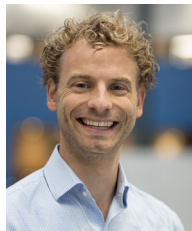


Overcoming the Valley of Death: A Design Innovation Perspective

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In large organizations, innovation activities often take place in separate departments, centers, or studios. These departments aim to produce prototypes of solutions to the problems of operational business owners. However, too often these concepts remain in the prototype stage: they are never implemented and fall into what is popularly termed the *Valley of Death*.

A design approach to innovation is presented as a solution to the problem. However, practice shows that teams that use design nevertheless encounter implementation challenges due to the larger infrastructure of the organization they are part of. This research aims to explore which organizational factors contribute to the Valley of Death during design innovation. An embedded multiple case study at a large heritage airline is applied. Four projects are analyzed to identify implementation challenges. A thematic data analysis reveals organizational design, departmental silos, and dissimilar innovation strategies contribute to the formation of, and encounters with, the Valley of Death. Arising resource-assignment challenges that result from these factors are also identified. Materialization, user-centeredness, and holistic problem framing are identified as design practices that mitigate encounters with the Valley of Death, thus leading to projects being fully realized.

Key words: organizational infrastructure, implementation, innovation department, Valley of Death, design

Introduction

An increasingly turbulent environment is forcing companies to take proactive stances to innovation (Elsbach and Stigiani, 2018). Organizations that aim to innovate while maintaining current operations (O'Reilly and Tushman, 2004, 2013) often choose an organizational form in which a semi-separate innovation department or team is located remotely from existing departments (Blindenbach-Driessen and Van Den Ende, 2014). Organizing innovation separately from operational departments can result in encounters

with the *Valley of Death* phenomenon, where difficulty implementing, accelerating, or commercializing an innovation project arises (Sandberg and Aarikka-Stenroos, 2014).

Innovation by design has the potential of mitigating the Valley of Death by structuring the process of innovation from creative ideas to valuable propositions (Kolarz et al., 2015). This approach is characterized by a number of themes: a user focus, iterative problem reframing, visualization, experimentation, and diversity. These themes are underpinned by specific principles and practices (Carlgren, Rauth, and Elmquist, 2016b). However, empirical research that aims to determine how design mitigates the Valley of Death is limited. Moreover, practice shows that a Valley of Death may still arise when a design approach to innovation is taken.

Therefore, this article aims to explore how the Valley of Death manifests when a design approach to innovation is undertaken. Additionally, initial insights into how design practices mitigate encounters with the Valley of Death are presented. The researchers thus set out to explore the following research questions:

- What challenges associated with the Valley of Death are encountered during a design approach to innovation?
- How can a design approach to innovation be applied to overcome challenges related to the Valley of Death phenomenon?

This article reports on an action research project (Coghlan, 2011; Kock, 2017) performed in the context of a large heritage airline. This airline, like many competitors in the airline sector, does not have a dedicated technological research and design (R&D) department. Instead, the organization opts for separate innovation hubs (Leifer, O'Connor, and Rice, 2001) to develop new services and improvements to existing operations. An embedded multiple case study at a large heritage airline is applied. Four projects are analyzed to identify implementation challenges. A thematic data analysis reveals organizational design, departmental silos, and dissimilar innovation strategies contribute to formation of, and encounters with, the Valley of Death. We conclude the article by recommending design principles and practices to help mitigate implementation challenges during design innovation.

Literature review

This literature review is segmented into three parts. Initially, we provide a short overview of the available literature on the Valley of Death. Second, an introduction to a practice-based conceptualization of design innovation will be presented. The third section of this review explores current literature regarding the potential of design practices to mitigate the Valley of Death phenomenon.

The Valley of Death

There are two bodies of knowledge that describe the Valley of Death. Literature regarding this subject can be found in (1) R&D management literature and (2) innovation management literature (e.g., Assink, 2006; Van de Ven, 1986). In R&D management literature, the Valley of Death is described as “a discrete segment of development between research and product development” (Markham, Ward, Aiman-Smith, and Kingon, 2010, p. 1). The phenomenon occurs in a space between opportunity discovery (invention) and product development (innovation) (Hudson and Khazragui, 2013; Markham et al., 2010). The *discovery* process is classically performed in R&D centers (e.g., as in the pharmaceutical industry with the development of prototype drugs). *Development* is often referred to as part of the new product development (NPD) process (as illustrated in Figure 1).

Literature regarding the barriers (as opposed to the drivers) of innovation, such as Moss Kanter (2006), Assink (2006), and Sandberg and Aarikka-Stenroos (2014) also recognizes the Valley of Death. In this field of literature, the process of innovating is generally divided into three phases: (1) ideation, (2) R&D, and (3) acceleration or commercialization (O'Connor and DeMartino, 2006). We consider the challenges of the last phase, aiming to develop a *physical artifact* (Trott, 2002) of an implemented and scaled solution when the Valley of Death is

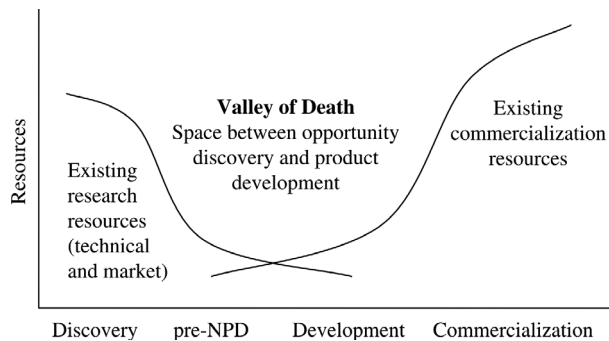


Figure 1. The Valley of Death in Markham et al. (2010).

encountered. This is in line with Assink's (2006) definition, who describes this valley as the gap between breakthrough invention and commercial application (p. 226). According to a literature review by Sandberg and Aarikka-Stenroos (2014), a lack of commercialization competences and an unsupportive organizational structure contribute to the Valley of Death's formation. Most of the available research in this field focuses on indicating barriers that are present throughout the entire innovation process, rather than distinguishing specific phases. Further, this research regards many different initiatives that apply various innovation approaches—but importantly, not design. Finally, research has been limited to providing general descriptions of barriers rather than advising courses of action to overcome such barriers within an organization.

Coinciding with the academic community's interest in the Valley of Death is a rising consciousness of companies that experience this phenomenon. In a recent annual report, the Design Council opens with a

statement from a business executive: "The Valley of Death—everyone talks about conquering it. [...] The UK has been inventing for years but has not been very good at commercialization—now we're trying to do that" (Kolarz et al., 2015, p. 2). Similarly, the chief operating officer of the large airline that is the subject of this study appealed in his annual address, "We've invested a lot in our capacity to generate new ideas and create prototypes, now it's time to become good at implementing these ideas." As interest in the topic is rising both within the academic literature and with business executives, the time seems right to study what contributes to encounters with the Valley of Death during design innovation and, further, how these encounters can be mitigated through design.

Design innovation

As an approach to innovation, the use of design has enjoyed increasing attention, with many recent contributions (Dorst, 2011; Micheli et al., 2018; Price and Wrigley, 2016; Rae, 2016; Verganti, 2003). Likewise, the

business world has also demonstrated high interest in design (Brown and Martin, 2015; Kolko, 2015; Liedtka, 2018). However, many researchers still struggle to define how design relates to innovation (Cooper, Junginger, and Lockwood, 2009; Kimbell, 2012; Rodgers, 2013). As a result, clarity regarding theoretical differences and similarities is yet to emerge. This plurality is also a strength of the design innovation field that offers diverse pathways between theory and practice. In this article, the design innovation concept of Carlgren, Rauth, and Elmquist (2016b) will be used as a central reference point. Carlgren and colleagues frame design as a way of performing innovation that is grounded in how design is *practiced*. Using large companies as their context for design innovation is highly pertinent to this article. According to their analysis, design can be characterized by five themes: (1) user focus, (2) problem framing, (3) visualization, (4) experimentation, and (5) diversity. Each *theme* (e.g., user focus) can be linked to *principles* (e.g., empathy) and accordingly to *practices* that showcase these principles (e.g., qualitative user research). These practices are observable and can thus be used to distinguish design innovation projects from other projects being undertaken by an organization.

Design to overcome the Valley of Death

In the aforementioned report of the British Design Council, design is

indicated as a means to overcome implementation challenges:

Our innovation system often presents formidable obstacles in getting scientific ideas and discoveries to market. [...] Design is one of the most powerful tools we have for this and for smoothing the journey from research insight to practical, marketable applications.

(Kolarz et al., 2015, p. 4)

Other authors have identified links between design and the Valley of Death. Liedtka (2015), although not specifically naming the Valley of Death, discusses how design helps to improve innovation outcomes by reducing cognitive biases in the innovation process. Assink (2006), for example, mentions the challenge of *organizational dualism* or *ambidexterity* (O'Reilly and Tushman, 2013), which design has been identified as capable of addressing (Stoimenova and De Lille, 2017). Assink (2006) also notes the inherent uncertainty related to the development of radical ideas and that a probe-and-learn approach needs to be taken. This coincides with the experimental and iterative nature of design, as well as the ambiguous nature of projects that designers tackle (Jahnke, 2013; Kolko, 2015).

At an activity level, design can also be linked to the Valley of Death. Within the Valley of Death, attention is required to matters of technical viability, market/user research, and business case development (Markham et al., 2010; see also Markham, 2013; Perry-Smith and Mannucci, 2017). In their literature review, Carlgren,

Rauth, and Elmquist (2016b) identify that the majority of the descriptions of design include finding a balance between (technical) feasibility, (user) desirability, and (business) viability. However, it should also be noted that Carlgren, Elmquist, and Rauth (2016a) argue that the use of a design approach may aggravate implemented challenges because of “the strong focus on reframing problems and building on deep user insights in DT [design thinking]” (p. 355). When poorly managed, reframing creates misalignment between stakeholders by creating divided frames (as opposed to shared frames). Subsequent courses of action are then contested as stakeholders refer to their own unique frame of the problem. Within large organizations, deeper user insights alone are often insufficient to drive a project through the final rigors that evaluate whether a project receives a green light toward implementation.

In sum, various authors offer conceptual approaches to mitigating the Valley of Death through design. Yet empirical studies that specifically identify how design can be applied to mitigate this phenomenon remain a notable absence. Further, a notion that poorly managed design innovation can aggravate, rather than alleviate, implementation challenges must be attended to in future research efforts.

Research design and methodology

Context and case selection

This research project is performed in the context of a cooperation between

a legacy airline carrier (i.e., AirCo) and a Faculty of Industrial Design Engineering. The cooperation between the two institutions aims to build design capabilities in the airline and to perform research on (the value of) design in this large organization's own transformation. The aviation industry is an operationally driven, highly regulated, and highly networked environment (Price, Wrigley, and Dreiling, 2015). AirCo operates within the aviation industry as a commercial airline at a midrange price point and aims to use a customer-intimacy strategy to attract and retain loyal customers. AirCo is one of the oldest airlines in the world and employs 30,000 employees. Yet AirCo faces fierce competition from both low-cost airline carriers (e.g., EasyJet and RyanAir) and premium gulf carriers (e.g., Qatar Airways and Emirates). AirCo has a traditional hierarchical organizational structure, as visualized in Figure 2, which consists of parallel silos of departments, with a separate user innovation department and a digital department

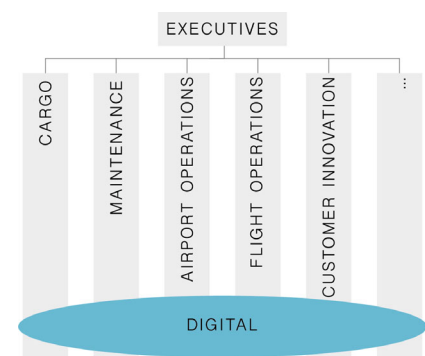


Figure 2. AirCo company structure. [Color figure can be viewed at wileyonlinelibrary.com]

that interact with all other departments located remotely.

This organizational context was chosen for two reasons. First, the researcher had the trust from AirCo management to access multiple projects and engage employees from various ranks to discuss implementation challenges. This rich access within an organization is essential. Second, due to its operational focus, and its highly networked and regulated nature, the aviation industry is known to be a challenging environment for innovation (Price, 2016). The consequence of these environmental factors is that the ability for an organization to conceive and implement innovation is a highly valuable capability (Rothkopf and Wald, 2011).

For this study, an embedded case research design was chosen due to the complex and contextualized nature of the object of study—the Valley of Death phenomenon (Scholz and Tietje, 2002; Yin, 1984). This approach allowed us to explore AirCo and their design innovation processes from within the organization (Scholz and Tietje, 2002). With access to a range of projects, a holistic understanding of the events leading to a Valley of Death could be developed (Baxter and Jack, 2008).

Projects selected for the employee interviews were from the digital department of AirCo. The digital department is not hierarchically linked to any of the operational divisions that characterize the AirCo organizational structure (as can be seen in Figure 2). This department is

tasked with developing digital solutions to enable better service delivery in order to improve employee and passenger experience. For the interviews, four cases were selected from this department using a criteria-based purposeful sampling approach as described by Palinkas et al. (2015). This approach allowed the researchers to gather data effectively and establish a base for generalizability. Projects were selected based on the following criteria:

- Active involvement of both a trained designer and a business manager, to be able to contrast the perspectives of both team members
- Use of design practices as described by Carlgren, Rauth, and Elmquist (2016b) to discover how these were applied during implementation phases
- Appearance of a Valley of Death, wherein the project has passed through advanced concept stages and is encountering significant barriers to implementation
- Involvement of multiple operational departments to allow perceived challenges related to meta-departmental factors to be observed.

Data collection

Eight semi-structured, exploratory interviews were completed employing techniques described by Blandford (2013). Interviews were completed with both business managers and designer team members. Interviews were one hour in duration and

recorded with consent. Word-for-word transcripts were developed for each recorded interview. An overview of the various projects and participants can be found in Table 1. The semi-structured interviews allowed us to probe and gather information regarding a range of foci. The main foci explored within the semi-structured interviews differed depending on the participant's role in the projects. Foci are presented in Table 2.

Data analysis

Data were analyzed applying a thematic approach. The flexibility of this approach is vital, as it provides a method to analyze rich, detailed, complex data to produce distinguishable themes (Braun and Clarke, 2006). We identified similarities regarding processes, language, and attitudes (Tesch, 1990). A schematic of the themes identified is visualized in Figure 3. Gray blocks indicate the main challenges that were linked to the Valley of Death. Blue blocks represent the structural factors of AirCo that were found to be contributing to these challenges. To inform the discussion, major themes produced during the analysis were discussed with managers from AirCo. This *member check* served to evaluate major themes, leading to a deeper articulation of the findings (Cahill, 2007).

Design innovation at AirCo

In this section, the findings from the analysis will be presented and discussed in relation to existing

	Boarding System (BS)	Bag Tool (BT)	IT Back-End (BE)	Unaccompanied Minors (UM)
Project goal	Optimize flow of passengers while boarding to improve customer satisfaction	Optimize flow of passengers in the airport by changing hand luggage behaviors	Facilitate and align procedural communication for airside employees by 2020	Redesign the Unaccompanied Minors service
Participant	1 designer 1 manager	1 designer 1 manager	2 designers 1 manager	1 designer
Delivered prototype	Physical prototype, tested at the gate	Physical prototype, tested at the gate	Visualization of software architecture and mockup interfaces	Physical prototype, digital mockup, and service design blueprint
Status at time of data collection	Ownership transferred to partner airline	Ownership transferred to airport	Preparing to launch two years after project initiation	Low prioritization, shifted to backlog

Table 1. Selection of cases

Participant role	Designers	Management
Focus 1	Development of project	Perceived major challenges in project management
Focus 2	Starting point -Parties involved -Dependencies	Innovation approach -Standard or custom -Contrast with design approach
Focus 3	Reflection and learning -For the designer -Perceived learning of AirCo	Implementation approach -Involvement of users -Stakeholder management
Focus 4	Role in the project	Perceived effect of design approach

Table 2. Interview foci per respondent type

literature. The insights will be structured according to the themes visualized in Figure 3. First, a short description of how the Valley of Death was experienced during innovation projects at AirCo is provided. Three major themes and their sub-themes will then be unpacked, followed by three accompanying insights into how designers contribute to mitigating the Valley of Death. A Valley of Death as described in the

literature review was encountered in all projects. The respondents also recognized the Valley of Death phenomenon as occurring. As the Bag Tool (BT) project manager mentioned, “everyone can make a plan, but to get the plan implemented: that is the real issue!” Similarly, the BT project manager also mentioned that “innovation is when you get something implemented in your real operational processes, and if you look

critically at the innovations at AirCo, almost none make it to that stage.”

Organizational design

AirCo’s legacy and the heavily regulated aviation industry have shaped a mechanistic (as opposed to organic) organizational design. Almost all organizational infrastructure within AirCo is designed to foster vertical communication, as is typically encountered in a hierarchical

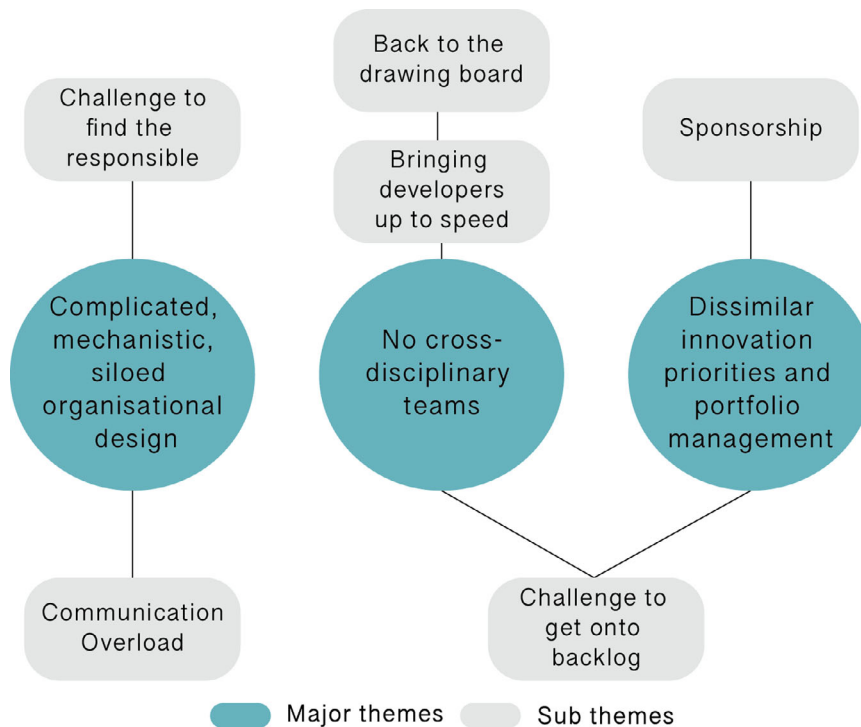


Figure 3. Themes produced during analysis, with challenges in gray and structural factors in blue. [Color figure can be viewed at wileyonlinelibrary.com]

organization design (O'Reilly and Tushman, 2013). External developments within aviation have forced a reassessment of this hierarchy. For example, when digital technology was identified as a possible driver for competitive advantage, a digital department was created to interact with almost all other AirCo departments. However, due to historic choices and a strategic alliance with another airline, the digital department could not take on the responsibility for managing and developing social media or website platforms. To complicate matters, airport touchpoints are managed by multiple stakeholders. For example, a single touchpoint may be managed by a

"hub" manager (airport), a manager responsible for the operation (airline-operational), and a customer experience representative (airline-commercial). These stakeholders have different goals and priorities, which are often linked to safety and regulatory compliance. The result is a complicated and procedural set of interactions between internal and external stakeholders.

Organizational navigation. This silo structure results in development teams becoming "lost" when navigating through the company. As the designer of the Unaccompanied Minors (UM) project mentioned: "AirCo is a huge company with a very

complex department-roles structure. It is even difficult to understand for employees that have worked there for more than 10 years." Similarly, the Back-End (BE) designer notes: "We found the front-end designer actually too late because nobody knew him, he didn't know about my project, it was by accident that we came across him." Due to inherent complexity, development teams also do not always align all the required stakeholders. As a result, when the implementation phase is initiated, new stakeholders enter and disrupt the project by imposing new conditions for a solution; that is, the solution must now also meet these requirements.

Communication overload. Another theme identified was that development teams experience *communication overload*. The moment an innovation appears *above the surface*, multiple departments regard it as their responsibility to challenge the legitimacy, viability, and feasibility of the project. The time spent communicating and aligning led multiple teams to lose momentum during their project, which resulted in a loss of enthusiasm and support. As the manager of the Boarding System (BS) project mentioned:

We tried to stay under the radar as long as we could and tried to communicate as late as possible in order to not get too many questions. By the time more people are aware, communication is key to keep everyone on the same level and

enthusiastic. [...] The need to be involved is so huge that you spend all your time and energy just keeping everyone updated, and still people feel left out. That leaves you almost no time to solve the actual issue.

An unsupportive organizational structure is identified as a barrier to innovation implementation (Sandberg and Aarikka-Stenroos, 2014; Story, Daniels, Zolkiewski, and Dainty, 2014). Specifically, siloed organizations can restrict innovation (Moss Kanter, 2006; Van de Ven, 1986). In AirCo, innovation has been restricted by a complex organizational design and subsequent challenges arising from navigating and “finding” the right stakeholders. Once these stakeholders are located, communication must involve them while carefully ensuring dialogue is productive rather than critical.

Several researchers have studied the relationship between organizational complexity and innovation outcomes on a macro level. Even though some studies conclude otherwise, the majority of these studies find a positive correlation between organizational complexity and innovativeness (Damanpour, 1996). This study indicates a negative relationship and thereby adds to the current literature by taking a more granular perspective and proposing that organizational complexity may work positively for ideation and prototype development, but not for implementation. This finding is comparative to Perry-Smith and Mannucci (2017), who propose that different phases of

the idea journey require different social networks.

A lack of interdisciplinary teams

The second often-mentioned factor contributing to the Valley of Death is the lack of an interdisciplinary team in the phases before the implementation phase. This may lead to a Valley of Death by causing a loss of momentum when new team members become involved later in the development process. In the most extreme cases, teams even needed to go “back to the drawing board” because unachievable new requirements were imposed by entrant stakeholders. As explained by the designer in the UM project:

After the prototyping phase, there was a big need for alignment and involvement of the technical departments. These were involved late and came with lots of questions. [...] Making a team earlier would have helped conducting efficient implementation from different sides. We would have balanced not only on design but also on the management and technical side.

The manager of the BS project also mentioned the lack of technical knowledge in the development team as a key challenge in the implementation phase. Both the BT and the BE designers mentioned that they needed to redesign (part of) their solution as new stakeholders got involved. Literature on innovation often mentions the need for cross-disciplinary teams (Veryzer, 2005), especially in design innovation

(Beckman and Barry, 2007; Lindberg, Meinel, and Wagner, 2011). The findings substantiate this and show that a lack of such teams at the early phases of development may lead to concepts that are difficult to implement as technical or managerial disciplines struggle to internalize what designers initially developed. As a result, the projects reach a deadlock when engineers or operational personnel become involved and identify new details requiring development.

Dissimilar innovation priorities and portfolio management

Design innovation requires the collaboration of different departments. As such, misalignment between departments regarding innovation prioritization (and the absence of portfolio management) may inhibit implementation. At AirCo, all departments are responsible for their own strategy and have the freedom to select which projects they prefer to progress. There is no overarching operational strategy specifying near-future developments. A corporate strategy is in place; however, this strategy consists predominantly of quantitative and financial metrics. A translation of these quantitative metrics to interesting innovation projects was absent. Observed instead were innovation teams that scouted corporate sponsors for new ideas. These teams experienced the Valley of Death when resources from other teams or departments were required. This loss of momentum was due to the way in which these other departments classified their projects.

“Low priority” would mean that the required support or resources would not be provided by other departments. The next section discusses this finding in greater detail.

Challenge to get onto the backlog. The lack of interdisciplinary teams and dissimilar innovation priorities were especially problematic when innovation teams depended heavily on resources or support from other departments. In AirCo, the digital department functions as one large, coordinated *scaled-agile production* factory. This means that the department maintains its own backlog, prioritization, working rhythm (or sprints), and planning events. Projects may thus encounter a Valley of Death as they end up being classified as “low priority.” The result is that projects go to the back of a digital backlog if they do not match the priorities of the broader digital department.

The BE designer explained how that team experienced this:

In the beginning of the project, we worked fast because there were not many dependencies and the prototype could be built stand-alone. [...] Implementation, however, takes so long because of the AirCo Digital department's planning. The project had to fit into their plans and priorities too. This was compounded by data limitations, slow APIs and back-ends that [were] not accessible.

An absence of integral and concrete innovation strategy can encourage teams that are what Rey, Pitta,

Ramonas, and Sotok (2019) call *autonomous and misaligned*. Teams within AirCo worked across scattered projects, which, while offering diversity, resulted in fewer synergies between stakeholders. These were some of the contributing factors to the Valley of Death being encountered in AirCo.

Sponsorship. Many of the interviewees also mentioned executive sponsorship as a vital element for development progress. The designer in the BE project mentioned:

[NAME] as a sponsor was definitely necessary because he gave me access to data and people. That's definitely important for implementation in big companies, you need someone to sponsor you. If you don't say their name when emailing, people don't feel obliged to help you.

However, sponsorship could also trigger a Valley of Death at the moment executive priorities shifted. The design team member of the BS case explained this: “Sponsorship is essential. After the last CEO left, the project lost momentum.” His business manager added: “The project was stopped because the new CEO [didn't] sponsor the project anymore and the project lost momentum after such a long time.” On the one hand, sponsorship is perceived to be needed to arrive at the prototype stage. On the other hand, the moment a project loses its sponsor, teams may lose their access to resources and encounter a slowing of momentum in their project—the Valley of Death takes effect. What

should be noted here is that this factor seems not to be limited to the Valley of Death as a phase in the development process. A loss of sponsorship may also end the project in an earlier stage of innovation too, such as exploration or problem defining. However, it does seem that the moment a project transfers from the prototype to the implementation stage, it must become resilient beyond one sponsor alone.

The managers at AirCo noted how reliance on sponsorship is related to misaligned priorities. As teams do not have a shared future vision of strategy to ground their projects, they need to rely on sponsorship. This leads to *pet projects* of senior managers that experience a Valley of Death when they require support from teams that report to other managers. This finding is in agreement with what scholars have found before. The need for a specific and shared *innovation strategy* has been recognized (Adner, 2006; Moss Kanter, 2006; Pisano, 2015). This article reveals how the absence of such a strategy may lead to a Valley of Death being encountered.

Overcoming Valley of Death challenges through design

The results of the interviews indicated three ways in which the practices of designers aided to mitigate the Valley of Death. These practices were materializing to align, user-centeredness, and embracing ambiguity and complexity.

Materializing to Align. According to the literature, the visual approach of

designers helps teams to align (Hargadon and Sutton, 1997) and share perspectives by achieving tangibility (Carlgren, 2013). Further, visualizing can assist in building constructive dialogue during innovation processes (Carlgren, Rauth, and Elmquist, 2016b). Both the designers and the managers in this study viewed visualization as a tool to aid cross-departmental communication and achieve alignment between departments. The manager of the BT project notes:

For me the visualization, prototyping, making it tangible . . . this process is very important in bringing the train up to speed, because people feel what this can bring. Also, this makes them understand: “this is helping me.” [. . .] It brings enthusiasm.

The designers of the BE project and the UM project both created a video. Both of them mentioned the alignment effect of this video within AirCo. As voiced by the BE project designer: “What worked very well is that we had the movie as a boundary object. [. . .] A lot of people, especially at the operations departments, saw the movie and it helped to create an image for them.” The UM designer provided more elaboration:

It is not the same to explain what the project is about to a programmer, to a business analyst or to a ground service agent. You always need to tailor the story to a level of detail and interest. What always worked as an ice breaker was the movie, even if it

creates a lot of questions it perfectly works to put everyone on the same page.

Visualization not only helps to align the team during the origination of a concept. Visualization helps to align team members who join the development team at a later stage and are influential in driving a project toward implementation.

User-centeredness. An aspect that all company managers mentioned was that designers frame projects around user needs instead of processes and numbers. As the BT manager explained: “Designers work more holistically. It’s not number-driven but people driven. [. . .] They think on an emotional and experiential level: that’s a different perspective.” The manager of the BS project contrasted this against his perception of other AirCo managers:

Most of the colleagues at the 6th floor [at the customer innovation department], 90% of the colleagues only go to the airport when they go to [foreign offices] or they go on holidays, they have no interaction with the real operation whatsoever.

The manager of the BE project explained how a user focus helped to align departments: “This helps to focus more on the customer and the user and shift from traditional AirCo processes.” The value of being user-centric is founded in what Carlgren and colleagues describe as “empathy building, deep user understanding and user involvement” (2016b, p. 46).

These attributes are usually viewed as important in the generative context of design. This research shows that there is an additional, more internally oriented advantage to being user-centered: aligning internal departments to user needs leads to concepts that cross the Valley of Death by uniting departments toward a consensus regarding the problem to be solved. This research shows that this is also a vital contribution of design, as design practices and principles encourage effective communication between departments, using visualization, for example, as a rapid way to share knowledge.

Embracing ambiguity and complexity. Two designers mentioned how design helps to tackle complex projects: “Designers know how to cope with complex and fuzzy projects, embrace the unknown, and that is a talent.” The result is that the innovation teams that are driven by design do not produce solutions to symptomatic or partial problems, but rather aim at providing more holistic solutions that consider the root cause of AirCo’s challenges. These solutions aim to take into account the desirability, viability, and feasibility issues at hand—whereas, in the past, AirCo has been driven mainly by efficiency-based decision making in keeping with the demands of the airline industry. Although this effect was not specifically coupled by the respondents to the Valley of Death, we and the manager with whom the results were discussed believe that a design approach to innovation leads

to solutions that are easier to implement, as the concepts are more “well thought through.”

Most literature that touches upon this subject is limited to mentioning that design culture is one in which ambiguity and complexity are embraced (Jahnke, 2013; Kolko, 2015). Liedtka (2015), however, takes a more explicit approach. She argues that, among others, a (focusing illusion) bias is reduced during the practice of design due to the introduction of broader perspectives. This article reveals that when broader perspectives are managed within design innovation and alignment is sustained between departments as a result, concepts find a safer path beyond the Valley of Death to full operational implementation.

Conclusion and further perspective

This article has reported on embedded multiple case studies at a large heritage airline, AirCo. The article has explored two research questions:

- What challenges associated with the Valley of Death are encountered during a design approach to innovation?
- How can a design approach to innovation be applied to overcome challenges related to this phenomenon?

Four AirCo projects were analyzed, using semi-structured interviews with designers and project managers to explore the implementation challenges encountered. The

Valley of Death in these projects can be linked to three main contributing factors:

- An organizational structure of strict silos, leading to misalignment of stakeholders and ineffective communication
- A lack of interdisciplinary teams, resulting in innovation teams losing considerable momentum as they approach the implementation stages of their project
- Divergent innovation priorities and a lack of portfolio management forcing teams to struggle to (1) acquire resources from other departments and (2) depend too heavily on senior sponsorship.

Further, findings reveal how the Valley of Death was mitigated through design practices. Design practices of materialization, user-centeredness, and a general embracement of ambiguity and complexity were valuable approaches to driving momentum within projects, thereby mitigating encounters with the Valley of Death. These practices aligned teams and stakeholders, reduced personal biases through user-centeredness, and allowed for multifaceted perspectives to be integrated while progressing through implementation phases of the innovation process.

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