Jonas Rehn-Groenendijk

More Than the Sum of Its Parts: Understanding and Addressing Experiences Through an Integrated Approach to Interior Architecture in Healthcare Design

1 An Integrated Approach to Interior Architecture

As illustrated in several studies and conceptualised in many different theories and methodologies, the design of the built environment can have a profound effect on one's emotions, thoughts, and behaviour as well as on physiological parameters such as heart rate, stress levels, and many others (Ulrich et al., 2008; Dijkstra, 2009). However, the built environment and interior architecture for that matter is not limited to its mere physical properties (e.g., wall colour, textures) but is shaped by and at the same time shapes processed and psychosocial needs regarding the people who will use this space. Therefore, a complex mixture of physical attributes, conceptual patterns (layout, wayfinding), and non-physical aspects (e.g., digital infrastructures, expectations based on image, and corporate identity) contribute to the actual experience of people in these spaces.

This chapter refers to this complexity of physical and non-physical aspects of interiors based on the "Systemic evidence-based approach of health-promoting design (SEA)," which was co-developed by the author (Müller & Rehn-Groenendijk, 2024). In line with this, the built environment is an entity of interwoven physical elements and structures, their mental representations, and connotations, as well as digital and hybrid structures that affect these environments (e.g., wayfinding apps, check-in counters, digital assistants). While this chapter refers in the first place to therapeutic contexts such as hospitals, approaches and insights presented here might be transferable to other building types. As illustrated by the profound body of literature on priming research (e.g., Bargh & Chartrand, 2014), stimuli in the built environment – such as colour, haptic sensations, or smells – can activate neural pathways and by doing so influence the way people experience, judge, and behave in these environments (e.g., Meyers-Levy & Zhu, 2007; Lobel, 2014; Lee & Schwarz, 2012).

Acknowledging this complexity requires looking beyond the formal aesthetic features of a space. These constitute only one of several components that need to be addressed in order to fully approach the needs of users. This is even more relevant in contexts where one finds a heterogeneous group that includes some users with high vulnerability, e.g., in therapeutic contexts. Using scientific rigor and empirical methods is one way to tackle the

complexity and counteract cognitive biases that people who design these spaces might have, based on their subjective assumptions or prior experiences.

2 Disentangling the Complexity of Interiors

In order to understand and address the different layers and pathways through which the built environment can affect emotional, cognitive, and behavioural aspects, one might differentiate between the actual (a) conceptual design elements in this space and the overarching (b) addressed constructs these elements refer to or establish (Müller & Rehn-Groenendijk, 2024, p. 5; see Fig. 1).

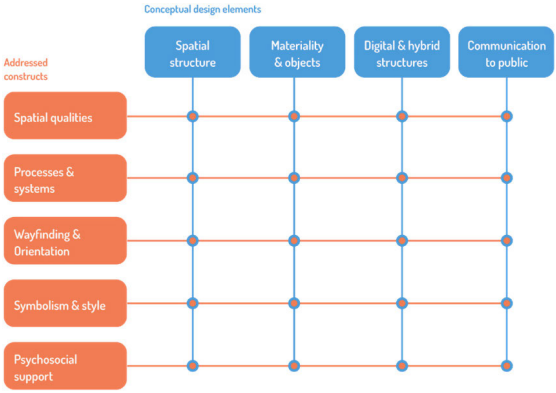

Figure 1: The WHAT-matrix.
(Graphic: based on Müller & Rehn-Groenendijk, 2024)

The former comprises spatial structures (architectural elements such as walls and ceiling), materiality and objects (e.g., furniture), digital and hybrid structures (e.g., interactive lighting programs, smart home applications), communication to public (the actual image and expectations related to the built environment, including advertisement and brand identity). Thus, conceptual design elements summarise all types of interventions that designers, architects, and planners can exert on a given space.

The category of addressed constructs, on the other hand, is based on the assumption that these design elements are not isolated features with one single purpose, and that they instead deliberately or coincidentally affect overarching themes. For instance, spatial structures, wall papers, and furniture contribute to a specific spatial quality (i.e., "atmosphere"). At the same time, they shape and are shaped by processes that happen in these spaces. If people who enter a medical practice need to check in with a person, the first spatial feature they most likely will be confronted with will be a counter. If this check-in process is moved to an app and is done at home or on the way to this practice, this part of the built environment will naturally be designed differently.

Another construct that can be addressed by conceptual design elements is the issue of wayfinding and orientation. Signs, floor marking, and labelling are just one – often less preferable – way of supporting users as they navigate through buildings. Other subtle cues, landmark knowledge, and more intuitive forms of semantic coding can be used to guide users.

In addition to this, various conceptual design elements not only create spatial qualities but also address specific styles or symbols that can be consciously or subconsciously decoded by users. This is frequently applied in the retail sector, when shop floors refer to nostalgia, futurism, or freshness to persuade consumers to buy more (e.g., Lindstrøm, 2010; 2011; 2014). In the same way, clinical contexts can address concepts such as decision-making at on a level playing field.

The construct of psychosocial support refers to a body of literature related to health-promoting and psychosocially supportive design. As illustrated by Ulrich (1997) and further conceptualised by paradigms such as "salutogenic design" (Dilani, 2005), the careful combination of conceptual design elements can directly influence one's sense of control, sense of coherence, or optimism. These psychosocial aspects are of crucial importance for health promotion. The built environment can also directly affect social behaviour (Lockton, 2010), as for instance illustrated already in the late 1950s by Sommer and Ross (1958).

To operationalise this knowledge, it is important to apply scientific rigor and an evidence-based approach, as coined by Hamilton (2003) (see also Stichler and Hamilton, 2008; Malkin, 2014). In this way, creative and intuitive processes are paired with scientific evidence

that is used as a basis to make decisions about the project throughout the entire process.

In many fields of the creative industry, scientific approaches are seen as limiting for intuitive and creative processes. In some cases, designers and architects are even stereotyped as artists that work based on spontaneity and talent. While this might be true to some extent and in some contexts, it is not a sufficient description of the scope and responsibility of, e.g., interior design in healthcare settings. There still is an ongoing debate on the role of process models and structure in design processes to maximise quality and efficiency (e.g., Dubberly, 2008), the elaboration of which would go far beyond this paper.

However, it is worth emphasising that systematic and scientific approaches and empirical results can foster innovative strategies and new insights that help designers make use of their creative potential by providing orientation and, ideally, even ways to evaluate concepts and results. The major challenges are to develop strategies and processes that allow both intuitive and creative processes, as well as rigorous scientific evidence, to play their parts.

While in some cases purely artistic approaches can lead to innovative and even profitable solutions (e.g., in the retail business), when catering to user groups with specific needs, designers have a moral obligation to make use of the available evidence and repertoire of research methods to thoroughly understand and address needs of users.

While empirical methods allow for objective data that can inform a design process, co-creative approaches can highlight specific needs, and in some cases design limitations, in a more direct way. Although customised approaches and thorough preparation are needed, co-creative processes can be used in almost all therapeutic contexts (see, e.g., Groot et al., 2019). Among many approaches, experience-based design (Goodrich, 2018) offers a systematic way that combines co-creative elements with evidence-based approaches. In more research-oriented projects, Patient and Public Involvement and Engagement (PPIE) is increasingly gaining relevance and should be considered for any project design.

3 Addressing Experiences as Systemic Approaches to Healthcare Settings

In healthcare settings, a number of systemic aspects create complexity that constantly needs to be addressed. Depending on local and national specifications, healthcare settings are usually highly regulated environments that are shaped by guidelines, norms, legal requirements, and individual rules regarding, e.g., hygiene, fire control and protection, occupational safety and health, data protection, and many other aspects. In participatory processes with representatives from clinics and members from staff, these regulatory boundaries can lead to cautiousness during the design process, which might limit creativity and innovation. At the same time, exactly these constraints can provide an opportunity for designers to thrive and achieve effective results.

Furthermore, new technologies, such as in the field of telemedicine and artificial intelligence, require designers and others to innovate on a systemic level to address both needs and potentials of these fast developments.

(Patient) Experiences as a Key Element in Tackling User Needs in Complex Built Environments

One way to acknowledge the system's complexity and effectively address user needs is to focus on the actual experiences that users (e.g., patients, staff) have in a certain built environment. As commonly discussed in the field of "experience design" (e.g., Risdon & Quattlebaum, 2018), these experiences are the result of an orchestrated interplay of a number of elements that emerge throughout a specific journey, which is defined as "the conceptual trip a person embarks upon to achieve a goal or satisfy one or more needs" (p. 88).

Experiences can be coincidental or carefully drafted. Many modern retail shops and amusement parks invest a lot of resources to design experiences. A key element in these are touchpoints. Risdon and Quattlebaum (2018, p. 88) describe these elements as "encounters of an organisation by a customer." These encounters occur through specific physical or digital products, such as websites, check-in counters, or billboards. From an interior architecture point of view and with regard to the literature on environmental psychology, one might view the whole built environment as a collection of touchpoints. Rooms, hallways, and objects in the spaces communicate with users through various semantic channels. As described earlier in relation to the SEA approach, the combination of certain environmental stimuli can create an atmosphere and activate cognitive patterns that form the basis for subsequent experiential processes.

In this way, tools and approaches from experience design can be highly valuable for the built environment, since they help one to understand and improve user experiences and thereby to address user needs.

Tools of Patient Experience Design and Their Application for the Interior Architecture of Healthcare Settings

One of the most popular starting points for designing experiences is the development of personas as fictional archetypes of a certain target group. Ku and Lupton emphasise that "personas highlight the deeper motivations, frustrations, and adaptations of human beings" (2020, p. 72). Ideally, personas should be as vivid and narrative as possible and should be based on scientific evidence instead of subjective assumptions. With regard to evidence-based design, it is recommended to apply a research-driven design approach

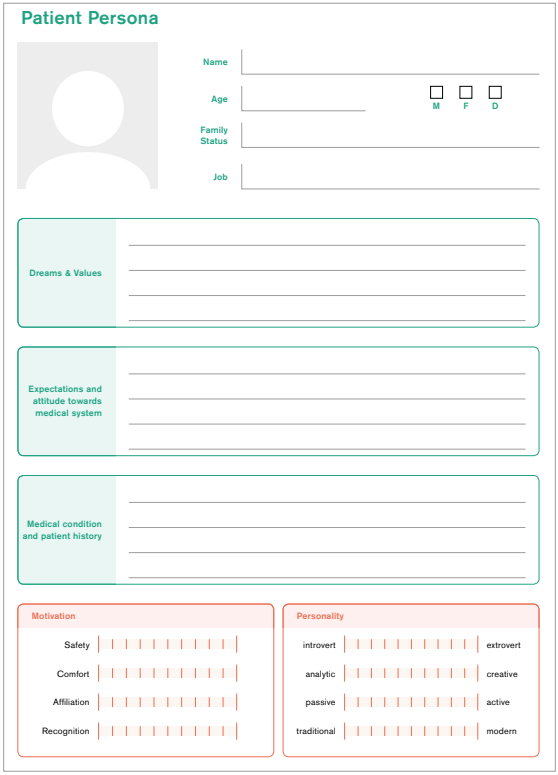

Figure 2: A simple template to create patient personas, available for free at: https://gesunde-gestaltung.de. (Graphic: Jonas Rehn-Groenendijk)

(Visocky O'Grady & Visocky O'Grady, 2017) to inform the design of personas. Simple qualitative empirical methods, such as explorative interviews and observations, can be useful tools to gather data. For personas to exert their full conceptual potential, they should be not the merely average subject of a given target group; they should instead take the form of individual subjects with unique characteristics (Fig. 2).

From a systemic point of view, it is of high importance to consider the overall system instead of focussing on single isolated aspects or spatial configurations. An experience ecosystem map and a touchpoint inventory (Risdon & Quattlebaum, 2018, p. 32) help to gain an overview of all relevant components that eventually create a given experience.

Experience ecosystem maps illustrate the broader network of objects, spaces, services, and people that eventually creates the experience at hand. Especially with regard to interior architecture, experience ecosystem maps help to understand the systemic interrelations between isolated built environment features and other – for instance digital – elements. In complex therapeutic contexts such as hospitals, patient experiences are formed by an indivisible mix of physical elements (e.g., building structure, furniture) and virtual structures (patient management software, information and check-in terminals, communication systems, etc.). Thoroughly investigating these ecosystems can deepen one's understanding of these settings and help to identify key elements that need to be changed to effectively improve patient (and staff) experiences.

Closely related to experience ecosystem maps are touchpoint inventories. While the former illustrated the entire system at hand, the latter are a structured collection of all contact points between a user and this system. These "touchpoints" are the crucial parts through which experiences are actually experienced. Usually, a touchpoint inventory is a table in which the first row indicates the most important phases of the experience to be investigated or designed and the first column indicates all relevant channels. At the intersection of channels and phases, touchpoints can be identified (Fig. 3). In classical user experience design, channels are mediums through which an interaction can take place – e.g., a website, phone, app, sign board. For instance, the phone of a medical practice can be seen as a channel. The phone call to schedule an appointment would be the actual touchpoint, as this relates to a specific step in a process. While this holds true to the broader context of the built environment, one can widen this scope by including interior design aspects. The merely aesthetic appearance of an entry hall can communicate a lot of information with regard to the shared values of the facility, such as professionalism (Devlin, 2014). Therefore, in a chain of actions, encountering an app to make an appointment, finding a parking lot due to proper signage, and arriving at a waiting room in which multisensory stimuli reduce anxiety and stress can comprise a number of channels through which several touchpoints have been used (Fig. 3).

Based on the evidence-based and thorough development of personas, experience ecosystem maps, and touchpoint inventories, a patient journey map (Fig. 4) can be created to illustrate the step-by-step process of a patient (or any other person in a given system) to meet a specific need (e.g., have an x-ray scan). Depending on the specific process at hand and the complexity of the system in which this process takes place, this map can be more or less comprehensive. Furthermore, researchers and designers need to decide on a level of zooming in for this process. One might look at a dentist appointment by beginning with tooth pain as the start of the journey. Zooming in more closely, the specific phase that runs from checking-in to waiting until one is called up can also be useful for the design task at hand.

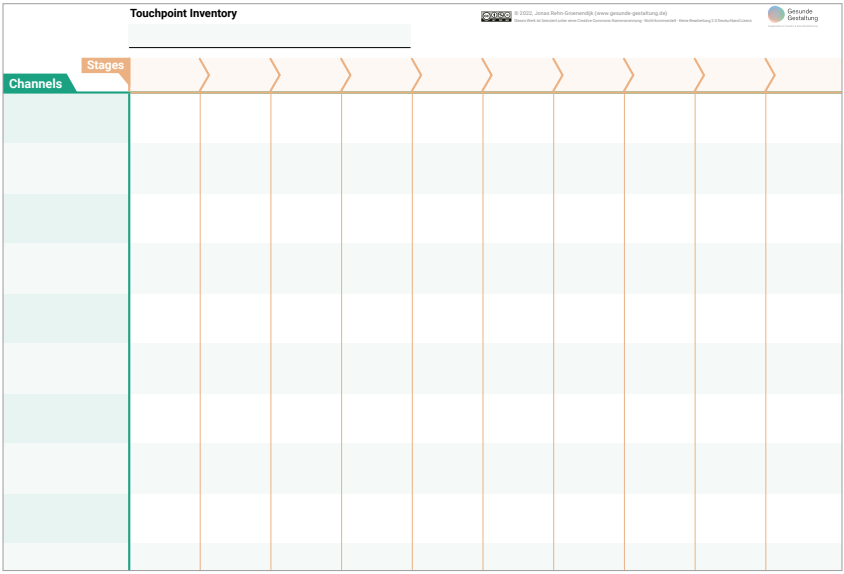

Figure 3: A simple template to develop a touchpoint inventory, available for free at: http://gesunde-gestaltung.de. (Graphic: Jonas Rehn-Groenendijk)

Generally speaking, there is no fixed structure for patient journey maps. However, most of them have in common that they dissect a process into a chain of stages and related activities and illustrate what touchpoints are used in these activities. Combining this information with emotions or thoughts that the persona has at a given moment helps to describe the subjective experience of this person in more detail. Empirical data, such as quotes from interviews, can be used here as well. It is recommended to include activities and tasks that happen behind a line of visibility (e.g., medical staff preparing a room for the next patient). This can be enormously beneficial for identifying opportunities to improve processes and increase efficiency. In all of this, the built environment can be a central object of interest, as it is the context of the individual activity and sometimes even a part of the touchpoint itself (Fig. 4).

When applying patient journey maps, it can be helpful to distinguish between a current state map and a future state map. While the former illustrates specific pain and gain points to improve the setting and processes in the status quo, the latter shows the experience design concept in action, elaborating on the emotional effects and spatial details of a changed process in the future.

When applying these and other tools from approaches such as experience design, one needs to acknowledge that they serve merely as qualitative analytical tools for visualising and understanding complex systems and interdependencies. This might appear to be a quantitative and to some extent mechanistic approach, especially in the case of journey mapping, but a more explorative and conceptual perspective is appropriate. Illustrating subsequent phases and tasks on different levels and as they are related to various roles and locations allows for a more holistic perspective on a given context. From this standpoint, it becomes easier to identify synergies and opportunities. However, as with most aspects in interior architecture and design, an iterative process supported by intermittent evaluative phases is recommended.

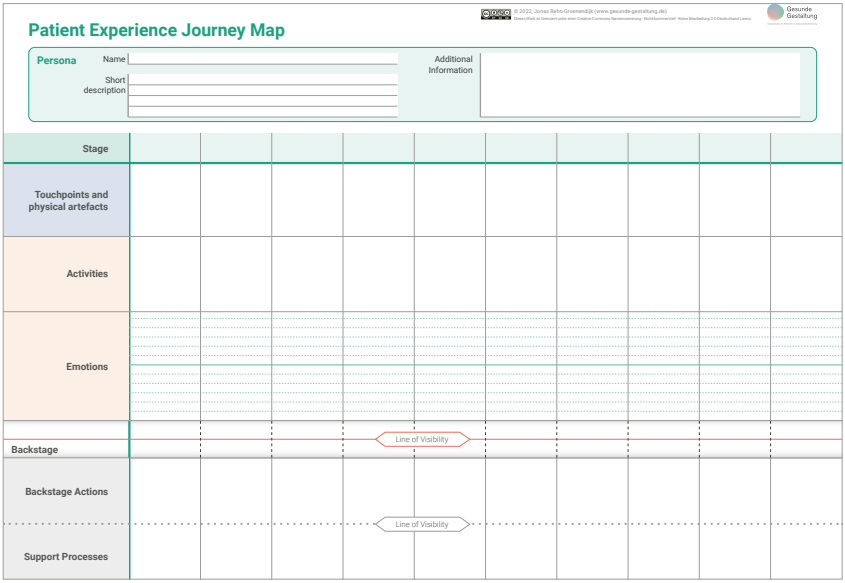

Figure 4: A simple template to develop patient journey maps, available for free at: https://gesunde-gestaltung.de. (Graphic: Jonas Rehn-Groenendijk)

4 Discussion and Conclusion

Understanding and addressing needs in interior architecture in healthcare settings can be complex and challenging. The SEA approach (Müller & Rehn-Groenendijk, 2024) and tools from patient experience design have been outlined to serve as a way to tackle this challenge. While one book chapter cannot cover the methodological complexity of these tools and approaches, it is worth highlighting that the overall foundation of the aforementioned steps is constituted by the rigorous acknowledgement of the relevant scientific evidence for the specific project at hand, as well as by the methodologically sound implementation of co-creative processes, the aim of which is to gain first-hand insights from future users (e.g., patients and carers). Specifics on how to do this can be found elsewhere (e.g., Jansen, 2018; Hendriks et al., 2015; Stickdorn et al., 2018).

At the same time, it is important to notice that just as therapeutic spaces are complex and intertwined, so are human behaviour and experiencing. Making use of empirical methods, scientific evidence, and analytical tools, as presented here, is an attempt to get closer to the factual reality of these settings. This undoubtedly is connected with a degree of uncertainty and blurriness that has to be acknowledged and addressed by iterative and evaluative processes to improve both methodology and results in the long run.

Certainly, more research regarding both single effects of interventions and methodological approaches is needed to advance the highly important field of health- promoting design and need orientation in interior architecture in general. Using patient experience design as a lens through which built environments can be assessed and designed is a rather new and promising approach. Further research that investigates the effect of built environment interventions on overall patient experiences by addressing the systemic interrelatedness in a given setting is much needed in order to increase ecological validity and the health-promoting effects of single interventions. This chapter aimed to give a conceptual framework and provide methods for addressing these systemic potentials in healthcare settings.

5 References

Bargh, J. A., & Chartrand, T. L. (2014). The mind in the middle: A practical guide to priming and Automaticity Research. In H. T. Reis und C. M. Judd (Eds.), Handbook of research methods in social and personality psychology, 2nd ed. (pp. 311–344). Cambridge University Press. https://doi.org/10.1017/CBO9780511996481.017

Devlin, A. S. (2014). Transforming the doctor's office: Principles from evidence-based design. Routledge.

Dijkstra, K. (2009). Understanding healing environments: Effects of physical environmental stimuli on patients' health and well-being. University of Twente.

Dilani, A. (2005). A new paradigm of design and health in hospital planning. World Hospitals and Health Services: The Official Journal of the International Hospital Federation 41(4), 17–21.

Dubberly, H. (2008). How do you design? A compendium of models. Dubberly Design Office.

Goodrich, J. (2018). Why experience-based co-design improves the patient experience. The JHD 3(1), 84–85. https://doi.org/10.21853/JHD.2018.45

Groot, B. C., Vink, M., Huberts, M., Schout, G., & Abma, T. A. (2019). Pathways for improving of care in psychiatric crisis: A plea for the co-creation with service users and ethics of care. Archives of Psychology 3(3), 1–20. https://doi.org/10.31296/aop.v3i3.99

Hamilton, D. K. (2003). The four levels of evidence-based practice. Healthcare Design, 11(3), 18–26.

Hendriks, N., Slegers, K., & Duysburgh, P. (2015). Codesign with people living with cognitive or sensory impairments: A case for method stories and uniqueness. CoDesign 11(1), 70–82. https://doi.org/10.1080/15710882.2015.1020316

Jansen, S. (2018): The seven principles to complete co-creation. BIS Publisher.

Lee, S. W. S., & Schwarz, N. (2012). Bidirectionality, mediation, and moderation of metaphorical effects: The embodiment of social suspicion and fishy smells. Journal of Personality and Social Psychology 103(5), 737–749. https://doi.org/10.1037/a0029708

Lindstrøm, M. (2010). Buy ology: Truth and lies about why we buy (1st ed.). Broadway Books.

Lindstrøm, M. (2011). Brandwashed: Tricks companies use to manipulate our minds and persuade us to buy (Internat. ed.). Crown Business.

Lindstrøm, M. (2014). Brand sense: Sensory secrets behind the stuff we buy. Free Press.

Lobel, Thalma (2014). Sensation: The new science of physical intelligence. Icon Books.

Lockton, D., Harrison, D., & Stanton, N. A. (2010). The design with intent method: A design tool for influencing user behaviour. Applied Ergonomics 41(3), 382–392. https://doi.org/10.1016/j.apergo.2009.09.001

Malkin, J. (2008). A visual reference for evidence-based design. Center for Health Design.
Meyers-Levy, J., Zhu, R. (2007). The influence of ceiling height: The effect of priming on the type of processing that people use. Journal of Consumer Research 34(2), 174–186. https://doi.org/10.1086/519146
Müller, H., & Rehn-Groenendijk, J. (2024). Systemic evidence-based approach of health-promoting design (SEA): The integrated working mode of the Designinstitut für Gesunde Gestaltung based on a biopsychosocial model of health. Designinstitut für Gesunde Gestaltung.
Risdon, C., Quattlebaum, P., & Rettig, M. (2018). Orchestrating experiences: Collaborative design for complexity. Rosenfeld Media.
Sommer, R., & Ross, H. (1958). Social interaction on a geriatrics ward. International Journal of Social Psychiatry 4(2), 128–133. https://doi.org/10.1177/002076405800400207
Stichler, J. F., & Hamilton, D. K. (2008). Evidence-based design: What is It? HERD: Health Environments Research & Design Journal 1(2), 3–4. https://doi.org/10.1177/193758670800100201
Stickdorn, M., & Hormess, M., Lawrence, A., & Schneider, J. (Eds.). (2018). This is service design doing: Applying service design thinking in the real world; a practitioner's handbook (1st ed.). O'Reilly.
Ulrich, R. S. (1997). A theory of supportive design for healthcare facilities. Journal of Healthcare Design 9, 3–7; discussion 21–4.
Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H.-B., Choi, Y.-S., Quan, X., & Joseph, A. (2008). A review of the research literature on evidence-based healthcare design. HERD: Health Environments Research & Design Journal 1(3), 61–125. https://doi.org/10.1177/193758670800100306
Visocky O'Grady, J., & Visocky O'Grady, K. (2017). A designer's research manual: Succeed in design by knowing your clients and understanding what they really need (2nd ed.). Rockport Publishers.