67ztA Work Project, presented as part of the requirements for the Award of a Master's degree in International Management/Management from the Nova School of Business and Economics.

HOW PROPTECH TRANSFORMS INTERIOR DESIGN: DEVELOPER PERSPECTIVES (IN THE GERMAN MARKET)

NINA LENA SCHMIDT

Work project carried out under the supervision of:

João Castro

17/12/2025

Abstract

This thesis examines how Property Technology (PropTech) is transforming interior design practice in the German market from the developer perspective. Drawing on the Technology Acceptance Model and Diffusion of Innovations theory as complementary frameworks, it employs semi-structured expert interviews to explore the qualitative dimensions of this transformation. The findings reveal diverse adoption paths shaped by organizational context, competitive pressure, and the ongoing importance of human expertise. Rather than replacing human-centered design, PropTech reconfigures it, demanding client-oriented and learning-driven strategies that enable sustainable value creation.

Keywords

Interior Design, Property Technology, Digital Tools, Digital Transformation, Technology Acceptance, Innovation Diffusion

This work was funded by Fundação para a Ciência e a Tecnologia (UID/00124/2025, UID/PRR/124/2025, Nova School of Business and Economics) and LISBOA2030 (DataLab2030 - LISBOA2030-FEDER-01314200).

Table of Contents

List of Figures

List of Abbreviations

AI	Artificial Intelligence
API	Application Programming Interface
AR	Augmented Reality
CAD	Computer-Aided Design
CAGR	Compound Annual Growth Rate
DOI	Diffusion of Innovations
EC	Experienced Customers
IoT	Internet of Things
PC	Potential Customers
PropTech	Property Technology
PT	Pivot Table
TAM	Technology Acceptance Model
VR	Virtual Reality

„The greatest danger in times of turbulence is not the turbulence; it is to act with yesterday's logic.“ - Peter F. Drucker

1 Introduction

Over the past decade, the property industries have experienced an accelerated digital transformation driven by Property Technology (PropTech), encompassing cloud platforms, virtual reality and augmented reality applications, data-driven tools and more recently, AI-enhanced systems (Hendriyani et al. 2022; Braesemann and Baum 2020). Long shaped by analogue processes and close personal interaction with clients (Kilmer and Kilmer 2011), interior design is now increasingly being influenced by these digital developments (Lesmana et al. 2024). Digital visualization technologies are becoming common components of project communication and exploration (Kamath et al. 2025). As PropTech reshapes how real estate assets are conceptualized and experienced, customer expectations in interior design have shifted accordingly (Tagliaro et al. 2025; Górska et al. 2022). Clients now seek greater transparency, faster iteration, personalized solutions and more immersive ways of understanding design proposals (Kamath et al. 2025; Qian and Sutunyarak 2024). These changing expectations expose the limitations of traditional analogue methods and put additional pressure on interior design firms to update their business models and working practices. At the same time, the integration of PropTech demands organizational adjustments, skill development and changes to established routines (Yanhua 2024; Sonpol and Khalifa 2024). Designers must decide which technologies genuinely enhance their work, how to manage increasingly complex tool ecosystems and how to preserve creative autonomy in digitally mediated processes (Yanhua 2024; Sonpol and Khalifa 2024).

Against this backdrop, this thesis investigates how PropTech is transforming interior design in the German market from the perspectives of both customers and developers. It seeks to clarify the conditions under which such technological change can create meaningful value rather than introduce additional complexity or risk.

1.1 Research Gap

While research on digital transformation and PropTech in the broader real estate sector has grown considerably, the specific implications for interior design remain comparatively underexplored (Braesemann and Baum 2020; Hanelt et al. 2021). Existing studies typically focus on PropTech's impact on property development or asset management. Instead, interior design appears only as a peripheral or illustrative domain (Braesemann and Baum 2020). At the same time, scholarship on interior design has largely focused on design methods, aesthetics, sustainability and user experience. Digital tools are often mentioned only as supportive instruments, rather than as potential drivers of structural change in professional practice (Hendriyani et al. 2022; Skipworth et al. 2025). Where digital technologies are examined, the focus is usually on their technical capabilities or on user experience. Their role in organizational decision-making, market dynamics or professional identity in interior design is rarely analyzed (Hendriyani et al. 2022; Nakonz 2023; Parlangeli et al. 2019). Consequently, there is limited empirical knowledge about how customers' acceptance of PropTech tools in interior design projects relates to designers' adoption strategies, resource configurations and market positions.

1.2 Research Objectives

Based on the identified research gap and the challenges outlined above, the following research question has been formulated: *"How PropTech transforms Interior Design: Customer and Developer Perspectives (in the German market)".* To address this question, the next chapter turns to the existing body of literature. It reviews academic and industry sources on interior design, digital transformation and PropTech to establish the theoretical foundation of the study. On this basis, the methodology chapter details the mixed-methods research design and introduces the Technology Acceptance Model (TAM) and Diffusion of Innovations (DOI) theory as the two central lenses guiding the empirical work. TAM informs the quantitative customer survey, while DOI frames the qualitative developer interviews. Building on this, the

empirical part of the thesis first presents the quantitative study, followed by the qualitative study. For each strand, the methodological approach is described, the resulting data are reported, and the key findings are interpreted. In the subsequent discussion, the results are integrated and related back to the theoretical foundations and the research question.

Finally, the thesis concludes by deriving practical implications for interior design practitioners, outlining the limitations of the study, proposing future research and summarizing the main insights.

2 Theoretical Background

This chapter provides the conceptual foundation for the study by outlining the evolving context of interior design and examining how digital transformation and PropTech are redefining design processes through key enabling technologies.

2.1 Interior Design

In order to establish a clear theoretical foundation for the following analysis, it is essential to first define interior design and distinguish this field from the closely related discipline of interior architecture. Interior design and interior architecture are multifaceted, interdisciplinary professions that unify the functional, technical and aesthetic development of interior spaces (Hildebrandt 2004). Both fields operate at the intersection of architecture, material design and lighting. Project teams collaborate across disciplines including architects, engineers and specialized planners to deliver solutions for residential, commercial, hospitality, healthcare and educational environments (Kilmer and Kilmer 2011). Their shared objective is to create spaces that are both functionally efficient and atmospherically effective, while being oriented toward user needs. Factors such as ergonomics, materiality, lighting, acoustics and color psychology play a central role, alongside technical, constructive and regulatory requirements (Ching and Binggeli 2018). Hildebrandt (2004) states that interior design and interior architecture share a

foundational design knowledge and a problem-solving approach that integrates analytical thinking with solution-oriented strategies. This expertise is complemented by discipline-specific and interdisciplinary communication skills.

However, the two approaches differ in their foundational orientation. Interior architecture follows a reductionist design principle, extending architectural language and logic from the exterior into the interior (Hildebrandt 2004). Interior design, in contrast, is based on "additive assemblies" (Hildebrandt 2004, 2) (i.e. the combination of design elements, which are developed and layered independently of the architectural shell), allowing for a unique interior design language. Against the backdrop of these conceptual developments, it is reasonable to consider interior design and interior architecture not as strictly separated fields, but as complementary components of an integrated design process. Both disciplines respond to the same technological, societal and ecological challenges and increasingly employ similar tools and methods (Hildebrandt 2004). For this reason, this thesis uses the term interior design as an overarching concept, explicitly including the interior architectural dimension.

2.1.1 Interior Design Market

Following this conceptual groundwork, it is necessary to examine the current market development and economic significance of the interior design sector at both global and regional levels. Driven by advancing digitalization, the global interior design market has been experiencing sustained growth (Lesmana et al. 2024). In 2024, the global market was valued at USD 137.93 billion and is projected to reach USD 175.74 billion by 2030, representing a compound annual growth rate (CAGR) of 4.3% (Grand View Research 2024a). The expansion of the interior design market is primarily fueled by three factors. These are rising demand for individualized design solutions, greater emphasis on sustainability through eco-friendly materials, and the increasing integration of digital tools within interior spaces (Grand View Research 2024a). Structurally, the market is characterized by a clear commercial-residential

division. Commercial interior design accounted for approximately 55% of the market in 2023, while residential projects represented the remaining 45%. This distribution reflects the growing emphasis on professional and workplace environments, driven by trends in flexible work arrangements (Grand View Research 2024a).

Reflecting these global trends, the German interior design market shows comparable momentum. In 2024, the market recorded a volume of approximately USD 6.6 billion, with projections suggesting an increase to about USD 8.5 billion by 2030, representing a CAGR of 4.3% (Grand View Research 2024b). This steady growth underscores the rising economic relevance of interior design and the need to understand how digital transformation reshapes value creation in this market.

2.1.2 Digital Transformation in Interior Design

The digital transformation is profoundly reshaping industries and societies worldwide and the interior design sector is no exception (Hendriyani et al. 2022). When talking about digital transformation, it is important to distinguish the term from digitalization itself. Digitalization describes the process of converting analog data into digital formats (Harwardt 2020). In contrast, digital transformation encompasses a broader, systemic change process. By strategically utilizing digital technologies and connectivity, it redefines business models, goods, services and organizational procedures (Stieninger et al. 2019). Adopting new tools is only one aspect of this shift. Businesses need to change how they manage processes, adapt structurally, and cultivate an innovative culture (Schmutte 2020). It is about reshaping how interior design firms operate and innovate within a digitally connected environment (Hanelt et al. 2021).

Historically, the property sector has lagged behind other industries in adopting digital technologies. However, recent advancements are accelerating change (Moring et al. 2018; Nakonz 2023). As interior design workflows increasingly rely on digital and data-driven methods, structured visualization and compliance with environmental or regulatory

requirements become more feasible through digital means (Nakonz 2023). In summary, digital transformation is driving a fundamental shift in traditional interior design processes and paving the way for increasingly important innovations in the field (Moring et al. 2018).

2.2 PropTech

The growing digitalization of the real estate sector has led to the emergence of a dedicated technological field commonly referred to as PropTech, short for Property Technology (Tagliaro et al. 2025). In essence, PropTech captures the digital transformation of the real estate industry through the adoption of Industry 4.0 technologies such as IoT, AI, cloud computing and automation (Starr et al. 2021). While digital transformation describes the broader shift in how organizations reconfigure their processes with the help of technology, PropTech marks its concrete expression in property-related activities (Baum et al. 2020). It encompasses the use of digital tools and data-driven solutions to innovate and optimize processes along the entire real estate value chain, from development and marketing through to operation and use (Tagliaro et al. 2025).

2.2.1 Evolution of PropTech

For a long time, the real estate sector was considered relatively resistant to innovation, partly because of its capital-intensive nature and its dependence on established professional intermediaries (Braesemann and Baum 2020). In recent years, however and especially with the acceleration of digitalization during the COVID-19 pandemic this perception has begun to change. PropTech is increasingly reshaping how properties are planned and experienced in everyday life (Starr et al. 2021).

Following Baum et al. (2020), this development can be described in three waves. PropTech 1.0, emerging in the mid-1980s, was driven by the spread of personal computers and early data-processing tools. Applications such as Excel, CAD programs and valuation software started to digitalize core tasks in property management and financial analysis. After the 2008 financial

crisis, PropTech 2.0 gained momentum based on cloud services, mobile internet and open APIs. In this phase, consumer-facing platforms like Zillow, Trulia and Airbnb increased market transparency and made access to real estate more flexible. Looking ahead, climate change and ongoing urbanization are expected to be the primary forces shaping PropTech 3.0. In this context, AI, machine learning, blockchain and IoT are seen as central building blocks for developing more sustainable and intelligent property systems (Baum et al. 2020).

2.2.2 PropTech Applications in Interior Design

In line with current research and the objectives of this thesis, the following digital applications are of particular interest: Building Information Modelling (BIM), 3D visualization, virtual and augmented reality (VR/AR), online configurators and virtual staging. Against this backdrop, these tools shape how spaces are visualized, discussed and decided on and they represent some of the most influential current innovations for interaction and decision-making in interior design (Abasova and Mamedov 2025; Kamath et al. 2025). Before examining these tools in more detail, it is worth noting that an increasing number of technological applications in interior design now offer optional AI-based functionalities, while others continue to operate entirely without AI. Many of the former integrate features such as automation, personalization or predictive modelling to enhance performance, even though their core modelling and visualization capabilities remain fully effective without relying on AI (Lesmana et al. 2024).

Building Information Modelling (BIM) brings geometric, spatial and semantic information together in a shared digital model, so that all project participants can access consistent data and work within more sustainable and efficient design workflows (Han and Liu 2021; Hong et al. 2023). In interior design, this makes it possible to test layouts, lighting concepts, furniture constellations and material choices at an early stage and to align aesthetic and technical requirements in one environment (Han and Liu 2021). Increasingly, BIM environments are extended by AI-based functions that support clash detection, material selection or energy

optimization, which further increases the precision and flexibility of the design process (Abasova and Mamedov 2025; Yanhua 2024).

3D visualization, by contrast, is concerned with creating digital three-dimensional representations of spaces or objects that resemble reality as closely as possible. Using software such as AutoCAD, ArchiCAD or 3D Studio Max, designers can develop and present concepts in a way that clients can immediately relate to, which noticeably improves communication in the project (Sadiku et al. 2018). Light, materials and proportions can be shown in a realistic manner, helping clients to grasp proposed designs and make decisions with greater confidence. As a result, 3D visualization has become a central working tool that allows projects to be viewed from different angles and under varying conditions, supporting both more informed choices and more creative exploration (Rajab et al. 2019).

Virtual and augmented reality (VR/AR) go one step further by enabling immersive, interactive experiences of future spaces (Bhandari et al. 2024). With VR, clients can “walk through” a planned interior in three dimensions before any construction takes place (Wu and Han 2023). AR, in turn, blends digital design elements with the existing physical environment, for instance via smartphones, tablets or headsets (Abasova and Mamedov 2025; Ahsani et al. 2025). AI functionalities can be added to these tools to suggest alternative layouts, generate variants or personalize the experience, yet their core benefit lies already in the enhanced visualization, increased client satisfaction and stronger confidence in design decisions they provide. In practice, they often help to spark creativity and reduce the likelihood of costly changes later in the process (Bhandari et al. 2024; Ahsani et al. 2025).

Online configurators shift part of the design process into the hands of users. They allow customers to adapt materials, furniture or room layouts directly on screen and in real time, creating an interactive environment in which they can explore options at their own pace (Parlangeli et al. 2019). In doing so, configurators narrow the distance between producers and

customers, support navigation through complex choices and make it easier to combine individual preferences with the logic of mass customization. Studies show that this kind of guided self-design can increase users' sense of autonomy and satisfaction and, in many cases, their willingness to purchase (Parlangeli et al. 2019).

Finally, virtual staging links digital visualization with marketing-oriented presentation. Empty or unfinished interiors are digitally furnished and decorated so that potential buyers or tenants gain a realistic impression of how the space could look and feel (Kamath et al. 2025; Tukur et al. 2024). Compared with traditional physical staging, this approach is typically faster and less costly, while still providing convincing imagery. More advanced platforms increasingly integrate AI to automate furniture placement, adjust lighting or fine-tune stylistic choices, whereas simpler solutions rely on manual 3D rendering. In both cases, the flexibility to create different versions for different target groups makes virtual staging an attractive instrument for both real estate and interior design (Kamath et al. 2025; Tukur et al. 2024).

2.3 Summary of Findings

Digitalization and PropTech are reshaping interior design in a profound way, weaving data-driven and interactive technologies into both creative work and day-to-day operations. A once primarily analogue, craft-based discipline is now an increasingly interdisciplinary, technology-supported field that overlaps with interior architecture and is driven by personalization and collaborative digital workflows (Ching and Binggeli 2018; Kilmer and Kilmer 2011). At the same time, the global market is expanding, as clients look for more customized and technologically supported design solutions (Grand View Research 2024a). Within this landscape, PropTech introduces a range of digital tools into interior design, including BIM, 3D visualizations, VR/AR environments, online configurators and virtual staging. These applications strengthen visual communication, streamline processes and invite users to participate more actively in the design experience (Kamath et al. 2025; Siniak et al. 2020).

Taken together, these developments point to a structural shift that softens traditional boundaries in the industry. This transformation pushes interior design toward greater efficiency, technological innovation and responsiveness to market demands (Braesemann and Baum 2020; Starr et al. 2021).

3 Methodology

To capture the multifaceted dynamics of digital transformation in interior design, this thesis employs a mixed-methods research design. Such designs are well suited to complex phenomena, as they integrate the breadth of quantitative data with the depth of qualitative insights (Diekmann 2018).

On this basis, this chapter introduces the two technology adoption theories that structure the study. The Technology Acceptance Model (TAM) serves as the conceptual foundation for the quantitative customer survey and helps to structure how attitudes, perceived usefulness and perceived ease of use are captured (Davis 1989). The Diffusion of Innovations (DOI) theory, in turn, guides the qualitative interview design and foregrounds the developer perspective by focusing on how innovations spread within a professional community (Rogers 1983).

The quantitative component consists of a standardized online survey that systematically records customer experiences, expectations and behavioral tendencies regarding digital tools in interior design (Berger-Grabner 2022). Building on these findings, the qualitative phase employs semi-structured interviews with interior designers to illuminate the interpretative frameworks, strategic considerations and everyday routines that influence how digital technologies are adopted and integrated into professional practice (Gläser and Laudel 2010). Bringing both strands together links generalizable quantitative patterns with their qualitative interpretation and context, thereby enabling a coherent and comprehensive understanding of digital transformation in interior design (Diekmann 2018).

3.1 Technology Acceptance Model

This study applies the Technology Acceptance Model (TAM), originally developed by Fred D. Davis (1989), as the theoretical and methodological foundation for the quantitative part of the research. TAM provides a well-established lens for analyzing how customers evaluate and accept digital tools and applications in the context of PropTech and interior design.

Based on Davis (1989), TAM proposes that two key perceptions, perceived usefulness and perceived ease of use, influence users' attitudes toward a technology, which in turn shape their intention to use it and their actual adoption behavior. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, 320), reflecting the user's assessment of a technology's functional benefits. Perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, 320), emphasizing how intuitive and accessible a system appears to the user. In the context of TAM, perceived ease of use has been shown to positively affect perceived usefulness, reflecting the theoretical interdependence of these factors.

Building on the foundational work of Davis (1989), TAM has been continually refined to capture the increasing complexity of technology adoption in a rapidly digitalizing environment (O'Dea et al. 2024). In later extensions of the model, additional dimensions were introduced to represent the full adoption process, as illustrated in Figure 1. These include *Attitude Toward Using (A)*, reflecting the user's overall evaluative response to the technology and *Behavioral Intention to use (BI)*, indicating the motivational readiness to adopt it. Both constructs are influenced by *Perceived Usefulness (U)* and *Perceived Ease of Use (E*) and jointly lead to *Actual System Use*, the observable outcome of adoption behavior. *External Variables* such as system design or social context indirectly shape these perceptions and attitudes, illustrating how individual beliefs translate into technology-related behaviors (Davis et al. 1989).

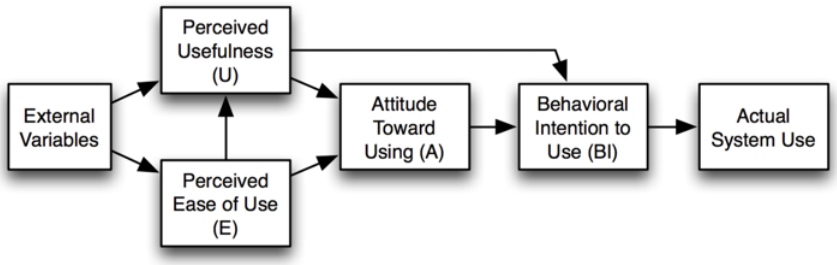


Figure 1: Technology Acceptance Model
(Source: Davis et al. 1989, 985)

3.2 Diffusion of Innovations Theory

The Diffusion of Innovations (DOI) theory by Everett M. Rogers provides a coherent analytical lens for examining how new technologies and design practices are adopted and disseminated within the interior design field (Rogers 1983). Its emphasis on innovation characteristics and social adoption processes makes it particularly suitable for the qualitative part of this study, which investigates the developer perspective through semi-structured expert interviews.

The model highlights that innovations spread over time and through particular communication channels embedded in a social system, rather than being adopted simultaneously. Rogers distinguishes four core components: innovation, time, communication channels and social system, forming a holistic framework that explains why adoption rates vary and how diffusion can be purposefully guided in research and practice (Karnowski and Kümpel 2015).

A central contribution of Rogers' work is the delineation of five key attributes that shape the speed and breadth of innovation adoption. The degree to which an innovation is perceived as superior to existing solutions is captured by *Relative Advantage***.** The greater this perceived benefit, the faster diffusion typically occurs especially in the case of highly efficient or disruptive technologies. *Compatibility* promotes adoption when new tools align with users' existing values, experiences and routines, thereby minimizing the need for behavioral adjustment. *Complexity* refers to the perceived difficulty of understanding or using an innovation. The more intuitive and user-friendly it appears, the lower the barriers to acceptance.

Trialability lowers uncertainty and psychological resistance by allowing potential adopters to test an innovation on a small scale. Finally, *Observability* underscores the role of visible outcomes. When the advantages of an innovation are clearly observable to others, social influence and imitation accelerate its diffusion (Rogers 1983).

The diffusion process itself follows a distinctive pattern that is frequently represented by a bell curve. The earliest wave of adoption is spearheaded by *Innovators*, individuals distinguished by their willingness to experiment and take risks. They are succeeded by *Early Adopters,* who act as trendsetters and thought leaders within their networks. The subsequent *Early Majority* engages once tangible proof of value is evident, followed by the *Late Majority*, whose skepticism and caution often slow uptake. *Laggards* ultimately join only after the innovation has become embedded within the mainstream. Each group exhibits distinct traits and collectively shapes the trajectory of diffusion across the broader community (Rogers 1983).

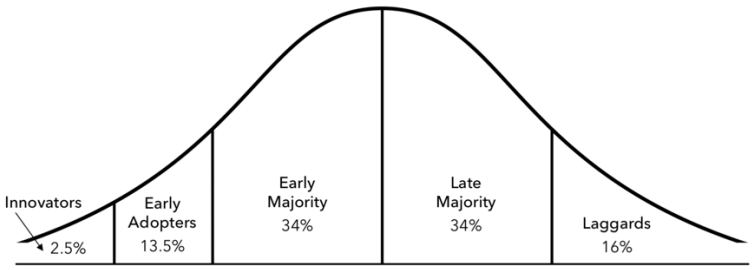


Figure 2: Diffusion of Innovations Curve
(Source: Rogers 1983, 281)

Importantly, Rogers (1983) draws a distinction between the overarching diffusion of innovations within a social system and the individual-level adoption process. While diffusion refers to the aggregate spread, adoption maps the psychological and behavioral journey each person undertakes traversing the stages of knowledge, persuasion, decision, implementation and confirmation. These sequential phases illuminate how individual choices aggregate to influence collective outcomes

4 Qualitative Approach: Developer Perspective

To move beyond the survey results from the quantitative phase, which primarily captured the customer perspective, this study adopts a qualitative approach to deepen understanding of the underlying mechanisms. Instead of focusing solely on outcomes, this second step looks at how professionals in interior design experience, interpret and justify their decisions in everyday practice (Gläser and Laudel 2010; Berger-Grabner 2022). For this purpose, empirical data was generated through semi-structured interviews (Berger-Grabner 2022). By combining structured guidance with open-ended questions, this format enabled in-depth insights into participants' experiences and perceptions (Gioia et al. 2012; Peters and Halcolmb 2015). The interview design followed the core dimensions of DOI theory but deliberately kept space for spontaneous developments and unforeseen perspectives to surface (Diekmann 2018; Rogers 1983). This approach ensured both comprehensive thematic coverage and the flexibility required for adaptive conversational exploration (Diekmann 2018).

4.1 Criteria for Selecting Interview Partners

To ensure the selection of interview partners was purposeful and methodologically rigorous, clear criteria were defined in direct alignment with the study's research objectives and the structure of the interview guide. Only professionals who were actively engaged in interior design practice at the time of data collection were considered, ensuring that participants possessed current and relevant industry expertise (Gläser and Laudel 2010). Particular emphasis was placed on identifying individuals with demonstrated experience in applying digital technologies (PropTech) in their work, as insight into this field was critical for addressing the study's core research question. Participants were carefully selected from companies of different sizes, ensuring a balanced mix of senior decision-makers from various firms and areas of specialization (Gläser and Laudel 2010). Potential interviewees were contacted approximately two months in advance, primarily via LinkedIn and email. They were

informed that their involvement was voluntary and confidential, provided explicit consent and were assured of full anonymity as well as compliance with data protection standards (Gioia et al. 2012). In line with the focus of the research question, the interview sample was restricted to interior designers operating in the German market. Although a larger number of practitioners met the general eligibility criteria, four experts were purposefully selected, as they offered the most relevant combination of professional experience, digital maturity and market insight for the aims of this study. The profiles and key attributes of these participants are summarized in Appendix 2. For reasons of confidentiality and analytical clarity, each expert is referenced using anonymized codes (E1-E4).

4.2 Execution and Data Preparation

The expert interviews were conducted as semi-structured interviews, grounded in DOI theory (Rogers 1983; Diekmann 2018). This theory-led approach enabled a flexible yet purposeful dialogue, allowing not only for responses to targeted questions but also for the emergence of unexpected insights and the pursuit of relevant follow-up questions. To ensure the clarity and relevance of the interview guide, it was piloted in a preliminary interview, which led to several necessary adjustments and refinements (Berger-Grabner 2022). The final version of the guide, used in all interview sessions, is provided in Appendix 1. The Interview questions were organized according to key DOI dimensions: relative advantage, compatibility, complexity, trialability and observability (Rogers 1983). This structure ensured a focus on both the benefits and challenges of digital tools in professional interior design practice. The interviews began with questions about participants' professional backgrounds and the role of digital tools in daily activities and then proceeded to the DOI framework topics. Each section encouraged reflection on digital tool integration, barriers, experimentation opportunities and outcome visibility. In addition to the DOI categories, questions also addressed external and organizational influences, future expectations related to PropTech and participants' advice for

the next generation of interior designers. This design provided a comprehensive overview of how PropTech is adopted, its influence on current practices and the factors shaping technology diffusion within the industry (see Appendix 1).

4.3 Data Analysis using the Gioia Method

The interviews were conducted online via Microsoft Teams, with each session recorded using mobile devices. Each of the four interviews lasted between 25 and 50 minutes. Audio files were transcribed using the software TurboScribe (see Appendices 6, 7, 8 and 9). The resulting transcripts were imported into the qualitative data analysis software MAXQDA for systematic coding and examination. The analysis followed the multi-stage framework of the Gioia method, a qualitative approach specifically designed to trace the evolution of inductive theory from empirical data (Gioia et al. 2012). Rather than applying predetermined theoretical models, this procedure enables the identification of new themes and interrelationships, with a strong emphasis on participants perspectives and language (Gioia et al. 2012). In the first phase, known as first-order analysis, segments of the interview material were coded based on terms and concepts explicitly articulated by interviewees (Gioia et al. 2012). This inductive step led to the emergence of 274 initial first-order codes. Next, these codes were compared and progressively clustered into higher-level, second-order themes (see Appendix 7). This phase involved moving beyond descriptive coding towards the formulation of broader concepts that reflect deeper structures and meanings within the data. The process was iterative and continues until no new relevant themes appeared, indicating theoretical saturation (Gioia et al. 2012). Once defined, second-order themes were consolidated into aggregated dimensions, which serve as key pillars of the resulting data structure and form the basis for schematic representations typical of the Gioia method (see Appendix 8). This visual mapping of dimensions, patterns and connections enables the final step: the construction of a grounded,

dynamic theoretical model that clearly depicts the underlying relationships using directional arrows (Gioia et al. 2012).

4.4 Findings

This section presents a detailed examination of the key findings from the expert interviews. The analysis is structured according to the predefined thematic areas, enabling deeper insights into the developers' perspectives.

Company Profiles and Contextual Information

At the beginning of each interview, the experts were invited to describe themselves and the company they represent. The four participating experts reflect considerable organizational heterogeneity (see Appendix 2), ranging from micro-enterprises (E1, E4) to a medium-sized firm (E3) and a larger enterprise with more than 50 employees (E2). This diversity provides essential context for understanding differentiated digital adoption patterns. E1 runs a small residential design office in Wiesbaden with two employees, which she characterizes as "a small team" (E1). By contrast, E2 is managing partner of a Düsseldorf-based firm with 52 employees that operates across the hospitality, retail, healthcare, office and residential sectors (E2). E3, who founded her Frankfurt-based studio "to build an international interior design brand in Germany" (E3), oversees four full-time professionals working across Europe. E4, based in Neuss with one employee and two freelancers, focuses primarily on residential commissions (E4). Taken together, these variations in company size, market focus and team structure offer important contextual insight into the diverse ways digital tools are adopted and integrated within interior design practice.

Use and Adoption of Digital Tools

All experts acknowledge the growing importance of digitalization in interior design, yet specific integration strategies and adoption patterns are shaped by individual company

philosophies and operational environments. Expert 1, for example, describes an irreversible shift in her profession and remarks that it is no longer possible to imagine the work without the digital world (E1). Her firm employs a comprehensive range of digital solutions, including social media platforms, architecture-specific programs for digital sketching and visualization, VR, AR, as well as online configurators. E2 views digitalization as mainly driven by personal curiosity and a continual drive for efficiency. Although client expectations for modern visualizations play a role, he focuses on using PropTech to streamline processes rather than replace people (E2). He considers fears of automation to be overstated and emphasizes that his company now works entirely digitally across all creative and administrative activities, from design software to project management and accounting systems. For him, a fully digital workflow is a non-negotiable standard and a marker of professionalism (E2). E3 shares this ambition but explicitly links it to a mindset of continuous improvement, captured in her question: "You need the mindset: I want to make this better. How can I make it better?" (E3). This attitude guides the integration of digital tools across all areas of her practice, from mobile access to project data to a software ecosystem that includes AutoCAD, AI-enhanced Photoshop and collaborative platforms such as Rayon (E3). E4, by contrast, pursues a selective and strongly client-oriented approach, employing digital tools only when they demonstrably add value. She notes, "[…] we use 3D visualizations about half of the time, depending on the client's needs" (E4). Taken together, these examples highlight how individual company philosophies, operational contexts and client orientations shape the ways digital tools are adopted and integrated in interior design practice.

Perceived Benefits (Relative Advantage) and Drawbacks

Across all interviews, experts reported that clients generally respond positively to digital tools, particularly because visualizations are improved and decision-making is made easier. E1 highlights that "[…] digital visualizations really excite people" (E1), as they stimulate

imagination and increase clients' willingness to invest. In particular, digital presentations make interior spaces more tangible and often accelerate the decision-making process. Nevertheless, it should be noted that older or less tech-savvy clients may initially struggle with digital formats (E1). E2 similarly emphasizes that visualization technologies improve clients' understanding of design concepts and provide a more realistic impression of the anticipated outcome (E2). However, these benefits also introduce new challenges, such as compatibility issues with file formats and the risk that hyperrealistic renderings may create overly high expectations. Managing these challenges requires careful communication throughout the project (E2). According to E3, cloud-based solutions and continuously updated digital documentation increase transparency, reduce follow-up questions and foster client trust. However, these advantages depend on a reliable technical infrastructure and clients' basic digital literacy (E3). E4 adopts a more nuanced stance, arguing that digital tools do not generate universal benefits but are highly context-dependent, with outcomes varying considerably across projects (E4). Ultimately, whether clients perceive digital tools as beneficial depends less on the technologies themselves than on designers' ability to communicate their value and on clients' willingness to engage with them (E4).

Compatibility

When asked whether workflows needed to be adapted to ensure the successful implementation of digital technologies, all experts described a gradual and pragmatic transition. E1 explained that manual drawing still plays an important role but is now supported by specialized software, whereas E2 considers hand drawing largely outdated and expects projects to be developed directly with digital tools (E1, E2). E2 confirmed that the shift to digital tools, including the use of AI, had not led to staff reductions but instead improved the efficiency of existing processes. He emphasized that the transition occurred incrementally: "We adapted step by step whenever new tools made sense or improved existing processes. […]. It evolved organically"

(E2). E3 described an even more profound change within the organization: "[…] our working world has changed completely" (E3). According to her, this process was strongly accelerated by the pandemic, which required new routines for digital collaboration and forced the team to continuously adjust. Overall, the experts indicate that adapting workflows to digital technologies represents less a radical transformation than an organic, step-by-step process.

Complexity

For E1, adopting digital tools has been demanding due to the complexity of architectural software. She notes: "Learning architectural software is demanding; you need real commitment and time because the functions are complex and the programs extremely versatile" (E1). Advanced 3D design tools remain challenging and require additional training (E1). E2 similarly emphasized that the ongoing costs for software licenses and hardware represent a considerable financial burden, a concern echoed by E3. E3 reports that rising IT and software expenses place significant pressure on the firm's budget. At the same time, she observes that digital documentation can strengthen client relationships by providing transparency and clarity. However, older clients frequently struggle with digital channels and therefore need more personal assistance (E3). E4 notes that this generational difference extends to designers as well: younger colleagues adopt new tools more quickly, whereas her own generation requires more time and guidance. She therefore argues that the value of digital tools depends largely on both the designer's competence and the client's openness (E4).

Trialability

The ability to practically test digital tools emerged from the interviews as a key requirement for successful adoption. E1 emphasizes the importance of first testing new software on small internal projects in order to gain confidence in using its features. Demo versions provided by manufacturers help to realistically assess fit and functionality (E1). She also stresses the

importance of ongoing professional exchange, noting that continuous development in this line of work is closely linked to learning from contact with other firms (E1). E2 likewise highlights the value of early, hands-on experience and regards structured pilot projects and targeted trainings as effective means of significantly lowering entry barriers. At the same time, he considers it essential to stay up to date through newsletters, professional forums and regular IT briefings (E2). While E4 supports structured pilot projects and communication-intensive training, she also points to a frequently underestimated challenge. In her opinion, cultivating motivation and overcoming resistance among hesitant team members is crucial for the successful adoption of digital tools (E4).

Observability

Regarding the observability of digital practices, the experts offer distinct perspectives. E2 emphasizes that digital visualizations and VR tours can convey a more professional image ”[…] because clients feel they fully understand the project“ (E2). Such digital presentations make results clearer and decision-making easier, yet E2 cautions, creativity ”[…] happens in the mind, not in the tool“ (E2), underlining that technology itself does not guarantee creative output. Similarly, E3 views digital visualizations as instruments that bring clarity and efficiency, helping clients make quicker and more confident decisions while setting clear expectations and fostering trust (E3). By contrast, E4 experiences little demand for detailed 3D visualizations in her work. She observes that analogue methods align well with both her clients’ preferences and her own professional approach and notes that they remain important in specific areas of the profession (E4). Overall, the experts agree that digital presentations can make results more visible and decisions easier. However, the creativity and unique character of a project ultimately depend on the designer rather than the tools used.

External and Organizational Influences

Digital adoption is neither determined solely by organizational scale nor isolated from market pressures, rather, it emerges from the interplay of internal capabilities and external market demands. In this context, firm size is often considered a key factor, yet the experts diverge on its actual influence on the extent to which digitalization is advanced and embedded in the company (E1, E2, E3). E1 explicitly challenges the assumption that large organizations naturally lead in digital innovation and remarks:" I don't think big firms are automatically ahead in terms of digital tools" (E1). She argues that agility and openness distinguish her small firm, whereas many established interior design firms tend to rely on reputation and long-standing routines rather than continuous digital advancement. In contrast, E2 stresses that larger firms are structurally better equipped. They can draw on in-house IT departments, specialized staff and more generous budgets, which together enable more extensive and technically sophisticated implementations than those typically accessible to independent practitioners. E3 integrates these views by arguing that project type and team composition are more decisive than company size alone (E3), suggesting that organizational flexibility matters more than absolute scale. However, organizational factors operate within an increasingly demanding external environment. E2 identifies client expectations as a primary driver. Clients now consistently demand modern visualizations and digital flexibility, compelling firms to adopt advanced rendering and project management capabilities. E3 further notes that the COVID-19 pandemic acted as an external catalyst that substantially accelerated digital transformation processes. In addition, E4 highlights a further source of competitive pressure. Market competition from furniture retailers offering affordable 3D renderings has begun to push smaller studios to expand their digital offerings, although adoption remains highly context-dependent (E4).

Future Perspectives

Looking ahead, all experts predict a rising significance for digital technologies in interior design, though with varying degrees of enthusiasm and emphasis. E1 and E3 both describe digital tools and visualizations as indispensable for contemporary practice. E1 encourages newcomers to ”Just do it: learn, try things out, implement. It’s the future“ (E1), while E3 anticipates that AI will facilitate further technical planning and efficiency improvements without supplanting human creative ideation (E3). E2 similarly underscores adoption urgency while noting that critical design judgment and experience remain irreplaceable. He demonstrates optimism regarding the rapid advancement of AI tools while acknowledging that creative competence and human-centric capabilities will assume heightened importance as technology advances. E4 articulates the most critical perspective on the expanding role of PropTech. She emphasizes that technological development velocity and tool complexity frequently present challenges for smaller firms. While E4 acknowledges the potential of future real-time visualization and more digitally integrated workflows, she insists that digital tools must demonstrate genuine intuitiveness and time efficiency to deliver tangible added value in everyday practice (E4). In sum, the experts anticipate a digitally intensified future for interior design, yet consistently stress that human judgment, creativity and contextual sensitivity remain central, a tension further explored in the following discussion.

4.5 Discussion: Integration of Qualitative Findings into Research

To integrate the interview findings more effectively into the research context, the Gioia method was applied to develop a multi-level data structure comprising first-order codes, second-order themes and overarching aggregate dimensions (Gioia et al. 2012; see Appendix 8). From these second-order themes, three central aggregate dimensions emerged: *Digital Transformation Readiness***,** *Value Creation and Strategic Recommendations,* and *Market Dynamics* (see Appendix 8). On this basis, a dynamic grounded theory model was developed. It illustrates how

Digital Transformation Readiness forms the foundation for Value Creation and Strategic Recommendations, which both shape and are shaped by Market Dynamics. Figure 3 summarizes the central drivers and relationships identified in this study that appear to enable the successful diffusion and integration of digital technologies in Germany's interior design sector.

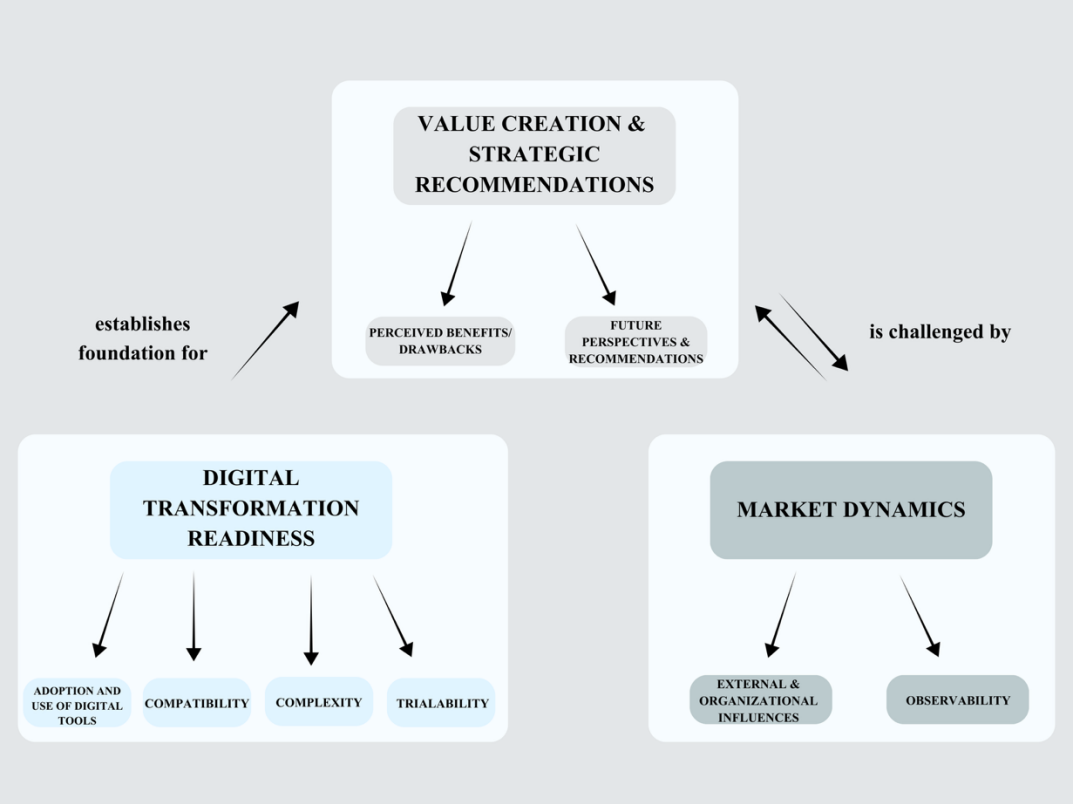


Figure 3: Grounded Theory Model
(Source: Own visualization according to the Gioia methodology)

The following sections provide an in-depth discussion of the aggregated dimensions, enabling a nuanced analysis of digital transformation in interior design from the developers' perspective.

Digital Transformation Readiness

Digital Transformation Readiness captures the internal digital maturity and adaptive capacity of companies in the interior design sector (Michelotto and Joia 2024). The self-developed concept builds on Rogers' (1983) theoretical foundations and comprises four central

dimensions: adoption and use of digital tools, compatibility, trialability and complexity which together determine an organization's capacity to integrate technological innovations. The interviews reveal a typical tension between innovation pressure and resistance. As E1 notes, the digital world is now indispensable, yet successful integration requires targeted training as well as a comprehensive cultural transformation within the organization. This aligns with Rogers' (1983) view that innovations diffuse gradually across social systems. The experts show differing adoption attitudes ranging from proactive learning (E3) to more hesitant engagement (E4), indicating that adoption is shaped as much by resources and mindset as by technological affinity (Michelotto and Joia 2024). Trialability emerges as a particularly important facilitator. According to E2, many individuals do not struggle with the tool itself but with the psychological barrier of trying something new, which pilot projects can help to overcome. This underscores the central role of structured experimentation (Rogers 1983). Compatibility**,** in turn, is strongly influenced by the strategic orientation of top management (Schmutte 2020). Clear leadership direction shapes employees' willingness to adopt new tools, although adoption cannot be expected to occur immediately, as E2 emphasizes. This resonates with findings that top management support primarily creates favorable conditions for change, but does not, by itself, ensure rapid adoption (Schmutte 2020). Individual openness also varies, with some employees preferring familiar routines while others actively pursue improvements (E3), reflecting micro-level differences in innovation tendency as outlined in adopter research (Rogers 1983). Tool complexity, particularly in architecture-related software, poses further challenges. Producing detailed visualizations is described as demanding and time-consuming (E1). Financial constraints add another layer of complexity. In some companies, IT expenses now even exceed the rent for the showroom (E3). This demonstrates that digital transformation is not a single, isolated project, but an ongoing financial and cognitive commitment. It also reflects current perspectives that understand digitalization as a continuous capability-building process

(Schmutte 2020). Based on the companies' varying levels of digital readiness, the four experts appear to correspond to different stages of Rogers' (1983) adopter typology, illustrating the heterogeneity of technological diffusion. E2 could be seen as an *Innovator*, with a strong technology-oriented approach, while E3 could be described as an *Early Adopter*, continuously evaluating new tools to enhance efficiency and quality. E1 can be aligned with the *Early Majority*, taking a pragmatic, peer-learning-based approach, and E4 with the *Late Majority*, adopting new technologies selectively and under time constraints. This classification shows that digital transformation progresses differently across organizations and that diffusion strategies must be tailored to each company's specific situation to ensure successful technology integration.

Market Dynamics

While Digital Transformation Readiness forms the foundation for Value Creation and Strategic Recommendations, Market Dynamics play an equally crucial role in shaping a company's strategic orientation. According to the grounded theory model developed in this study (Gioia et al. 2012), market dynamics consist of external and organizational influences as well as the observability of digital practices, which together determine how value is generated and which strategic measures companies undertake (see Figure 3). Market participants face increasing competitive pressure driven by emerging trends and ongoing digitalization (E2, E4). The interviews suggest that larger market players employ digital workflows as operational necessities (E3), which subsequently become industry norms. Interior designers are also pressured to expand their digital capabilities by furniture retailers offering affordable 3D renderings that raise clients' digital expectations (E2). Theoretically, this development can be understood as a consequence of innovation diffusion and rising competitive pressure in the industry, as digital solutions and standards primarily spread through social comparison and imitation in Rogers's diffusion model (Rogers 1983). Moreover, recent pandemic-related

changes have further accelerated the adoption of digital tools by forcing firms to reorganize (E3). Regarding the visibility and transparency of outcomes achieved through digital approaches, digital renderings and VR tours are perceived by clients as a clear indicator of enhanced professionalism, "[…] because clients feel they fully understand the project […]" (E2). This pattern of increased client satisfaction is reflected in the quantitative survey results, which show higher satisfaction levels among clients of interior designers who use digital tools (see Appendix 2). At the same time, demand for traditional visualizations such as hand drawings and material collages remains high, depending on the project, as E4 emphasizes. Taken together, these dynamics illustrate how both external pressures and perceived benefits shape the adoption of digital tools, which aligns with the Technology Acceptance Model positing that users are more likely to adopt digital tools when they perceive them as useful and easy to use (Davis 1989).

Value Creation and Strategic Recommendations

This final aggregated dimension addresses the perceived value creation of digital initiatives. It builds on Digital Transformation Readiness and is shaped by Market Dynamics. The focus lies on how interior designers generate value through the integration of PropTech, and which strategic measures emerge as the optimal response to the interplay between organizational maturity (Digital Transformation Readiness) and external pressures (Market Dynamics).

In line with Rogers's (1983) concept of *Relative Advantage*, innovations diffuse more rapidly when their benefits are clearly identifiable and aligned with users' needs. The interviews highlight the role of digital workflows in providing greater flexibility and improving client decision-making through visualizations. These tools help to make complexity more manageable and enable the parallel handling of multiple projects, resulting in a clear performance gain over sequential analog processes (E1, E3). Research on digital

transformation similarly emphasizes that workflow optimization and improved coordination are central drivers of value creation (Matt et al. 2015; Schmutte 2020).

At the same time, the findings make clear that PropTech not only creates value but also introduces new tensions and risks. E2 argues that current AI systems are not yet sufficiently mature for professional use. The issue lies not in a lack of basic functionality but in the inconsistency observed in iterative processes. As soon as parameters are changed, the entire generated image often shifts, making it practically impossible to achieve a result without other unintended changes to the room (E2). This challenges the assumed perceived usefulness and suggests that AI tools still do not provide the level of relative advantage that professional designers require (Davis 1989). Moreover, new technological dependencies arise, as E3 notes. Digital transformation thus presents a familiar trade-off, as efficiency gains come at the cost of increased vulnerability to system failures (Schmutte 2020).

Overall, the interviews indicate that PropTech and digital transformation are seen as essential and ultimately unavoidable, even though they do not produce exclusively positive effects (E1, E2, E3). Against this backdrop, the experts recommend a pragmatic, open approach to PropTech, encouraging experimentation and continuous learning to keep pace with rising technical complexity (E1). At the same time, they stress that technology should support rather than replace professional design expertise, since high-quality results still rely heavily on practitioners' experience and judgement (E2). The experts anticipate that digital tools will become standard expectations in interior design over the next few years (E2). In addition, they observe an emerging countermovement in which the human factor, particularly creative judgment and personal client interaction, may gain renewed importance (E2, E3).

Value creation in digital interior design therefore, does not arise solely from technology adoption, but from a thoughtful integration of digital efficiency gains with human expertise and client-centered interaction (Yanhua 2024).

5 Practical Implications

Building on the empirical findings, this chapter derives practical implications for how interior design firms can respond to digital transformation in the German market. Rather than offering a one-size-fits-all roadmap, it proposes guiding principles that can be adapted to different levels of digital maturity, strategic positioning and organizational context. In particular, the willingness and ability to engage proactively with digital transformation has emerged as a critical competitive factor, extending far beyond the mere adoption of technologies to encompass organizational culture and leadership. Firms are therefore well advised to work systematically with the conceptual models discussed in this thesis, such as DOI and TAM, in order to better understand how customer expectations, perceived usefulness and perceived ease of use translate into actual adoption behavior and how organizational conditions facilitate or hinder this process. Addressing the opportunities and challenges of digitalization thus requires a multi-stage, iterative approach.

Step 1: Assessing Digital Maturity and Adopter Type

At the outset, firms should conduct an honest assessment of their current technological infrastructure and operational processes. In addition, they need a realistic view of their adopter profile, since qualitative findings suggest that *Innovators* and *Early Adopters* tend to engage proactively with new tools, whereas the *Early Majority* and *Late Majority* rely more on proven success stories and peer experience. In practical terms, this means examining how well new tools fit existing routines, how complex they appear in everyday use and how much internal space for experimentation exists. A simple, institutionalized maturity scale ranging, for instance, from “analogue-dominated” to “digitally integrated” can help to structure this self-assessment and prioritize subsequent steps.

Step 2: Experimenting through Pilot Projects

The next step should involve targeted investments in digital pilot projects and continual expansion of the technology portfolio. Organizations are encouraged to experiment with a limited set of tools, such as advanced visualization software or online configurators, on a small scale as a way of building experience. Firms are therefore well advised to begin with a small number of clearly defined applications in order to test benefits and costs under realistic conditions and adapt internal routines step by step. Systematic training is critical to strengthening digital competencies and ensuring acceptance of innovative practices.

Step 3: Designing Segmented Client Experiences

At the same time, the TAM-based analysis points to the need for segment-specific, digitally mediated client communication and differentiated service offerings. Perceptions of usefulness and user-friendliness differ markedly by experience, age and technology affinity, which means that a single, standardized “digital client journey” is unlikely to meet expectations for all client groups. Younger, digitally confident clients often respond positively to more immersive formats such as interactive configurators or VR sessions, while less tech-savvy groups tend to benefit more from structured 3D renderings, guided screen-sharing meetings and clearly explained click paths. Interior design firms could respond by structuring their portfolio into modular packages ranging from “personally supported” (e.g. 3D visualization in face-to-face meetings) to “digitally intensive” (e.g. remote VR reviews and online configurators) and by communicating these options transparently.

Step 4: Strengthening Digital Competence and Client Guidance

The qualitative analysis further shows that the impact of PropTech depends strongly on designers’ ability to guide clients through digital processes. Investments in digital capabilities for instance, software training and the informed handling of data and feedback from platforms

feed directly into clients' perceptions of usefulness and ease of use. In addition, standardized yet adaptable "guided journeys" can help structure project workflows by specifying which digital tools are used at which stage and which decisions are expected on the client side. This could not only reduce uncertainty but also create a common reference point for internal coordination.

Step 5: Making Human Expertise Visible

The interview findings simultaneously underscore that clients experience digital tools as valuable aids for visualization and decision-making, but still regard personal consultation, empathy and the designer's professional expertise as indispensable. Interior design firms should therefore position PropTech explicitly as an extension, not a substitute, of their advisory and design profile. In practical terms, this implies deliberately combining digitally mediated touchpoints with analogue moments such as material samples, on-site visits or in-person workshops in order to build trust and foster long-term relationships.

Step 6: Measuring Impact and Embedding Continuous Learning

Finally, making the contribution of PropTech to value creation visible requires a metrics-oriented approach that is consistently linked to a learning mindset. Tracking such metrics over time helps firms to distinguish where digital tools genuinely streamline processes from where they merely add complexity and to refine their tool portfolio and ways of working accordingly. This internal measurement should be complemented by an outward-looking perspective. Continuous observation of market developments, emerging client needs and technological trends, supported by active exchange with partners, professional associations and educational institutions, enables firms to keep their digital strategy aligned with a moving environment.

In addition to these steps, this thesis provides further orientation for practice through a checklist for digital transformation in interior design (see Appendix 9). The checklist synthesizes the central empirical insights of the study and was refined in dialogue with expert E1 to ensure practical relevance. It is not intended as a prescriptive master plan but as an impulse and illustrative template that firms can adapt to structure their own transformation efforts in line with their specific context, strategic priorities and client base.

6 Limitations and Future Research

As with any empirical study, this thesis is subject to several limitations that shape the scope and interpretation of its findings. The mixed-methods design made it possible to look at the research question from multiple angles and to combine quantitative and qualitative approaches in a meaningful way. At the same time, this breadth inevitably came at the cost of analytical depth in some areas. The formal page limits of a master's thesis meant that not every facet of digital transformation in interior design could be examined with the desired level of detail. A more narrowly focused study, for instance concentrating solely on the impact of digital tools on client relationships or on internal adoption processes within firms, might have yielded deeper insights into specific aspects of the phenomenon. Moreover, the quantitative strand relies predominantly on descriptive statistics and cross-tabulations. As a result, the identified relationships should be understood as exploratory patterns rather than as robust causal effects. As most respondents were recruited from the researcher's personal network, the sample is relatively homogeneous. To enhance external validity, future studies should incorporate a more heterogeneous and larger sample for example through industry platforms or representative panels. The overall sample size (n = 104) can also be considered limited, as a larger dataset would allow for more robust conclusions, particularly regarding subgroup comparisons.

In the qualitative component, future studies could employ a broader sampling strategy, for instance by including interviewees in different roles and hierarchical positions within interior

design firms, to further enrich the exploration of industry-specific challenges. Moreover, deeper segmentation by market or target group (e.g. B2B vs. B2C) offers additional potential for insight. Regarding the qualitative data analysis, it must be noted that the application of the Gioia method like all interpretive approaches entails inherent subjectivity, which is partly shaped by the researcher's prior knowledge and experience. Complementary methods, such as stronger intersubjective validation processes, could increase the reliability of future studies by minimizing bias and enhancing the robustness of findings.

Finally, the thesis is theoretically anchored primarily in TAM and DOI, reflecting the analytical choice to apply TAM to the customer perspective and DOI to the developer perspective, even though alternative allocations or a more integrated use of both frameworks would likewise have been conceivable. While these frameworks are well suited to analyzing acceptance and diffusion processes, they leave other perspectives, such as service-dominant logic or organizational change theories, largely unaddressed. Future research could combine TAM and DOI with such complementary lenses to capture additional dimensions of how PropTech reshapes interior design practice. Beyond these methodological aspects, the study is geographically and sectorally limited to the German interior design market, so the transferability of the findings to other countries or more internationalized firms remains uncertain. In addition, the results are time-bound, as rapid advances in AI-based and immersive PropTech tools are likely to change both the technological baseline and user practices. Future research could build on these findings by using larger and more heterogeneous samples and by conducting longitudinal studies that trace how Digital Transformation Readiness, customer expectations and Market Dynamics co-evolve within interior design firms over time. Comparative studies across countries and adjacent creative industries (e.g. architecture, product design and facility management) could clarify which patterns are specific to the German interior design market and which reflect broader digitalization trends.

7 Conclusion

"The greatest danger in times of turbulence is not the turbulence; it is to act with yesterday's logic." - Peter F. Drucker. This observation by Peter F. Drucker encapsulates the core challenge addressed in this thesis. In an environment of accelerating digitalization, interior design firms can no longer rely on established routines, analogue tools or traditional assumptions about client behavior. They should rethink how value is created, how technologies are integrated and how human expertise is sustained within digitally mediated processes. The theoretical and empirical work presented here reinforces Drucker's observation. The risk for interior design does not lie in digital transformation itself, but in the persistence of outdated logics of practice, organization and market engagement.

This thesis examined how PropTech is transforming interior design from customer and developer perspectives in the German market, drawing on a mixed-methods design that combines a TAM-based customer survey with DOI-informed expert interviews. This approach enabled digital transformation to be understood simultaneously as a matter of technology acceptance and as a diffusion process embedded within organizational and market structures.

Quantitatively, customers evaluate PropTech positively along the core TAM dimensions. Digital Tools such as BIM, 3D visualizations, VR/AR, online configurators and virtual staging improve understanding of design concepts, support more confident decisions and enhance overall project satisfaction. Ease of use, however, varies across segments, especially among older and less digitally confident clients who depend more strongly on guidance, so digital value creation ultimately hinges on clarity, transparency and support rather than technological sophistication alone.

The qualitative findings complement this perspective by showing how digital tools are embedded in professional practice and how adoption is shaped by organizational capacities and external pressures. Applying the Gioia method, the study develops a dynamic inductive

model with three aggregate dimensions: Digital Transformation Readiness, Market Dynamics, and Value Creation and Strategic Recommendations. Digital Transformation Readiness captures firms' ability to experiment with, integrate and govern digital technologies, revealing a spectrum from pioneering fully digital studios to cautious late adopters. Market Dynamics raise the baseline for professional practice through rising client expectations and digitally advanced competitors. Value Creation and Strategic Recommendations explain how firms translate these conditions into concrete digital offerings and positioning decisions. Digital tools generate real benefits only when their use is deliberately aligned with the firm's overall strategy. Both perspectives point to the central insight that PropTech does not replace human expertise but rather reconfigures its role within the design process. On the customer side, digital tools enhance engagement and understanding, yet trust-based consultation remains decisive. From the developer perspective, creativity, judgement and design sensibility retain their fundamentally human character. Sustainable value creation therefore depends on an appropriate balance between digital capabilities and continued investment in human skills and design practice. In this light, the true risk in turbulent times is not technological change itself, but the assumption that technology can substitute for human-centered expertise.

Overall, the findings suggest that interior design is moving from a phase in which digital tools were optional add-ons to one in which they have become indispensable, yet still depend on human skills and judgement. Firms that abandon "yesterday's logic" in favor of a reflective, client-centered and learning-oriented approach to PropTech are best positioned to turn turbulence into an opportunity for renewal.

8 Bibliography

Abasova, A., and E. Mamedov. 2025. “Analysis of Modern Development Trends in the Construction Sector.” *Economics of the Transport Complex*, 45: 184.

Ahsani, Majid, Sumarni Binti Ismail, Ali Al-Ameen, Maedeh Fereidooni, Roya Dadashzadeh, and Pouria Ahmadi. 2025. “Augmented Reality in the Interior Spaces: A Systematic Review.” *International Journal of Academic Research in Business and Social Sciences* 15 (1). https://doi.org/10.6007/ijarbss/v15-i1/24558.

Baum, Andrew, Andrew Baum, Andrew Saull. 2020. “PropTech 2020: The Future of Real Estate.” Oxford: *Saïd Business School, Future of Real Estate Initiative.* https://www.sbs.ox.ac.uk/sites/default/files/2020-02/proptech2020.pdf.

Berger-Grabner, Doris. 2022. *Wissenschaftliches Arbeiten in Den Wirtschafts- Und Sozialwissenschaften.* Wiesbaden: Springer Gabler. https://doi.org/10.1007/978-3-658-39586-5.

Bhandari, Harshil, Siddhant Daryanani, and Anilkumar Patel. 2024. “Augmented Realites: A Comparative Analysis of AR and VR Innovations in Interior Design by IJISRT.” *International Journal of Innovative Science and Research Technology (IJISRT)*. 9 (3): 868–873. https://doi.org/10.38124/ijisrt/ijisrt24mar1017.

Braesemann, Fabian, and Andrew Baum. 2020. “PropTech: Turning Real Estate Into a Data-Driven Market?” *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3607238.

Ching, Francis D.K., and Corky Binggeli. 2018. *Interior Design Illustrated*. 4th ed. Hoboken, New Jersey: John Wiley & Sons, Inc.

Davis, Fred D. 1989. “Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology.” *MIS Quarterly* 13 (3): 319–40. https://doi.org/10.2307/249008.

Davis, Fred D., Richard P. Bagozzi, and Paul R. Warshaw. 1989. “User Acceptance of Computer Technology: A Comparison of Two Theoretical Models.” *Management Science* 35 (8): 982–1003. https://doi.org/10.1287/mnsc.35.8.982.

Diekmann, Andreas. 2018. *Empirische Sozialforschung: Grundlagen, Methoden, Anwendungen.* Hamburg: Rowohlt Verlag.

Drucker, Peter. 1999. “Management Challenges for the 21st Century .” *HarperBusiness.* https://doi.org/10.4324/9780080942384.

Freepik. n.d. “Drafting Supplies Around Tablet.” Accessed October 9, 2025. https://img.freepik.com/free-photo/drafting-supplies-around-tablet_23-2147831917.jpg.

Gioia, Dennis A., Kevin G. Corley, and Aimee L. Hamilton. 2012. “Seeking Qualitative Rigor in Inductive Research.” *Organizational Research Methods* 16 (1): 15–31. https://doi.org/10.1177/1094428112452151.

Gläser, Jochen, and Grit Laudel. 2010. *Experteninterviews Und Qualitative Inhaltsanalyse Als Instrumente Rekonstruierender Untersuchungen.* Wiesbaden: VS Verlag.

Global Peter Drucker Forum. 2020. “Leadership Everywhere Means Reversed Leadership by Jane McConnell - Global Peter Drucker Forum BLOG.” Accessed October 20, 2025.

https://www.druckerforum.org/blog/leadership-everywhere-means-reversed-leadership-by-jane-mcconnell/.

Górska, Anna, Anna Mazurczak, and Łukasz Strączkowski. 2022. "Customer Preferences of Modern Technologies (PropTech) on the Primary Housing Market." *Scientific Papers of Silesian University of Technology Organization and Management Series* 2022 (162): 213–27. https://doi.org/10.29119/1641-3466.2022.162.12.

Grand View Research. 2024a. "Interior Design Market (2025-2030)." Accessed September 24, 2025. https://www.grandviewresearch.com/industry-analysis/interior-design-market-report.

Grand View Research. 2024b. "Interior Design Market Size, Share & Trends in Germany. 2024. " Accessed September 24, 2025. https://www.grandviewresearch.com/horizon/outlook/interior-design-market/germany.

Han, Fengyi, and Yaping Liu. 2021. "Indoor Intelligent Decoration System Based on BIM + VR Technology." *IOP Conference Series Earth and Environmental Science* 783 (1). https://doi.org/10.1088/1755-1315/783/1/012121.

Hanelt, André, René Bohnsack, David Marz, and Cláudia Antunes Marante. 2020. "A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change." *Journal of Management Studies* 58 (5). https://doi.org/10.1111/joms.12639.

Harwardt, Mark. 2020. "Digitalisierung in Deutschland – Der aktuelle Stand. " In *Führen und Managen in der digitalen Transformation*, edited by Mark Harwardt, Peter F.-J. Niermann, Andre M. Schmutte, and Axel Steuernagel, 17-34. Wiesbaden: Springer Gabler. https://doi.org/10.1007/978-3-658-28670-5_2.

Hendriyani, Annisa Nuzuliya Inayati, and Fristi Regiasty. 2022. "The Effect of Technology in the Development of Interior Design in Today's Digital Age." *International Journal of Design.* https://doi.org/10.34010/injudes.v2i0.7341.

Hildebrandt, Henry. 2004. "The Gaps Between Interior Design and Architecture." *DesignIntelligence.*

Hong, Ying, Maolong Peng, Lan Zhao, and SiJie Zhao. 2023. "Analysis of the Application of BIM Technology in the Combination of Interior Design and Smart Home." *Applied Mathematics and Nonlinear Sciences* 9 (1). https://doi.org/10.2478/amns.2023.2.00567.

IndiaMART. n.d. "MEP Design Engineering Services. " Accessed October 9, 2025. https://5.imimg.com/data5/FR/TS/HO/SELLER-11179692/mep-design-engineering-services.png.

Kamath, Karthik R., Komal Voichal, Kiran P., Kishor Mathad, Kavan Cariappa, Kartik Raikar Lavanya, and M. Nalini. 2025. "Innovative Virtual Interior Design Solutions: A Study on Visual Design Studio." *International Journal of Scientific Research in Engineering and Management.*

Karnowski, Veronica, and Anna Sophie Kümpel. 2015. "Diffusion of Innovations von Everett M. Rogers (1962)." In *Schlüsselwerke Der Medienwirkungsforschung*, edited by Matthias Potthoff, 97–107. Wiesbaden: Springer Fachmedien. https://doi.org/10.1007/978-3-658-09923-7_9

Kilmer, Rosemary, and W. Otie Kilmer. 2011. *Designing Interiors*. Hoboken, NJ: Wiley.

Kuula. n.d. “Header Image for Making Tours.” *Kuula Blog*. Accessed October 9, 2025. https://blog.kuula.co/assets/make-tours-1-2/header-2.jpg.

Law, Brandon. 2010. “The Drucker Difference: A New Era in Management. ” *Claremont Graduate University*. Accessed November 7, 2025. https://www.cgu.edu/news/2023/01/the-drucker-difference-a-new-era-in-management/.

Lesmana, Vania Azalia Audrey, Antonetta Tina, and Sugesti Retno Yanti. 2024. “Optimizing AI’s Role in Advancing Interior Design Industry.” *Journal of Artificial Intelligence in Architecture* 3 (2): 61-71. https://doi.org/10.24002/jarina.v3i2.7908.

Matt, Christian, Thomas Hess, and Alexander Benlian. 2015. “Digital Transformation Strategies.” *Business & Information Systems Engineering* 57 (5): 339–343. https://doi.org/10.1007/s12599-015-0401-5.

Michelotto, Flavia, and Luiz Antonio Joia. 2024. “Organizational Digital Transformation Readiness: An Exploratory Investigation.” *Journal of Theoretical and Applied Electronic Commerce Research* 19 (4): 3283-3304. https://doi.org/10.3390/jtaer19040159.

Moring, Andreas, Lukas Maiwald, and Timo Kewitz. 2018. *Bits and Bricks: Digitalisierung von Geschäftsmodellen in der Immobilienbranche.* Wiesbaden: Springer Gabler.

Nakonz, André. 2023. “Die Architektur der Daten: Neues Bauen im digitalen Zeitalter”. *The Interdisciplinary Journal of Image Sciences* 38 (2): 17-26. https://doi.org/10.1453/1614-0885-2-2023-15725.

O’Dea, Michael, Xue Zhou, Da Teng, Darren Mundy, and Tanko Ishaya. 2024. “Editorial: ‘Are Technology Acceptance Models Still Fit for Purpose?’*” Journal of University Teaching and Learning Practice.* 21 (08). https://doi.org/10.53761/1bdbms32.

Parlangeli, Oronzo, Stefano Guidi, Paul M. Liston, Enrica Marchigiani, and Andrea Zucchiatti. 2019. “Shopping Online and Online Design: The Role of Prospective Memory in the Use of Online Product Configurators.” *CHItaly ’19: Proceedings of the 13th Biannual Conference of the Italian SIGCHI Chapter: Designing the Next Interaction*. https://doi.org/10.1145/3351995.3352051.

Peters, Kath, and Elizabeth Halcolmb. 2015. “Interviews in Qualitative Research.” *Nurse Researcher* 22 (4): 6–12. https://doi.org/10.7748/nr.22.4.6.s2.

Plan7Architect. n.d. “Choose Materials and Textures to Customize Floors, Walls and 3D Objects Individually for a Realistic Representation of Your Design.” Accessed October 9, 2025. https://plan7architect.com/wp-content/uploads/2025/02/Choose-materials-and-textures-to-customize-floors-walls-and-3D-objects-individually-for-a-realistic-representation-of-your-design.jpg.

Qian, Baiying, and Chonlavit Sutunyarak. 2024. “Factors Affecting Virtual Reality Interior Design Products Acceptance Behavior of Consumer from Shenzhen City, China.” *Journal of Electrical Systems* 20 (6s): 853–879. https://doi.org/10.52783/jes.2767.

Rajab, Mohammed, Amna Rafi Chaudhry, and Merin Cherian. 2019. “The Development of 3D Visualization and Its Potential Impact on Interior Design and Its Clients.” *2019 Sixth HCT Information Technology Trends (ITT)*. https://doi.org/10.1109/itt48889.2019.9075098.

Rogers, Everett M. 1983. *Diffusion of Innovations*. 3rd ed. New York: Free Press.

Sadiku, Matthew N. O., Shumon Alam, and Sarhan M. Musa. 2018. “3D Visualization Technology.” *International Journal of Engineering Technologies and Management Research* 5 (5): 93–95. https://doi.org/10.29121/ijetmr.v5.i5.2018.230

Schmutte, Andre. 2020. “Digitale Transformation – Trends, Mythen und Konsequenzen für das Management*”*. In *Führen und Managen in der digitalen Transformation*, edited by Mark Harwardt, Peter F.-J. Niermann, Andre M. Schmutte, and Axel Steuernagel, 35–66. Wiesbaden: Springer Gabler. https://doi.org/10.1007/978-3-658-28670-5_3

Siniak, Nikolai, Tom Kauko, Sergey Shavrov, and Marina Ninoslav. 2020. “The Impact of PropTech on Real Estate Industry Growth.” *IOP Conference Series: Materials Science and Engineering* 869: 1–11. https://doi.org/10.1088/1757-899x/869/6/062041.

Skipworth, Scott, Fiona Chatteur, Mary Lou Maher, and Tony Jan. 2025. “The Acceptance of Artificial Intelligence (AI) by an Australian Interior Design and Design Education Community*.” International Journal of Design Creativity and Innovation* 13 (2): 93–113. https://doi.org/10.1080/21650349.2025.2471297.

Sonpol, Nader Badawy Ahmed, and Zeinab Lotfy Abd El-Hakeem Khalifa. 2024. “Artificial Intelligence Tools for Generating Design Alternatives for Interior Spaces – Literature Review.” *2024 International Conference on Decision Aid Sciences and Applications (DASA)*. https://doi.org/10.1109/dasa63652.2024.10836356.

Starr, Christopher W., Jesse Saginor, and Elaine Worzala. 2021. “The Rise of PropTech: Emerging Industrial Technologies and Their Impact on Real Estate*.” Journal of Property Investment & Finance* 39 (2): 157–169. https://doi.org/10.1108/jpif-08-2020-0090.

Stieninger, Mark, Andreas Auinger, and René Riedl. 2019. “Digitale Transformation Im Stationären Einzelhandel. *Wirtschaftsinformatik & Management* 11 (1): 46-56. https://doi.org/10.1365/s35764-018-0152-4.

Tagliaro, Chiara, Alice Paola Pomè, Alessandra Migliore, and Vitalija Danivska. 2025. “Technology ‘Like a Fork’: How PropTech Shapes Real Estate Innovation.” *Journal of European Real Estate Research* 18 (1): 4–26. https://doi.org/10.1108/jerer-05-2024-0035.

Tukur, Muhammad, Yehia Boraey, Sara Jashari, Alberto Jaspe Villanueva, Uzair Shah, Mahmood Al-Zubaidi, Giovanni Pintore, et al. 2024. “Virtual Staging Technologies for the Metaverse.” *2024 2nd International Conference on Intelligent Metaverse Technologies & Applications (iMETA).* https://doi.org/10.1109/imeta62882.2024.10807986.

VividWorks. n.d. “3D Product Configuration & Instant Quoting.” Accessed October 9, 2025. https://www.vividworks.com/.

Wu, Shuang, and Sangyun Han. 2023. “System Evaluation of Artificial Intelligence and Virtual Reality Technology in the Interactive Design of Interior Decoration.” *Applied Sciences* 13 (10): 1–13. https://doi.org/10.3390/app13106272.

Yanhua, Liu. 2024. “Research On The Application Of Artificial Intelligence in Interior Design”. *International Journal Of Science And Engineering Applications* 13 (7); 24-29. https://doi.org/10.7753/ijsea1307.1007.

9 Appendices

Appendix 1: Interview Guide

Company Profiles and Contextual Information

1. To start, could you briefly introduce yourself and describe your current role? (Age, position, number of employees in the company)
2. In which areas of interior architecture is your company mainly active, for example residential, commercial, or office sectors and how large is your team?

Use and Adoption of Digital Tools

3. How important are digital tools in your daily work, and which digital tools (e.g. BIM, VR, AR, online configurators) do you currently use, and in which specific areas?
4. How did it come about that you started using these tools was it your own decision, a client request, or a specification from the company?
5. How has your work process changed as a result of using digital technologies?

Perceived Benefits (Relative Advantage) and Drawbacks

6. What advantages do digital tools offer compared to traditional working methods?
7. Do you have the impression that digital tools improve customer satisfaction or decision-making processes?
8. What are the general responses from clients regarding the use of digital tools, or have you encountered any complications with digital technologies in your work?

Compatibility

9. Did you have to adapt your workflows in order to use these technologies successfully

Complexity

10. How easy or difficult was it for you to get to grips with new digital tools, and what technical, time related or financial challenges have made their use more difficult?

Trialability

11. How do you keep yourself up to date regarding new digital tools and developments in this field?
12. Did you have the opportunity to test or try out new tools before fully integrating them into your projects?
13. Do you think that more training or pilot projects would help more designers to use digital tools?

Observability

14. Do you believe that digital presentations for example, VR tours make your work appear more professional or creative?

External and Organizational Influences

15. How supportive is your professional environment or your company when it comes to adopting new technologies?
16. Do you observe differences between larger offices and self-employed designers in their use of digital tools?

Future Perspectives

17. How do you see the future role of digital technologies in interior architecture?
18. Which technologies do you think will be especially relevant in the coming years?
19. What advice would you give young interior designers with regard to digital tools?

Appendix 2: Table of Anonymized Interview Participants

	Age	Gender	Position	Number of Employees	City
Expert 1 (E1)	55 years	Female	Owner	2	Wiesbaden
Expert 2 (E2)	54 years	Male	Managing Partner	52	Düsseldorf
Expert 3 (E3)	61 years	Female	Owner and CEO	4	Frankfurt
Expert 4 (E4)	62 years	Female	Owner	1 and 2 freelancers	Neuss

Appendix 3: Interview 1

Interviewer: Let's get started. Could you briefly tell me about yourself and your current work. What exactly do you do?

Expert 1: I'm 55 years old and have been working as a freelance interior designer in Wiesbaden for nearly 15 to 16 years.

Interviewer: Okay, and in which areas of interior design are you mainly active? Residential, commercial, or office spaces?

Expert 1: Primarily in residential projects. However, I've also designed office spaces, as some clients for whom I did the home interior trusted me enough to let me handle the office design as well.

Interviewer: Cool. And how many people are on your team? How big is your company?

Expert 1: There are just two of us.

Interviewer: Great. What role do digital tools play in your daily work? Which digital tools do you use?

Expert 1: You simply can't imagine the work without the digital world today. We use design programs that need to be continuously improved, especially as AI technologies are advancing

so rapidly. This way, we can always offer clients the latest standards. We also use platforms like Instagram, TikTok, and LinkedIn at various levels, even VR, AR, and online configurators.

Interviewer: Do you use any special tools?

Expert 1: No, we primarily work with the standard architecture-specific programs. These are quite specialized and require proper training, especially regarding drawing and visualizing spaces. Things people know from mainstream media like Instagram, LinkedIn, and TikTok are more common among younger folks for presentation, but aren't suitable for professional work. Learning architectural software is demanding; you need real commitment and time because the functions are complex and the programs extremely versatile. In the past, these tasks were mostly for computer specialists and programmers; now, thanks to AI, some things have changed. AI systems already help with some jobs for instance, they can generate and design rooms from photos. Still, the results are often generic and rarely match specific customer wishes. The subtlety, the individuality, and the adjustments to each project's requirements still need human work. AI is a tool, but it doesn't replace creative, hands-on work. I still need to draw and design the spaces myself to truly meet my clients' expectations.

Interviewer: Got it. Was the use of digital tools something your clients increasingly requested, or was it company-driven?

Expert 1: Honestly, digital visualizations really excite people. Since I started integrating and actively offering them in my work, I've noticed a real increase in demand. Often when I meet with clients or their representatives, I get feedback like "You're really unique." That shows not everyone uses these possibilities. Previously, designs were done with pencils and paper; now it's digital. Sure, some clients are fine with just a conventional floor plan, but most have trouble really imagining the space. That's the main advantage: using digital sketches and visualizations, I make my interior design much more vivid and accessible. I'm not sure if you follow me on Instagram, but I often share work examples there.

Interviewer: Yes, I've seen them.

Expert 1: A good example is my "Perfection in Form" project, which I also posted on Instagram. It was an apartment in Wiesbaden, where I started with only a floor plan. The clients wanted an extremely minimalist look the rooms and walls should be kept plain, their old sofas and those distinctive round chairs were to be reused, and everything else was animated digitally. The bathroom is actually going to be built as rendered in the visualization. From experience, clients really appreciate presentations like these. Especially if someone's bought a new apartment, I can lay out the floorplan digitally and send photos or animations inclusive of which furniture from their previous place will be incorporated. People love that, and it really eases their decision-making.

Interviewer: Did your workflow have to change for this? How has your working process changed with digital technology? It's quite different from crafting everything by hand, right?

Expert 1: Of course, I still have to draw, but that's now done using dedicated software on the computer. Measurements are made digitally, and results are packaged for the client. It's not just about basic floorplans anymore: clients first get a mood board, then I can offer 3D visualizations, and, if they wish, even a personalized shopping list. For example, say a client has a student daughter and needs a more affordable setup I can provide a budget-conscious shopping list. The workflow is now more flexible and digital but remains fundamentally similar to before. The possibilities have increased, and I can respond even better to the client's needs.

Interviewer: So the workflow is basically the same for you?

Expert 1: Yes, but it's absolutely more demanding now. Producing a simple floor plan is quick and easy, but detailed visualization especially including furniture and other design elements is challenging and quite time-consuming. There's a lot of work behind each project to produce a realistic and attractive result.

Interviewer: Nice!

Expert 1: I don't know if my style actually suits your taste everyone has different preferences. For me, it's important that the design is modern, minimalist, and still has a cool edge. That's what makes a space special and authentic to me.

Interviewer: What do you think are the advantages of digital tools over conventional working methods?

Expert 1: Digital tools give us enormous advantages in interior design compared to classic methods. Through 3D visualizations and moodboards, we can offer clients very detailed previews of how rooms will look long before construction starts. That doesn't only save time, but also prevents costly errors, as everything can be digitally planned and coordinated up front. Digital tools open up much more creative freedom. We can try out different variants and react far more flexibly to individual wishes.

Interviewer: Do you get the impression that digital tools improve customer satisfaction or decision processes?

Expert 1: Absolutely, customer satisfaction has distinctly increased now that we work digitally. Visualizations help clients immensely they can imagine their homes, offices, or outdoor areas so much better. Many people struggle with conventional floor plans. Decisions are quicker and made more confidently because everything's so much more tangible and clear. More often than not, customers are enthusiastic and even willing to invest more because they see the possibilities and trust in our professionalism.

Interviewer: What are the general responses from customers when it comes to digital tools, or have you faced any complications or hurdles with digital technologies?

Expert 1: Of course, there are challenges. Not every client is immediately comfortable with digital solutions. Some older customers are skeptical or have a hard time following everything on screen. Sometimes there are technical hiccups like software issues. But overall, the benefits far outweigh the downsides and the outcomes almost always convince clients.

Interviewer: How easy or hard was it for you to pick up these new digital tools and get used to them? Was it a time, technical, or financial challenge?

Expert 1: Yes, absolutely. In every way it's a challenge.

Interviewer: How do interior designers in general keep up to date how do you stay on top of new digital tools and current developments?

Expert 1: You just have to keep evolving in this line of work, and you learn a lot through contact with other firms. Sure, it'd be amazing if there were an AI that could take care of everything, but right now, you still need a person bringing know-how. Particularly, clients sometimes want something really exclusive like a designer lamp or a unique sofa. Anything is possible, even at very high budgets. I see constant development, especially from manufacturers: a lot now offer ready-to-use 3D models of their furniture and lights, which can be dropped straight into my planning software. They do this intentionally because virtual visualization is becoming so much more important and demand keeps growing.

Interviewer: Did you have the possibility to test new tools before actually using them in your projects?

Expert 1: Yes, I usually get to try new tools on small internal projects before integrating them into client work. I take my time to get comfortable with new programs or features. Especially with visualization and presentation tools, it's vital for me to ensure everything works smoothly before presenting it to customers. Manufacturers often offer demo versions too, so I can find out if the software fits my workflow. That way, I'm confident with my tools before using them on client projects.

Interviewer: Do you think trainings, workshops, or pilot projects would make it easier for designers to use digital tools?

Expert 1: I think that would be fantastic. I mostly taught myself, but truthfully this is not for the faint of heart. It's extremely demanding: without patience, drawing basics, and a good sense for spaces, you'll struggle. It demands grit and expertise.

Interviewer: So you didn't do official trainings?

Expert 1: I taught myself step by step. Some programs have good tutorials, but mostly, you learn by working on actual projects, and there'll be bumps where you just have to power through. Without experience or technical know-how, you'll easily get lost. Going forward, I expect more providers will offer training and workshops so beginners have it easier. Maybe someday an AI will handle all that, but right now you need to put in the learning and practice effort.

Interviewer: Great! Do you think digital presentations like VR tours make your work look more professional or creative?

Expert 1: Definitely! Digital presentations especially VR tours make my work appear far more professional and creative. The stunning part is that clients really feel like they're moving through the planned space and experiencing every detail. It sparks new emotions and helps them understand the design much better.

Interviewer: How supportive is your professional environment/team when it comes to adopting new technologies?

Expert 1: As a small team, we're really open to new technology, which definitely sets us apart from many others.

Interviewer: Do you think there's a difference in the use of digital tools between smaller teams like yours and larger architecture firms? Do you feel big firms work more intensively with digital tech, or are other factors more important?

Expert 1: I don't think big firms are automatically ahead in terms of digital tools. Some famous firms like Pitbone or DuPont in America have enormous resources, but honestly, many rest a

bit on their established reputations and stick to classic methods. They do their drawing and bring fabric samples, which works because they're known for it, but it isn't necessarily innovative. A while ago, I redesigned a hunting lodge from scratch. At first it didn't look great, but with digital planning and animations including kitchen and wine cellar I could show the client what was possible. He was thrilled and never imagined the transformation. Presenting a complete concept rather than just a floor plan sells it: a sheet of paper hides a lot, but with photos and 3D visualizations, people get really excited and forget about price entirely. Everyone gets the floor plan, but with detailed animations and compelling visuals, you're genuinely a step ahead.

Interviewer: So you say digital technologies are definitely the future. How do you see their role in interior architecture going forward?

Expert 1: Yes, it's absolutely the future to use digital technologies in interior architecture.

Interviewer: Which technologies do you think will be especially relevant for interior design in the next few years? Any digital trends or tools you see as key for the industry?

Expert 1: Honestly, I can't say for sure because things are still developing. Some people I know are skeptical and stick to their familiar programs because it seems too much trouble. But among younger designers, there's huge enthusiasm for whatever's quick and new platforms like TikTok and Instagram play a big part and have a growing influence on the field. Overall, I think digital trends and social media will only become more important and it'll be essential to present and connect yourself in that space.

Interviewer: If you could give young architects or interior designers advice regarding digital tools, what would you say?

Expert 1: Just do it: learn, try things out, implement. It's the future. At university, the topic is often only brushed over. Students might be introduced to some software, but honestly, that's not how I design and present my ideas. The options are often clunky you can barely render

images or get creative visualizations; I don't find that appealing. I get much better results making a good floor plan and, like in the past, adding materials and colors. These new media and digital visualizations really engage people, and you can't ignore them any longer in our field. Anyone thinking about entering this area after studying should definitely dive into visualization and digital presentation it's absolutely worthwhile.

Interviewer: Fantastic thank you so much for your answers! That's all.

Expert 1: Thanks, happy to help.

Appendix 4: Interview 2

Expert 2: Hello.

Interviewer: Hello. First of all, thank you very much for taking the time to answer a few questions for our thesis. It really helps us get some internal insights on PropTech.

Expert 2: Glad to. I should ask right away what you include under PropTech. Do you mean AI in general or a specific area?

Interviewer: Digital tools in general.

Expert 2: All right. I would still differentiate a bit, because for me digital tools already include Photoshop. I would count it in because it is digital, and not only Photoshop. We also work with Archicad for CAD plans, and in both Photoshop and Archicad there are more and more hidden AI elements this year, sometimes more obvious, sometimes less. The same with Google Search these days. For weeks now the first response is always AI, which is a little annoying, but it still belongs in the picture. I would at least broadly include it.

Interviewer: We have prepared a guide and will go through the questions. Some things may already be answered along the way, but I will proceed as planned. To start, a quick introduction to you and your current role, including your age, position, and how many employees your company has.

Expert 2: I am the managing partner of a firm with fifty two employees, and I am fifty four.

Interviewer: Next, in which areas of interior architecture is your company mainly active?

Expert 2: Hospitality, which means hotels and gastronomy, retail, healthcare, office, and residential. And we do interior architecture only, which is important.

Interviewer: Perfect. Let us move to digital tools. How important are digital tools in your day to day work, which tools do you use right now, and in which parts of the workflow?

Expert 2: I can speak to that, focusing first on the rendering team. We work to produce three D visualizations. We start from an Archicad base model. Cinema 4D is our main rendering program. There is no AI implemented there yet. V Ray is our render engine. There are first efforts by Chaos, the parent company behind it. We also use Unreal Engine, which in combination with AI optimizes computations in the background, although we do not actively notice it. Our programs use ray tracing. Light hits an object, bounces, and carries color information or not. AI optimizes that ray tracing process. In daily work we do not notice it, except that the image finishes faster in the best case. That was Cinema 4D. Unreal Engine is also a digital tool in the broader sense for creating three D visualization. The advantage is that we are in a real time loop. If I change a material or swap out a chair, it appears in the finished image immediately in the best case. I do not have to wait and can forward the image right away. Photoshop is our post production or part of it. There I notice more and more that AI is entering, for example when isolating objects. Privately with photos, if I want to place myself into another background, like your blurred background right now, some AI is doing that automatically. It keeps getting better. Photoshop has always had tools like the magic wand to isolate elements, but AI is still imprecise. Recently I wanted branches in the foreground. Cutting branches with leaves by hand is a lot of work because every leaf must be cut individually and takes about forty five minutes. The AI did it in two seconds, but the result was too rough, so I had to do it manually. The hope is that in one, two, or three years, or even months, that gap will close. We have also tried to create renderings with AI in parallel in recent months. Sometimes the results

are good and realistic enough that a normal user would not notice the difference. Our problem is the iteration. AI works via prompts that we type. I describe the room in text, maybe add reference images, and it produces an image or a video that looks good, but the revision loops do not work. If we have a living room and the wood floor runs left to right in the image and I want it rotated by ninety degrees, achieving that without the room changing in other ways is practically impossible. So the benefit is not there for us yet. I recently scanned a hand sketch of a chair to be newly designed and asked the AI to make a three D chair from it. It did an okay job. The proportions were a bit different than the sketch, but acceptable. Then I changed the prompt and added that the chair should be in leather. It made it leather, but the chair also looked different from the very first version, and it changed the background because it received the word leather. Every small change breaks consistency. More generally, in interior architecture we also use AI in data processing and accounting. DocuWare is the system, and we also use Lexware and a costing program called Kobold. DocuWare and Kobold use AI in parts such as recognizing invoice numbers and codes. That works well because it is factual work. You scan data, codes, numbers, postal codes, bank codes, and the system recognizes them. We do that. There is a lot of development in AI for execution planning. You specify carpet and it lays it into the CAD plan and tells you it is forty five square meters and how much you need. The same with electrical. We do not use that because it is more for home use. You might use it when moving into an apartment for quick estimates. For us it is not precise enough. If we condense the nine HOAI phases into three, there is the creative phase, the technical phase, and the construction phase. AI tries very hard in the first phase and somewhat in the second. That part is numerical and in principle doable, but there is no program that truly replaces the architect or gives an architect three or five times the output by simply feeding the machine and getting reliable results. Developers claim it will work, but it is very error prone and follows a formula.

So AI is not truly usable for that yet. I would love it if the machine replaced parts of human work, but only in parts.

Interviewer: How did you come to adopt these tools. Was it your own decision, a client request, or a company directive?

Expert 2: The main motive was my personal curiosity and the ambition to stay on the technological cutting edge and deliver the best possible results. It was my own decision rather than a directive. External expectations matter a bit, since clients want modern visualizations and flexibility, but the impulse came from my interest in improving our work without losing sight of creativity. The goal is to make processes more efficient, not to replace people.

Interviewer: How did digital technologies change your workflow? And do you use them so they take work off your plate without replacing you?

Expert 2: It is an illusion to think they will take over everything. They mostly reduce effort in visualization. It is a tool that evolves. People once retouched by hand, then Photoshop arrived, some retouchers did lose jobs, but the tool changed rather than the need for human input disappearing. AI still needs to be fed. As I said before, it is not fine enough for our needs. If I prompt design me a restaurant in the style of the Guggenheim Museum, the image may look great. But if I then say it must have eighty five seats, which matters for us, it fails. As a tool replacement we do use it. For example here in Essen at the Variete we created a film for large LED columns. We generated the texture with AI. That worked well. But it did not replace a human. It replaced another tool.

Interviewer: So if a client says they want the hotel to look a certain way and you deliver a first draft, you might use a little AI support, but you create it yourselves rather than with AI?

Expert 2: If a client already specifies the exact product they want, they are usually in the wrong place with us.

Interviewer: Because you want to show ideas of what it could be.

Expert 2: Exactly. We live from ideas. Our core is not execution alone. Right now the programs do not serve professional users well enough. They are for home use. If you take photos of your bathroom and feed them in, it can generate three bathroom designs. That might work for you, but at our level of detail it does not. Also the same issue we see with social media applies. You enter a search term and you always get content personalized to you. AI cannot replace creativity because its data comes from people. It pulls from existing designs, which pushes uniformity. You cannot feed it so precisely that it turns your creative input into a faithful image. If I say leather chair, it thinks of dozens of leather chairs and produces an average. That leads to sameness at a time when people feel maximally individual. We already live in a uniform world. We played with it. We did a bathroom. After we asked for a loft touch, a wash basin ended up hanging from the ceiling, and it clearly used American data because the toilets were floor mounted, while in Germany they are usually wall mounted. It is not ready for precise use. Another office tried a green bar. The results looked like a blend of the six green bars trending on social media. It was copycat output.

Interviewer: Looking at digital tools more broadly and not just auto generated content, you do use various tools. For example, for furniture placement you place items yourself, but you still use tools to define how it will look.

Expert 2: Yes, but if you do placement with AI on a given floor plan and I do placement with AI on the same plan, we end up with the same placement. If I use my head and place items myself, you will never have exactly what I have.

Interviewer: When you do it yourselves, which tools do you use? More generally, which tools do you use?

Expert 2: CAD. For two D floor plans, sections, and elevations we use Archicad. For three D images of the space we use Cinema 4D and V Ray as the render engine. Both still work without AI. They could in theory become better with AI. For example AI could check for planning

errors. Say the code requires sockets to be at forty centimeters above the floor and we placed them at twenty five. The AI could flag an error. That would be useful, but it does not exist yet.

Interviewer: What advantages do digital tools offer over traditional methods?

Expert 2: We work fully digitally with the current state of the art. We are open to working with AI, but at present it is not yet good enough to earn a firm place in our process. Our setup is compact and digital. I am old enough to remember starting out when there were barely any drafting programs, and the early ones were very basic. They improved steadily, which is also our hope for AI. Everything in our office is digital. A colleague who sent a hand drawing to a client would be out of line. That is work like in the nineteenth century. About five years ago we also adopted digitalization and AI in accounting to avoid working like the country does on average and to be as digital as possible. We are fully digital across time tracking, scheduling, everything.

Interviewer: Do digital tools improve client satisfaction and decision making?

Expert 2: Yes, definitely. Clients are more satisfied because they can understand designs much better and get a realistic sense of the final result.

Interviewer: What feedback do clients give about digital tools, and what complications have you experienced?

Expert 2: Clients respond very positively because digital tools make designs easier to grasp. Complications arise when file sizes are too large or clients cannot open files properly. Sometimes renderings look so real that clients think the result already exists, so we need to recalibrate expectations.

Interviewer: Did you have to adapt your workflows to use these technologies successfully?

Expert 2: Yes, of course, but it was a gradual process rather than a sudden change. We adapted step by step whenever new tools made sense or improved existing processes. For example we integrated the rendering team more tightly because visualization now begins much earlier than

a few years ago. Data exchange is fully digital with central servers, automatic filing, and cloud systems. It evolved organically. We never said that from tomorrow everything is different.

Interviewer: How easy or difficult was it for you to learn new tools, and what technical, time, or financial challenges make their use harder?

Expert 2: For me it was not difficult, just time intensive. The biggest challenge is keeping up, because the programs evolve constantly. Technically the tools are stable today, but financially it is significant. Good software licenses and powerful machines are expensive and require annual investment. It is more a matter of priorities than ability.

Interviewer: How do you stay up to date on new tools and developments that could be relevant for you?

Expert 2: I follow newsletters from our programs and participate in a few forums on Reddit that focus on AI, including subgroups for specific tools. I use Stable Diffusion and Forge. There are frequent updates, and if you look away for a month the landscape changes. Two years ago when I started to explore AI seriously you had to check the hands in generated images. Five fingers were rare. Sometimes there were three, six, or eight. You could spot it instantly. Now I have a fast laptop at home that runs an offline AI, and I can generate images of people and landscapes that you cannot distinguish from real photos. That progress happened within months. A year ago people would have laughed at the idea of running it on a laptop. Next year it will probably run on a phone. That is the interesting part, because the mass of users is there. Anything you can use at home on a laptop has a potential user base of billions, so investment flows there. Niche fields like interior design come last because they are small markets. We even have a specialist who has lived online for decades. I hired him to brief me once a month on what is happening in AI worldwide. So I would say we keep our finger on the pulse.

Interviewer: Would more training or pilot projects help more designers adopt digital tools?

Expert 2: Yes, absolutely. Many do not fail because of the tool but because of the barrier to trying it. Training and pilots help show that these programs are not a threat but a relief. Once people get started they quickly see how much more efficient and precise the work can be.

Interviewer: Do you think digital presentations such as VR tours make your work appear more professional or more creative?

Expert 2: More professional for sure, because clients feel they fully understand the project. I am more cautious about creativity. That happens in the mind, not in the tool. A VR tour is a good aid but it does not replace an idea. What you show matters more than the medium you use.

Interviewer: Do you see differences between larger firms and self employed designers in their use of digital tools?

Expert 2: Yes, definitely. Larger firms are usually better equipped with IT structures, specialists, and budgets for software. Self employed designers often use simpler tools and must think harder about what is worth the cost. That does not mean their work is worse, but the technical depth and efficiency can differ.

Interviewer: How do you see the future role of digital technologies in interior architecture, and which technologies will be especially relevant in the next few years?

Expert 2: They will be unavoidable, just like Photoshop or similar tools are unavoidable today. Always as tools. Speed will change, so you may not need five or six people to produce the same number of images or videos, but people will still be behind the work. Otherwise you feed fragments from social media into a blender and out comes a neat looking result that looks like everything else. I once heard a leader of the German association of interior designers say that AI will take our jobs. I immediately thought that is the wrong way to see it. It will not take jobs outright. Error rates may drop and the business model will change. People seek individuality. A global interior design AI would risk industrialized sameness. I believe sales, client advisory,

and truly creative thinking will become even more important. You may not need someone to produce every technical plan in full detail, but you will need someone to check. Work will become more effective. In the end you still need people who can operate the tools and one essential thing that cannot be replaced. Humans are mostly emotional in their decisions. Presenting and selling a design idea remains a human to human issue, whether the idea is generated by AI or by a person. There is always a counter movement, and I think that human aspect will become even more central. Smaller studios already feel pressure because even kitchen stores can generate simple renderings at no cost, though at lower quality. They will have to reposition. We probably will as well. I have done this for twenty-seven years and I always ask whether we want to move with the times and work at the front or slowly slide backward. We choose the first.

Interviewer: It is helpful to hear critical points about digital tools and AI. What advice would you give to young interior architects regarding digital tools?

Expert 2: Learn to use digital tools as early as possible and do not be afraid of them. The programs evolve constantly, and those who stay open and curious have a clear long term advantage. At the same time do not rely only on technology. The most important tool is still your own mind and your design judgment. One more thought. If you have a planner who is twenty five and another who is fifty, and both work with AI support, the younger one still lacks the experience the older one has. Experience and the knowledge needed to do a good job are not replaced. We saw the same when moving from hand drawing to computers. Older colleagues were slower in software, but they had knowledge younger ones did not. AI can make people lazy. Our own behavior on social media shows that. For people who are not lazy that creates a real opportunity to stand out.

Interviewer: Yes, that is true.

Expert 2: For example, I do not actually use any program myself. Not Word, not Excel, nothing.

Interviewer: At least others in your office do, which is what matters.

Expert 2: Yes, and I push them to master the tools. I support them in everything even though I do not operate the programs myself, because I still know what is possible with them. That combination seems to work. Sometimes the team is the brain that translates, executes, and provides input. We even discuss AI from time to time, although I do not apply it myself. You do not have to use it to understand it, and I might be one of the few who do not use it, since most people can by now.

Interviewer: Great. Thank you very much for the insights. We can take a lot from this.

Expert 2: My pleasure.

Interviewer: Have a great day. Goodbye.

Expert 2: You too, goodbye.

Appendix 5: Interview 3

Expert 3: Hello.

Interviewer: Hello. First of all, thank you very much for taking the time to do this short interview with us again. As I mentioned earlier, our topic is PropTech and the use of digital tools by interior architects. Before we begin, we've prepared an interview guide, and I'd like to go through it with you. To start, could you briefly introduce yourself your current role, perhaps your age and position, how many employees your company has and in which areas of interior architecture is your company mainly active?

Expert 3: I run an interior architecture studio in the greater Frankfurt area, and we work across Germany and elsewhere in Europe. I have four full time employees. For an interior architecture firm, that's already on the larger side compared to many others. Most firms in our field are one or two person offices, or at the other extreme very large offices with 80 employees. Our size is

less common, but we need this many people to handle the volume of complex projects in both design and technical planning. With two or three people you simply couldn't keep up the necessary pace or manage projects of this size. So this is the "critical mass" you need which also means constantly carrying a large pipeline of work. That's the particular situation of our office. I've been doing this for almost 30 years. My original training is in textile engineering with a focus on design. Working in the German textile industry wasn't really an option at the time. I developed the Non Food business for Tchibo. Back then they had, essentially, three randomly sourced sweaters; my job was to build a strategic, conceptual product development approach really a business model for offering Non Food products across numerous retail locations. I did that, and before that I worked at Esprit while studying. Esprit is now a largely vanished brand, but in the 1990s it was a strong American fashion label we were in a pre Zara, pre H&M world (H&M existed, Zara wasn't yet in Germany). I headed the textile design department there. So I bring both a creative and a very technical background. Those two things motivate me and I believe they're central to our success today. You have to be both: an excellent process manager who integrates technical constraints into design work, and a designer with strong creative expertise. That dual capability is, I think, what makes our market position distinctive. I founded Add it ten years ago because I wanted to build an international interior architecture brand in Germany. Despite its size, Germany's interior architecture field is severely underexposed out of proportion to population, quality, demand, and purchasing power. It's just not proportional especially when you compare it with countries like Belgium, the Netherlands, France, or England, where interior architecture has a very different culture. I no longer harbor illusions that this will change in Germany; but it matters when considering our field and our work. If you look at the German market and ask where we stand and where we might go, you'd think it must be huge, with enormous latent demand. But that runs counter to German mentality. I'm turning 62. The company primarily focuses on interior architecture for private residences.

Interviewer: Excellent that's already a very helpful overview we can use for our write up. Let's jump straight into the use and introduction of digital tools. How important are digital tools in your day to day work, and which ones do you currently use?

Expert 3: That's a very good question, because our working world has changed completely. You could see it coming five years ago, but before COVID we were still "just" producing our plans digitally and focusing on paper reduction and clearer communication to manage complexity more efficiently in both design and technical planning. COVID changed everything dramatically, and our way of working accelerated sharply. We completely transformed our workflow. Paradoxically, COVID was very positive for us, because it changed how we think about complexity and how to manage it when you can't meet or constantly speak in person. Complexity is almost more important than visualization or technical planning, because that's what creates confusion for clients and interface issues which lead to misplanning, budget problems, and, above all, errors. Today we no longer create PDFs that we update after each decision. Instead, across all three phases concept design, technical planning, and detailed execution (e.g. built ins or custom furniture) we work in a single shared link. Everything lives in that link; as soon as we revise something, it updates automatically, and everyone can always access the latest state. I'd say this is the most significant change: complexity becomes manageable. It also lets us handle multiple projects in parallel. Because you're not tied to your desk, you can access the design, the technical plans, potential frictions, and interfaces from anywhere on site, in a meeting, at a furniture supplier zoom into details, and manage interfaces quickly and with little effort. That's the big difference from before. Some of these link documents run to 300 pages, with a table of contents and navigation you can jump into chapters and back to the overview. Compared to ring binders and loose papers I honestly don't know how we managed. It lets us work more accurately and better organized with far more people sometimes up to 120 people contribute to a project. That's a profound change it's really about

managing complexity. In the past, because you couldn't hold everything in your head, you could only handle one project at a time not four at different stages. Now everything is on my phone, iPad, or laptop, always with me. If someone asks, "Where exactly is the transition between parquet and stone?" or "Which side does this door open on?" I might not know by heart, and neither do they but we can check instantly and answer immediately. That has simplified coordination enormously and helps us keep control. There's also been a profound shift in the quality of visualization. Many architects I work with still produce very simplified, abstract technical plans and people then make decisions that go off course. Clients also find it hard to decide early on because they don't yet know, for example, which lamp will hang over the table, what size it should be, the table's dimensions, or exactly where it will stand even though, in shell construction, such decisions often have to be made very early. That's why we produce highly detailed visualizations of everything. On our website you can see a short project video if you pause it, you'll see a bathroom visualization I lay on the table, and in the video you see the realized bathroom. The view in the room is exactly the same as on the printed sheet. This enables clients to see every wall and the floor every detail and how they interact compositionally. It's labor intensive, and there are different approaches to doing it. We're constantly evolving. We tried doing it in 3D for a while. 3D quality has improved a lot. For example, what you see behind me is a 3D it looks like a photo of a room. We developed a hotel project because we wanted to push into that area. If the 3D is good enough, you can't tell it's not a real photo. Many companies use 3D to market products often badly, where you instantly see it's a render. But you can produce excellent quality today. However, it's very time consuming and only a few people can do it well. And 3D doesn't easily let me move into the technical layer. So we decided to take a different route. Five years ago I thought 3D was the way; now we do it differently. Over the years we've built extensive Photoshop libraries. We draw the architecture (walls, floor), then layer the visualization on top, and can remove it again.

That way, we can place the socket exactly where it belongs because we already positioned it in the visualization. In other words, we do two jobs at once. We also continuously scan the market. Right now we work with AutoCAD, the biggest and best known architecture program almost everyone uses it. That lets us exchange DWGs with other trades. It's complex, but the last 18 months brought a KI/AI based update that improved associativity. Cross references are critical: if I change something in one place with consequences elsewhere, it must update automatically there, too; otherwise I have to remember to change it in three views. Those linkages are now better: change a wall and the floor plan updates; change a thickness or move a window and the façade view updates (provided you've set the links). We're also observing another program, Rayon far more user-friendly and much stronger for collaborative work: three people can work on the same plan, and it updates instantly. It could replace our current setup, and it seems to require less specialized know how. Photoshop, too, has improved notably thanks to AI. We do a lot of image editing we photograph clients' rooms and then modify the images as photomontages. You can see clear AI driven progress: "Do this like so," and it produces better results than a year ago. So we're constantly on the lookout for tools that increase efficiency and quality or bring improvements to existing tools. They're indispensable now. I don't understand people especially in my age group who still draw by hand because they "never learned" the digital way. Then you have to hire younger staff who can do it. There's simply no alternative.

Interviewer: That's already great input and probably anticipates some of my next questions. On tools: do you use augmented reality to place furniture virtually? And what about Building Information Modeling that's probably a step earlier in construction do you use BIM in your office?

Expert 3: We achieve similar ends by different means. For example, big retailers like Maisons du Monde let you upload a photo and an AI suggests furniture we don't use that, because I'm convinced it can't, at least for now, support the level of design we offer. When we began with

3D, we also tried VR headsets. We found that this doesn't suit our clientele their personalities are different, and they're often older and more affluent not very receptive to that. Maybe that will change someday. I also noticed which is why we moved away from 3D that if the very first result looks too real, clients can't grasp that there's still an arduous, craft heavy process ahead. They lose understanding for costs, complexity, manpower, potential mistakes because the illusion suggests it's all very simple. So I'm a bit skeptical in our niche. That said, anything that genuinely gets us to a better result faster should be monitored and adopted.

Interviewer: Understood. My next question would have been how you came to adopt these tools was it your own decision or driven by client demands? And how have digital technologies changed your workflows?

Expert 3: One more point that matters across many professions and to me as a mother and a woman: these tools make remote collaboration feel natural. We can talk from Lisbon to Kronberg and not feel we need to be in the same room no sense of social isolation. Digital tools make cooperation and flexibility possible in new ways. For example, I really wanted a young mother to return to the firm. I told her I don't care when or where she works as long as she comes back through the door. Thirty years ago people would've laughed; in consulting it would have been unthinkable. So yes, part of this was intentional and part of it was a chronological development that COVID then accelerated sharply. I remember the very first video call it felt awkward. Today it's normal. Of course, among tradespeople there's still a generation that doesn't like reading emails. But in more professional settings, digital communication has grown so much that entirely new possibilities have opened up. Before, this would have been unimaginable. For me, it's all positive.

Interviewer: Great. I think you've already answered the question about the advantages of digital tools over traditional methods especially the ability to run multiple projects at once.

Expert 3: Yes and I'd add home office flexibility. Mothers can jump in and out of work without commuting. In short, people's lives have changed.

Interviewer: Right. Do you find that digital tools improve client satisfaction and decision making? What feedback do you get from clients?

Expert 3: Absolutely. The number of follow up questions to me has gone down because people can check things themselves in the link whenever they have a question. Our projects can last up to two years; it's a long collaboration, and trust grows over time. In our field, trust is crucial clients don't need to know every last detail of how something is done. If they trust you, they say, "She'll know what to do." The shared link, which lets them revisit details they've forgotten or never knew at that level, creates tremendous reassurance. Another factor, rooted in my design philosophy: interior architecture is not a matter of personal "style" it's about necessity and inevitability. Our approach to concept, visualization, and the tools we provide conveys that to clients far more convincingly. As a result, we now realize almost 100% of what we design exactly as designed. Previously that wasn't the case communication and expectations were vaguer. Now expectations, our work, and the final result sit very close together. That's a fundamental difference.

Interviewer: Have you experienced complications or hurdles with clients regarding digital tools?

Expert 3: Rarely. Some say, "I don't have a laptop, I only use a phone, and everything's too small." Then I suggest a larger screen or cast the link to the TV. "I can't do that either." So yes, sometimes, especially in my age group, people are hesitant they may manage an iPhone but little beyond that. Usually there are two decision makers, and the men often active in professional roles are familiar with these things. I don't see a serious, systematic problem. And clients are getting younger: for people in their 40s and 50s, this is completely normal.

Interviewer: That makes sense. Did you have to adapt your workflows to deploy these technologies successfully, or was the transition relatively smooth?

Expert 3: It was a gradual process no overnight disruption. We started with stopgap links when we couldn't travel to projects in Austria or to Sylt, then improved step by step. I've always been very open to technology. I still remember at Esprit when suddenly those little square Apple computers appeared; previously we didn't have them. For my thesis there was still the question, "Does this have to be typed on a typewriter?" The computer changed things but slowly, at first. So I'd describe it as step by step.

Interviewer: How easy or difficult was it to learn new tools, and what about the technical, time, and financial challenges?

Expert 3: I use everything, but I don't execute every step myself that's what the team is for. Many of these tasks involve a lot of clicking and practice. Some people prefer doing things the way they always have they're not open to technology and cling to the old; you have to push them. Others are naturally curious and constantly look for improvements. It's more a matter of temperament than age. Costs are high. Our IT costs, measured against the rent for our showroom, are now twice as high previously unimaginable. We've gradually raised our hourly rates; we regularly replace hardware and invest in the best monitors. There's no one and done; it's continuous. A positive side effect: the office is now largely paperless. We print far less than before. E invoicing and bookkeeping are fully digital. I work on a virtual desktop my "desk" with work folders is accessible from any device, anywhere. And if I'm in Portugal we have a little paradise there I just plug in and keep working as if I were here. That would have been unimaginable, especially with complex documents that you need to see in one place.

Interviewer: How do you stay up to date on new tools and developments?

Expert 3: Fortunately, one colleague treats this as a personal hobby always in forums, always scouting what's new, bringing impulses to the team. We also work with an IT company, because

we've become more vulnerable. Just the other week there was an Adobe Cloud issue; if that lasts more than a day, we feel it, because we often don't have static PDFs saved. You can export links to PDFs and work from those, print, or fall back on more old school approaches, but without a network below 5G it's tough. On site, I'll use a hotspot to get documents on a larger screen. If the network is shaky, that's a problem. So dependency has increased. We're waiting for fiber; the conduits are already in place. Security is a big topic: last year we had several DDoS attacks. It's not that our designs or client data are especially sensitive, but being taken offline would be painful. We invest in security. We moved our first in house server offsite into a data center. We started with one "fridge sized" device now we have three. It's all data, data and suddenly power and availability are crucial in ways they weren't when you were working with pencil and paper.

Interviewer: Were you able to test tools beforehand? Do you think more training or pilot projects would encourage wider adoption among designers or did you simply dive in?

Expert 3: We dove in and kept improving. That's my nature: do things as well as possible and keep making them better. If you compare our visualizations and the readability of our technical plans from five years ago to today, the evolution is enormous driven by that ambition. In theory, you can learn anything today. Often, people simply lack the drive and that applies to some team members, too.

Interviewer: So it's really about the general attitude.

Expert 3: Exactly. You need the mindset: "I want to make this better. How can I make it better?" Then you'll find people who show you how and you'll do it better.

Interviewer: I'd agree. It's a bit tragic, but you can't easily change people's nature.

Expert 3: No, certainly not.

Interviewer: I think you also answered whether digital presentation and tooling make the work appear more professional or more creative.

Expert 3: For me, “more creative” and “more professional” are different things. We start with a clear brief, it’s very analytical and textual at first and then we develop the first iterations, which I correct. I’m often surprised by what I have to correct and say, “You should have seen this yourselves.” Creative work needs someone, in our case, me as creative director, with a clear target and the ability to see when something is good or not. We experiment with AI now and then, but I find it can’t yet do this. You have to balance a set of somewhat abstract elements, priorities, proportions, I’d say maybe eight major dimensions that must be tuned ideally for each wall and then in three dimensions. That’s a form of talent; before there’s an AI that can do that, and also connect with the human for whom I’m designing, we have a way to go. Clients won’t tell you everything explicitly, “I always walk around my house naked,” or “I like doing this or that.” You have to discover what will make them happy in their daily life their functional and aesthetic needs by asking the right questions: where do they like to vacation, what landscapes fascinate them? You also have to link this to the place orientation, view, the architecture. Interior architecture improves the more inevitably all these elements cohere into something that feels “necessary,” like a natural landscape that no one designed and yet feels right. That takes talent, practice, and experience. What’s interesting is that by making all this visible with digital tools, even people who can’t do it alone can see why option A is better than B. The designer can ensure quality before presenting, and the client understands and if you can articulate the reasoning, decisions become easy. But I don’t think this can be taken away from people entirely. We always ask which professions AI will replace this isn’t one of the easier ones.

Interviewer: Fair point. Do you notice differences between larger firms and solo designers in their use of digital tools is there a size effect?

Expert 3: It’s hard to say, because I only see what collaborators do for example, architecture firms on build outs where we handle the interiors. There I see their deliverables and think,

“Wow,” but I don’t really see what peer interior designers are doing. My impression is that big, well known offices work digitally much like we do, while many smaller ones don’t. I still encounter interior designers at large furniture suppliers who send small hand drawings that still exists. The larger the office, the more digital collaboration becomes a necessity to coordinate work. In university programs (architecture/interior architecture), software skills are taught; but craft knowledge e.g. how a socket is constructed is not. They do learn design skills, but not enough technical content.

Interviewer: Finally, looking ahead: how do you see the future role of digital technologies in interior architecture, and which technologies will be especially relevant in the next few years?

Expert 3: I mainly expect easier execution of what we already do: producing realistic representations with less effort where I now need 20 hours, I’ll need eight. Efficiency will be a big theme. I also hope for AI in technical implementation. If AI could take our design and say, “Here’s the lighting concept,” and then generate the electrical plan switches, circuits, precise dimensions, clearances that would be fantastic. Translating design into technical plans is arduous; the creative input remains human, but the translation could be AI assisted. I’m also curious about technologies that address non visual senses. In interior architecture, tactility and scent are crucial to how a space feels. If there were ways to engage those senses more deeply in the process, that would be interesting to not just see that something will feel cool/warm or smooth/rough, but to actually sense it. In any case, there’s no end in sight. Every day I feel I have more control and oversight, and things don’t slip away from me because everything is digitally accessible. It’s hard to imagine working any other way.

Interviewer: One last question: what advice would you give young interior architects regarding digital tools simply to keep at it?

Expert 3: I’d have many pieces of advice and the biggest gaps aren’t in the tools. Access to software is relatively easy. What’s missing is everything else they should know.

I’d argue that education for young interior architects (and architects) should include far more on all the relevant factors starting with teaching design principles properly. They don’t learn that at all. So I see many things that need strengthening beyond the current curriculum far more than in digital tools per se. The deficits lie elsewhere.

Interviewer: Thank you so much for your time. We’ve reached the end of the interview guide this has been extremely helpful and valuable for us.

Expert 3: Of course my pleasure. I wish you the best of luck that you bring this to a good close and that your career continues just as you hope.

Interviewer: Thank you, and have a wonderful Friday and a great weekend. Goodbye it was a pleasure.

Expert 3: Goodbye likewise.

Appendix 6: Interview 4

Interviewer: Hello.

Expert 4: Hello. I have time right now and I hope you can understand me well.

Interviewer: That's perfect for me. I'm sitting here in a room at the library and I hope the acoustics are alright. Great! If you'd like, we can start right away. I suggest we go through the interview questions together, just to get an overview. Is that okay for you?

Expert 4: Yes, that's fine.

Interviewer: Excellent. Maybe you could start by telling me a bit about yourself and your current work. How many employees do you have and what is your position? And perhaps your age everything will of course remain anonymous.

Expert 4: Of course. I am 62 years old and a qualified engineer. I studied at the Peter-Bernd School of Art, which is now the university back then it was the University of Applied Sciences in Düsseldorf. Over the years, I have run my own business at different times and have taken breaks in between. I managed three different shared office spaces independently and with some

interruptions. Since 2017 so for eight years now I have been working completely on my own. Before that, I had business partners whom I worked with, either in partnership or within the office. But since 2017, I've been self-employed and have one salaried employee and two freelance staff members.

Interviewer: Great, thank you. Which area do you primarily focus on? Is it residential, commercial, or office projects?

Expert 4: We mainly operate in the private residential sector. However, we occasionally take on projects like setting up an occupational therapy practice or office spaces, including medical practices. These commercial projects come up from time to time, but the majority of our work is for private clients.

Interviewer: Okay. Do you already use digital tools in your work? If so, which ones have you integrated into your daily workflow?

Expert 4: That's an interesting point. Larger firms and architectural offices tend to use digital tools more extensively than we do, likely because we primarily serve private clients. We have been using digital drawing software like Vectorworks for a long time, mainly for 2D floor plans and elevations. We also offer 3D visualizations. However, clients often hesitate to invest in these costly visual presentations. Some trust our expertise enough to forgo them, while others prefer the 3D views to help with their decisions. So, roughly speaking, we use 3D visualizations about half of the time, depending on the client's needs.

Interviewer: So, it's basically the client who decides whether you use these tools or not.

Expert 4: Exactly. We don't offer it automatically because it always requires advance research. We always have to create a digital floor plan first. In our case, the programs are separated. We're not really proficient in Vectorworks 3D; that would require additional training. We can't simply switch from 2D to 3D at the push of a button. It's something that could certainly be sped up and streamlined. I actually don't produce any digital drawings

myself. That's handled by my employee. I simply don't have the capacity to get back into it. I focus on other tasks. But even she would need further training. That's why we've had a freelance collaborator for years now – she's excellent at it and can transfer our floor plans into 3D quite quickly, though of course it's not instantaneous. It still takes about three hours per room.

Interviewer: So, does that mean the overall workflow takes longer? Or how does it change the process? The workflow itself is longer, then?

Expert 4: It is possible with Vectorworks, but that's just my assumption. The tools themselves keep improving. I'm not even sure of the current state of Vectorworks 3D right now. We use Palette their 3D capabilities are quite impressive. But honestly, things are moving so fast in this field, it's hard to keep up with the latest developments. Maybe everything could be done much quicker now. The real issue is time; we simply don't have enough to get up to speed. As I mentioned, even without house moves or renovations, my schedule is packed. You really have to set aside time for this, which I rarely manage. Perhaps with more interest or motivation, I'd be more inclined to dive in. Personally, I need it to be more streamlined and intuitive easier to use before I'll spend time on it.

Interviewer: Would you still say there are any fundamental advantages to the new approach, despite its drawbacks? For example, does it increase customer satisfaction or improve decision-making processes?

Expert 4: Honestly, I don't think so. I really don't see any added benefit there. We can already present our work very effectively using PowerPoint. Of course, we can also do things with InDesign, and we have a variety of other ways to present our ideas these are more than sufficient for our clients. I don't get the sense that they're missing anything. We're able to convey the atmosphere very well as it is, and that's such a crucial aspect of our work. In fact, sometimes I feel that if presentations are too artificial, it can actually detract from the

atmosphere. Our presentations always incorporate a lot of our own creativity, combining high standards of aesthetics and individuality, which our clients really value. I do notice that the younger generation is moving more in the digital direction, though. However, both my colleague and I often find that university graduates haven't learned as much about digital methods as we would've expected. Most Bachelor's or Master's graduates actually familiarize themselves with specialized programs only once they start at major design firms, because they have no other option. So, in my view, there's still a lot of room for improvement at the university level, even for us and especially for junior staff. We had hoped to gain more digital insights by working alongside students and recent graduates, but unfortunately, that hasn't really happened so far. Regarding the quality of our presentations we're still very satisfied with our own methods. We're able to create an atmospheric and engaging experience for our clients that visually communicates exactly what we want to achieve.

Interviewer: Are there any groups or networks where you can exchange information about digital tools and stay up to date, especially given that most people only learn about these topics in larger firms, not at university?

Expert 4: To be honest, I really can't say for sure at the moment. I don't know what the current state is at the universities. From what I gather, different software is taught there like Rhino, for example. When my student assistant has to do certain tasks for me because my freelance colleague is unavailable or working on other projects, I'm sometimes surprised at how different the results are from what I'm used to. Our own 3D renderings are highly photorealistic, almost like actual photographs. So, from what I've seen, there are still real qualitative differences. This also becomes very apparent in graduation projects: it's easy to see who has taken the initiative to advance and deepen their skills, and who has remained at the university standard. In general, I see a need for academic programs to focus much more

on practical digital tools this is something I've noticed repeatedly when reviewing recent student work.

Interviewer: Do you think that more training or pilot projects could help interior architects use digital tools more widely?

Expert 4: Yes, but I think it still needs to be communicated and promoted much more effectively and honestly, I'm not sure how you actually reach people with these initiatives. I'm in touch with colleagues who work similarly to me, most of whom run very small studios or work entirely solo. For example, my best friend has a very high-profile clientele. I consider myself more of a "social architect." My aim is always to reach people who haven't previously worked with interior architects. That's also how I've set up my website: to lower the threshold and make it easier for them to get in touch. With my friend, it's a different story entirely. In her field, there's little demand or expectation for impressive 3D visualizations. She hardly ever uses 3D; instead, she sticks to traditional 2D wall elevations and material collages, leveraging her expertise to bring her presentations to life

and that works wonderfully for her. Of course, I can see the trend is moving toward 3D; there's no question about it. Eventually, it will probably become the norm. But right now, it's still not a major issue for us. Maybe it's because the technology needs to be made simpler, especially for people of our generation. It's just something I notice as with my sons, for example. When I ask them a digital question, they just roll their eyes and tell me to Google it. For their generation, everything happens quickly, almost automatically. Sometimes I wish they would take a moment to help me out, just like when kids ask their parents how to wash something or cook a meal. Or if something fits with my clothes I turn to them for insights, because I personally don't always know. And yes, I need to see things once, twice, sometimes three times before I really get it. Figuring things out on my own is challenging; I'd rather put in a bit of extra effort and do it my way. Honestly, I'm not sure how else to express it. This whole

digital world is quite tough for people of our generation. And I can say the same for my ex-husband, who's also an architect he doesn't use digital tools at all.

Interviewer: Yes.

Expert 4: The surprising thing is that outcomes with digital tools vary greatly. Not everyone is equally skilled at digital drawing or at using 3D tools in a way that successfully conveys atmosphere. There are huge differences depending on how individuals use these tools. I'm always struck by just how different the results can be especially when it comes to conveying atmosphere. The range is really astonishing.

Interviewer: So, a digital presentation doesn't always automatically look more professional or creative, just because digital tools were used?

Expert 4: Exactly.

Interviewer: And it doesn't automatically feel more atmospheric, exciting, or stylish either. That isn't always the case.

Expert 4: Yes, you can definitely say that. Regarding the future role of digital technologies in interior design: Personally, I see a lot of potential, especially in the context of residential consulting, which is my main focus. I offer consultation packages designed to make homes in Germany more beautiful. These packages are affordable, straightforward, and highly beneficial. I visit people's homes, help optimize their spaces, and sometimes digitally scan the existing furnishings.

I think it would be fantastic to have technical options that allow me to take a photo of a space and immediately make digital changes like removing, adding, or swapping elements—right there on the spot. This way, I could visually demonstrate updates in real time as I discuss ideas with the client. Do you understand what I mean?

Interviewer: Yes, exactly.

Expert 4: Many companies especially furniture manufacturers already offer these kinds of features. You can scan your living room and virtually place our furniture to see how it would look. That's exactly the kind of tool I'd love to have for my own work. If I could buy such a program, I would do it right away, as long as it comes with a versatile library that isn't limited to a single brand, but is broadly usable and flexible. It would also be extremely helpful if I could make edits in the photos themselves, such as retouching or removing items.

Interviewer: Yes, I can see the benefit in that.

Expert 4: These are just spontaneous ideas, but something like that would be a real asset.

Interviewer: And having a good variety of furniture options, right? Yes, that's understandable.

Expert 4: That would definitely win people over! During my on-site consultations, I could immediately create a digital protocol. Currently, my process is very efficient: I scan the living space and instantly identify what's missing or what could be improved but of course, that takes experience. All of this then needs to be documented so clients can follow along. While they could do it themselves, my service is to provide a complete evaluation afterward, including mood boards, specific furniture recommendations, and more.

If I could handle all of this digitally and in real time while I'm there inserting and visualizing changes directly into their photos the client would immediately get a clear sense of the possibilities. That would make the process much easier for both sides.

Interviewer: Very cool. So if you were to give advice to a young interior architect who's just graduated specifically about using digital tools and whether or not to adopt them what would you say? Maybe as a final thought.

Expert 4: I'd definitely encourage young professionals to start out in large firms, rather than going directly to small studios. In big offices, you really get to pick up important technical skills, since you work on larger projects and are immersed in all the digital tools, like 3D visualization and modeling. That foundational experience is extremely valuable large firms

really provide a great technical grounding. Almost everyone I know says that working in smaller firms is nicer overall: it's more personal, more individual, and you have much more freedom to do a bit of everything. For example, one of my colleagues started at a large interior architecture firm in Düsseldorf, gaining all the essential know-how early on. Later, she joined another big firm but ended up doing a very narrow set of tasks and became dissatisfied. She's been with me for years now, and she values the variety and more personal style of work. She especially appreciates the individuality and diversity in a small practice. That said, when you're first starting out, it's essential to experience the big offices to really learn the ropes of digital workflows and tools. It's a great training, and sometimes it's quite cool, too. You always have to adapt to clients and budgets, of course. Often, the more exciting assignments do come up in big firms. The opportunities to experiment and present ideas are just so much broader in large studios. I genuinely think young people should bite the bullet and start in big firms it isn't always comfortable, and sometimes the workloads are intense, with lots of overtime that isn't always compensated. Whether that's always the case nowadays, I can't say, but it was common in my experience. Even in competitions, my goddaughter (who's also my employee's daughter) worked for a young architecture firm for very little money, just to break into the scene they weren't a huge practice, but were very active. So even in bigger firms, you can feel a bit burned out, but you do get the best technical foundation at the start of your career.

Interviewer: So, if I understand you correctly: as a young architect or interior designer, you should gain practical experience with digital tools in a larger office at first but in the end, more tools isn't always better.

Expert 4: Exactly. There are certainly people who truly enjoy working in large offices and find it genuinely innovative. That may be true, but it always comes down to the internal hierarchies. For example, I know an architecture and interior architecture firm in Düsseldorf where the culture is quite different everyone is very fair, collegial, and equal. The

atmosphere there is unique, mainly because the boss genuinely cares about his employees' well-being and makes sure they feel completely comfortable. I think that's the direction more firms should head, but unfortunately, it's still not very common. More often, people end up moving from large firms to smaller ones after a while. My impression is that, in those big offices where you're only expected to deliver output, you probably won't stay very long. Sadly, there are still too many places like that. Of course, there are good examples and it doesn't have to be this way. Ultimately, it depends entirely on who's in charge and how they run things.

Interviewer: Yes, absolutely. Thank you, that was my last question.

Expert 4: Thank you as well. I truly hope my insights and experiences have been helpful for you. If you have any more questions in the future, please don't hesitate to get in touch. I really appreciated the engaging discussion it was a pleasure to share my perspective.

Interviewer: Yes, absolutely, thank you. It's always valuable to hear a different viewpoint. Many people insist digital tools are indispensable and that change should happen as quickly as possible, but I think it's important to keep an open mind and consider alternative perspectives.

Appendix 7: Code Structure

2. Order: Adoption and Use of Digital Tools (in the MAXQDA document: light green)

1. Order: Personal curiosity and openness	Statements that contain information about the reason for adopting digital tools (personal curiosity/openness or customer demands) are coded.
1. Order: Integration into daily workflow	Statements that contain information about the integration of digital tools into the daily workflow are coded.
1. Order: Digital Tools	Statements that contain information about digital tools are coded.

2. Order: Perceived Benefits (Relative Advantage) and Drawbacks (in the MAXQDA document: dark green)

1. Order: Visualization and design options	Statements that contain information about visualization and design options in interior design are coded.
1. Order: Client decision processes/feedback	Statements that contain information about client decision processes and feedback in interior design are coded.
1. Order: Planning and flexibility	Statements that contain information about planning and flexibility in interior design are coded.

2. Order: Compatibility (Fit with Existing Values and Processes) (in the MAXQDA document: blue)

1. Order: Adaptation of processes and workflows	Statements that contain information about the adaptation of processes and workflows in interior design due to digitalization in the industry are coded.
1. Order: Team/organizational acceptance	Statements that contain information about team and organizational acceptance in interior design in the context of digitalization in the industry are coded.

2.Order: Complexity (Ease/Difficulty of Use) (in the MAXQDA document: purple)

1. Order: Need for training	Statements that contain information about the need for training during the introduction of digital tools in interior design offices are coded.
1. Order: Technical challenges	Statements that contain information about technical challenges during the introduction of digital tools in interior design offices are coded.
1. Order: Time expenditure	Statements that contain information about time expenditure during the introduction of digital tools in interior design offices are coded.
1. Order: Cost factor/investment for new tools	Statements that contain information about the cost factor or investment required for new digital tools in interior design offices are coded.

2. Order: Trialability (in the MAXQDA document: pink)

1. Order: Pilot projects and trial phases	Statements that contain information about pilot projects and trial phases of digital tools in interior design are coded.
1. Order: Use of tutorials and demo versions	Statements that contain information about the use of tutorials and demo versions of digital tools in interior design are coded.

2. Order: Observability (Visibility of Results and Outcomes) (in the MAXQDA document: turquoise)

1. Order: Presentation and visualization practices	Statements that contain information about presentation and visualization practices in interior design are coded.
1. Order: Client reactions and feedback	Statements that contain information about client reactions and feedback in interior design are coded.

2. Order: Future Perspectives and Recommendations (in the MAXQDA document: red)

1. Order: Technology trends and expectation of growing digitization	Statements that contain information about technology trends and expectations of growing digitization in interior design are coded.
1. Order: Advice to junior colleagues	Statements that contain information about advice to junior colleagues in interior design are coded.

1. Order: Forward-looking ideas and wishes	Statements that contain information about forward-looking ideas and wishes in interior design are coded.

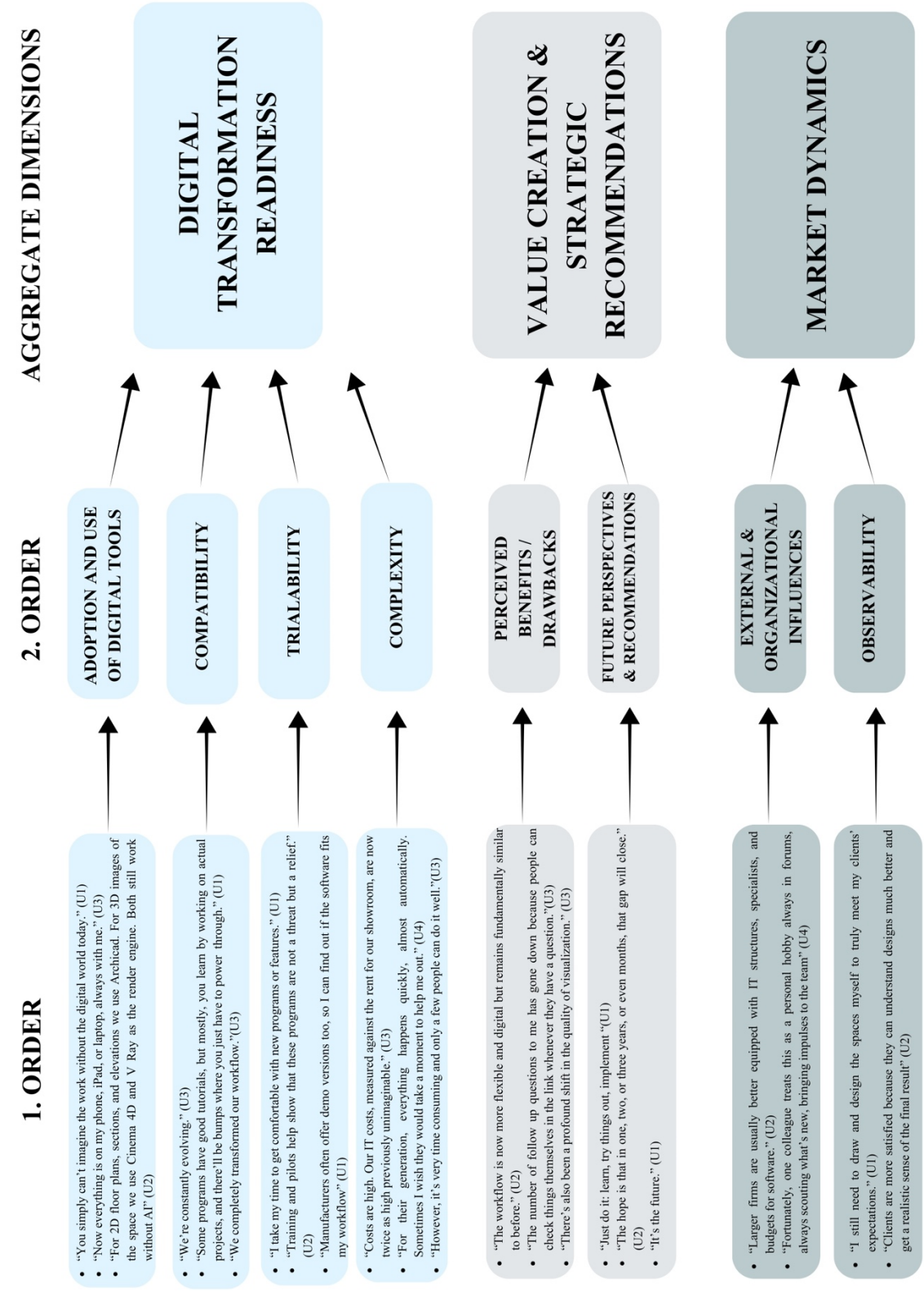
2. Order: External and Organizational Influences (in the MAXQDA document: orange)

1. Order: Team/company support for new technologies	Statements that contain information about team or company support for new technologies in interior design are coded.
1. Order: Differences between large firms and solo designers	Statements that contain information about differences between large firms and solo designers in interior design are coded.

General Information: (in the MAXQDA document: grey)

Person	Statements that contain general information about the respondents are coded.
Team	Statements that contain information about the team and the company's employees are coded.
Company	Statements that contain general information about the companies interviewed are coded.
Industry	Statements that contain general information about the industry are coded.

Appendix 8: Own Data Structure According to Gioia



Appendix 9: Strategic Checklist Derived from Empirical Findings

Checklist for the Digital Transformation of Interior Design Firms:

- Analyze the company's digitalization level and maturity status (self-assessment).
- Define clear digitalization goals and a strategic vision (including values and market positioning).
- Launch pilot projects with new technologies (e.g. 3D visualizations, VR/AR, PropTech, collaboration tools).
- Provide targeted training for employees in digital and creative competencies.
- Design customer processes to be digital, user-centric and segment-specific (e.g. self-service configurators, virtual presentations).
- Foster agile, cross-departmental collaboration (digital platforms and feedback loops).
- Establish data protection and IT security as core components of all processes.
- Continuously monitor and evaluate the impact of digital tools on process efficiency and client experience, as well as evolving market trends and customer needs.
- Strengthen an internal culture of innovation and encourage seeing mistakes as learning opportunities.
- Position human expertise as central by deliberately combining digital tools with personal consultation, material samples and on-site visits.
- Build partnerships with technology providers, industry associations and educational institutions.

Declaration of Authorship and Use of Digital Tools

I hereby declare that I have written this Master's thesis independently and without unauthorized assistance. All sources and references used have been properly cited. This work has not been submitted to any other institution for academic credit. I further declare that digital tools such as TurboScribe and DeepL were used for transcription, translation and language-related support purposes. All analysis, interpretation and final wording of the thesis are my own work.

Nina Lena Schmidt

(Lisbon, 12.12.2025)