for effective knowledge transfer. By working together, teams regularly exchange ideas and clarify misunderstandings, thereby reducing reliance on formal documentation. One participant observed, “We usually make sure that at least one designer [here, architect] is involved in workshops and other situations where work is done with service designers. We typically have a designer present in those sessions, partly to help ensure that the handover is moving forward”. (7) In this project context, the role of the knowledge mediator shifts from addressing knowledge management issues arising from structural project deficiencies to actively promoting knowledge exchange and fostering a culture of continuous learning. Although all three knowledge transfer practices are observable within this setting, interaction and mediation are more predominant than documentation. Our findings indicate that the project scenario involving concurrent design phases provides a conducive environment for collaboration among actors.

Post-COVID changes in knowledge transfer practices

Post-pandemic, our study investigated the effects of COVID-19 on the utilisation of SD in the built environment. Interviewees noted a significant shift towards remote communication, replacing in-person meetings with digital facilitation. One participant said, “Well, yeah, I would say quite a lot changed because the pandemic completely transformed the entire design process. Before, there was a strong emphasis on in-person meetings as core methods. Then came the pandemic, which basically pulled the rug out from under all of that[…] And now we are kind of somewhere in between – in a way, we have stayed very much in the digital era, but at the same time it feels like face-to-face interactions are valued even more

than before". (20) Our analysis shows that while remote tools provide flexibility, accessibility and improved documentation, they may also impede stakeholder rapport and trust, which is crucial in user-centred design. Regarding knowledge transfer practices, we found that the digital shift has benefitted documentation; however, deeper interactions now require additional effort. Mediation remains significant and must adapt to these changes. Overall, despite the development of new tools, the fundamental design principles and knowledge transfer practices stayed consistent before and after the pandemic.

Discussion

This study set out to examine how collaboration between SD and AD can be enhanced to address knowledge management challenges in workplace development projects. Our findings indicate that the configuration of project phases and the appropriate use of knowledge transfer practices together shape the conditions for effective interdisciplinary interaction. Situating these results in relation to existing literature clarifies why some configurations and practices support user-centred outcomes, whereas others lead to loss of insight.

Our observations on how temporal dynamics influence knowledge transfer align with research on organisational memory, which shows that knowledge often dissipates across cycles and actors (Ajmal and Koskinen, 2008; Argote, 2013). This indicates that designing phase lengths and their sequencing is not merely a scheduling issue; it is a strategic lever for maintaining knowledge continuity. The two organisational scenarios identified, linear progression and concurrent design phases, reflect established process models in the built environment. Linear progression resembles stage-gate or "waterfall" processes and traditional briefing, which create hard handover points and risk knowledge loss during phase transitions (Cooper, 1990; Blyth and Worthington, 2001). In contrast, concurrent design phases align with concurrent engineering, lean design management and Integrated Project Delivery, where early and continuous involvement across disciplines reduces rework and enhances value alignment (Koskela, 2000; Ballard, 2008; Kent and Becerik-Gerber, 2010). Our findings contribute to this literature by demonstrating that concurrency encourages effective interdisciplinary interactions in workplace development projects.

Knowledge transfer as boundary work

Building on Carlile's foundational work on knowledge boundaries (2002, 2004), knowledge transfer between SD and AD can be understood as boundary work enacted through specific practices. SD outputs, such as reports, use cases, personas and journey maps, can be regarded as boundary objects. These are concise, visual and action-oriented artefacts that describe needs, use cases and affordances rather than prescriptive spatial solutions. Boundary objects can successfully cross syntactic, semantic and pragmatic boundaries to be used in AD. In project scenarios with linear progression, structural discontinuities necessitate robust boundary objects, structured handovers, ongoing dialogue and explicit mediation to carry insights across phases. Conversely, in concurrent settings, interaction becomes the primary channel for knowledge flow, reducing dependence on documentation and aligning with co-creation and participatory design practices (Sanders and Stappers, 2008). Mediation helps sustain the knowledge transfer process by guiding the pace, depth and focus of exchanges, reflecting boundary-spanning translation and transformation (Carlile, 2004; Dossick and Neff, 2010).

The COVID-19 pandemic accelerated remote and hybrid collaboration, leading participants to report that digital modes of work improved information accessibility while also limiting opportunities for informal sense-making and trust-building, as also observed in

studies of remote teamwork (Waizenegger *et al.*, 2020). Viewing collaboration platforms as evolving boundary objects can help maintain context over time and among participants. By embracing hybrid ways of working through co-located workshops at key milestones, supported by regular online interactions, the intensity needed for concurrent SD and AD work is sustained while reaping the documentation benefits of digital tools (Leonardi, 2011).

Considerations for clients, project managers and designers

This study investigates not only organisational aspects but also the dynamics of knowledge exchange between service and architectural designers. The project context, influenced by clients and project managers, is vital for facilitating this interaction. The implications for key stakeholders are outlined below.

For clients, thoughtful project structuring is essential for effective collaboration between SD and AD and for integrating user insights into design outcomes. Projects that support overlapping SD and AD phases can enhance collaboration and minimise knowledge loss. When linear progression is unavoidable, clients should ensure comprehensive documentation, structured handovers and clear mediation to maintain knowledge continuity.

Project managers play a leading role in configuring the operational environment for interdisciplinary collaboration. The decision between linear and concurrent scenarios should be strategic, supported by an appropriate balance of documentation, interaction and mediation. Project managers should function as, or appoint, a knowledge mediator to maintain alignment between SD and AD throughout the project.

Early and sustained involvement with SD is advantageous for architects, as it fosters a deeper understanding of user needs while reducing reliance on documentation. Architects should clearly articulate the form and detail required from SD and specify when this information is most critical, aligning outputs with decision-making milestones. When priorities conflict, architects should use the mediator to integrate user insights with technical, regulatory and cost considerations.

For service designers, effective documentation that facilitates translation is imperative. Deliverables should be concise, visual and free of jargon, focusing on needs, use cases and performance criteria, thus integrating more effectively into AD than prescriptive spatial designs. Structuring knowledge transfer as an interactive process with opportunities for clarification and follow-up is essential. Maintaining availability during AD ensures accurate interpretation of insights and reduces rework.

Limitations and future research

This study explores knowledge management in interdisciplinary workplace design projects, focusing on exchanges between SD and AD. It does not, however, examine individual capabilities, attitudes and power dynamics that influence collaboration and knowledge transfer. Understanding these factors could improve collaboration strategies and guide future research. Post-COVID-19 pandemic, participants noted increased reliance on digital tools, though their specific use was outside this study's scope, presenting an opportunity for further investigation. The limited sample size and focus on Finland's real estate sector may limit the generalisability of the findings. Future research should involve larger, more diverse samples.

Conclusion

The evolution towards a service-centred and experience-driven model in workplace design necessitates innovative tools that effectively align user needs with business objectives. SD offers promising methodologies for comprehensively understanding user requirements and translating them into practical work environments. However, the integration of SD and AD

calls for further investigation. By bridging the domains of design management and knowledge boundary research, our study identifies knowledge management within interdisciplinary teams as the primary challenge in merging SD with AD.

Our research question, "How can the collaboration between SD and AD be enhanced to address knowledge management challenges and facilitate effective interdisciplinary interactions in workplace development projects?" has been addressed. We examined organisational scenarios in design projects involving SD and AD, identifying two distinct approaches: linear progression and concurrent design phases. While linear progression often leads to gaps in knowledge continuity, concurrent design phases promote collaborative knowledge creation through dynamic teamwork and continuous integration of insights. Our study outlines knowledge transfer practices that can further improve knowledge management: documentation, interaction and mediation. Adopting these practices ensures continuous and accurate information exchange between SD and AD throughout a project. We contend that shifting to concurrent design phase scenarios can transform interdisciplinary interactions, establishing a standard for efficient, user-centred design processes across the industry.

This study makes valuable contributions to the field of workplace development by revealing the collaborative dynamics between two design disciplines instrumental to contemporary office creation, SD and AD, and offering actionable insights that enhance interdisciplinary collaboration. Our findings advance theoretical understanding and contribute to the development of a comprehensive framework for knowledge transfer in interdisciplinary design processes within the built environment. As organisations increasingly strive to optimise their offices to meet evolving employee needs, the insights from this study will be invaluable to practitioners aiming to deliver impactful, responsive design solutions.

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