



## **De la culture traditionnelle à la culture agile : vers la construction d'un pont franchissable From a traditional to an agile culture : building a crossable bridge**

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### **Résumé :**

Être agile a pendant longtemps été perçu comme étant un buzzword. Cependant, accentué par l'émergence du Covid-19, agile est maintenant considéré comme étant indispensable pour les entreprises. En effet, les bénéfices attendus de l'agilité tels que la capacité à rapidement s'adapter aux changements ou encore un meilleur alignement entre business et IT, sont d'autant plus utiles au vu de la situation actuelle. Toutefois, afin de récolter ces dits bénéfices, l'entreprise se doit d'entreprendre une transformation agile. Il ne s'agit donc pas, uniquement d'une simple adoption des pratiques agile dans certaines équipes de développement, mais une transformation globale de l'entreprise. Dès lors, la culture organisationnelle d'une entreprise considérée comme « traditionnelle » s'avère être un obstacle considérable à cette transformation, puisque à l'opposée d'une culture dite agile.

Ancré en Design Science Research, ce papier présente la première étape d'un projet de recherche visant à aider les organisations à mener leur transformation culturelle vers l'agilité. L'étude empirique au sein d'une entreprise traditionnelle entreprenant une transformation agile, nous a permis d'identifier un premier problème : la difficulté à définir ce qu'est une culture agile au vu d'une telle transformation. Face à ce problème, ce papier relate le développement d'une solution visuelle et collaborative et propose comme première étape un modèle conceptuel pour le design de cette solution. Nous contribuons ainsi à enrichir la littérature parcellaire sur la culture agile et le besoin d'outils appropriés, et proposons les premières bases au développement d'un outil visuel permettant aux acteurs de s'engager collectivement dans la cartographie de leur culture actuelle et l'identification de la culture agile souhaitée. Cette solution servira alors de pont entre la culture d'entreprise actuelle et la culture agile désirée, et facilitera donc le chemin sinueux vers l'agilité.

### **Mots clés :**

Transformation agile, culture organisationnelle, transformation culturelle, culture agile, design science research

## 1. Introduction

The Covid-19 pandemic has brought to light the value agile holds for organisations (Peters et al., 2020). Although in the context of digitisation and globalisation agility has regularly been deemed desirable, it is now considered essential for enterprises (Aghina et al., 2020, Jadoul et al., 2020). Indeed, the benefits that agile can offer, such as enabling an enhanced aptitude in handling changing priorities, allowing rapid decision making, and providing a better alignment between IT and business (Sommer, 2019; 14<sup>th</sup> Annual State of agile Report, 2020), have become more valuable than ever before (Jadoul et al., 2020). To reap these benefits however, organisations ought to engage in an agile transformation. By an agile transformation we refer to a scaled and comprehensive “*organisational mutation*” (Gandomani & Nafchi 2016, p.257) where an established organisation would need to embrace not only the agile methods but also its principles and values (Agile Manifesto, Beck et al., 2001). This is in contrast with a more simplistic notion of solely adopting agile practices within the organisation’s IT department.

An agile transformation is difficult (Koutsikouri et al., 2020) and encounters many different obstacles on its way (Denning, 2019), such as insufficient training or regulatory and government hindrances (14<sup>th</sup> Annual State of agile Report, 2020). Both practitioners (14<sup>th</sup> Annual State of agile Report, 2020) and scholars (Iivari & Iivari, 2011; Gandomani & Nafchi, 2016; Gerster et al., 2018; Gupta et al., 2019; Kischelewski & Richter, 2020) however agree that organisational culture is a significant – if not the most – aspect to consider for such a mutation since it represents a transformation’s largest impediment (Gerster et al., 2018). Overall, as emphasised by Lindvall et al. (2002, p.203): “*To be agile is a cultural thing. If the culture is not right, then the organisation cannot be agile*” – hence organisations cannot afford to overlook culture when engaging in an agile transformation. However, addressing the required culture change to support the transformation is challenging. This is particularly the case when the current culture is considered traditional and hence deemed contradictory to an agile culture (Sutharshan, 2013; Mergel et al., 2020), implying that a larger gap must be bridged between the two. While a traditional culture is considered to be bureaucratic with a general vertical power-structure (Zaitsev et al., 2018, Denning, 2019), an agile culture is believed to be adaptive to change, collaborative, better suited for knowledge sharing (Misra et al., 2009; Rebutisch et al., 2018), and overall, best suited to foster agile methods (e.g., Scrum, SAFe) (Strode et al., 2009). We witnessed this challenging journey during a nine-month empirical problem investigation in a Swiss, state-owned organisation, operating in the aviation industry.

The topic of culture change in the context of an agile transformation can be considered as an ill-defined problem since its solutions meet the following criteria: many exist, they are not guaranteed (Schraw et al., 1995) and they are debatable (Lynch et al., 2009). According to Avdiji et al. (2020), such ill-defined issues can benefit from Visual Inquiry Tools since they engage their users through collaboration and offer a shared visualisation of the matter. However, although past research has made it clear that having an agile culture is important; tools designed for traditional organisations, that offer a way to collaboratively tackle the needed culture change for their agile transformation are still scarce – if not inexistant. This paper paves the way towards a solution that assists traditional organisations and accordingly undertakes the first step towards the development of a Visual Inquiry Tool: the creation of a conceptual model that frames the concept of agile culture. We thereby address the following research question: *How can an agile culture conceptual model be developed to serve as a basis for the development of a Visual Inquiry Tool?*

In the interest of answering this research question, Design Science Research guidelines (Hevner, 2007; Peffers et al., 2007) and Avdiji et al.'s (2020) theory for Visual Inquiry Tool development are used as leverage. In addition, insights from the nine-month empirical problem previously mentioned are relied upon to ensure the issue's relevance. By answering this paper's research question, we initiate a Design Science Research project and thereby present the very first design and evaluation cycle of an agile culture conceptual model. Accordingly, this research study's main contribution is the proposal of a conceptual model which frames the concept of agile culture in a parsimonious, rigorous and relevant way for traditional organisations, regardless of the industry they operate in (i.e., sub-design principles for conceptual model: Avdiji et al., 2020). This contribution is essential as it serves as foundation for the design and development of a Visual Inquiry Tool that helps drive agile transformations by proposing an engaging, visual and collaborative way for users to map their current culture and perform a gap analysis around the key concepts of an agile culture. Thereby, the Visual Inquiry Tool aims to serve as a passable bridge between the current and desired agile cultures.

This paper proceeds as following: firstly, we provide a theoretical background concerning organisational culture and culture change in order to ensure a common understanding of the topic. This part is concluded by highlighting an existing gap in the literature – namely that no collaborative and visual tool exists to help traditional organisations address their agile culture change. We proceed to present the design science research paradigm and introduce the process model (Peffers et al., 2007) and design theory (Avdiji et al., 2020) leveraged to conduct this research study in view of filling the gap. In the following section, the problem is identified and motivated by means of an observation and field study (Morana, 2020) in the industry after which, the solution's objectives are presented in a distinct section. The two subsequent sections walk through the design cycle composed of the design and development of the conceptual model based on the existing literature and its evaluation (Venable et al., 2016). Finally, we conclude this paper by presenting the identified limitations and discussing the next steps for further research.

## 2. Literature review

This theoretical background introduces organisational culture change and highlights its importance in an agile transformation. Subsequently it aims to shed light on ways to address the needed culture change in view of an agile transformation. Finally, an existing gap is uncovered and discussed.

Hofstede's (1980) seminal paper defines organisational culture as «*the collective programming of the human mind that distinguishes the members of one human group from those of another. Culture, in this sense, is a system of collectively held values*» (ibidem, p.24). It is subsequently stipulated that culture is to the collective what personality is to the individual. Additionally, many authors have asserted that organisational culture can encompass practically anything in a company (Sackmann, 1991; Siakas & Siakas, 2007; Iivari & Iivari, 2011) such as for instance, the habits, traditions, values, principles, practices, ideas, the autonomy and trust individuals are accorded (Tolfo & Wazlawick, 2008; Tolfo et al., 2011; Iivari & Iivari, 2011). Consequently, organisational culture is a remarkably broad notion as it incorporates a multitude of dimensions (Gupta et al., 2019). Moreover, the organisational culture is multi-layered, meaning that there exists a multitude of layers constituting the culture in an organisation (Siakas & Siakas, 2007; Tolfo et al., 2011; Iivari & Iivari, 2011). However, a dominant culture, based on the prevailing values in a company practically always arises which is then

acknowledged to be the organisation's main culture. Therefore, when discussing organisational culture, one usually refers to the dominant culture (Tolfo et al., 2011).

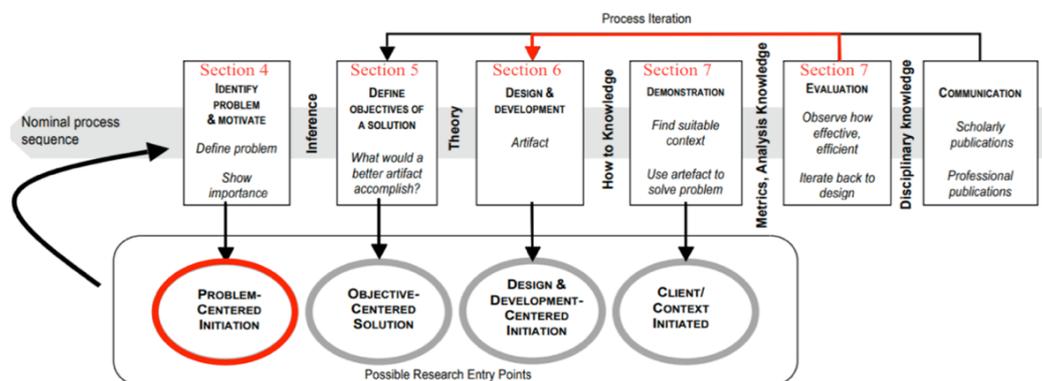
Culture continues to represent the greatest impediment in an agile transformation (14<sup>th</sup> Annual State of agile Report, 2020). Thus, an organisation's culture must be considered and adapted to suit an agile culture, in particular when the organisations' current culture is deemed traditional (Sutharshan, 2013). Despite the difficulty of the task, such a change is considered possible (Ogbonna, 1992). Moreover, although a culture transformation cannot perfectly be planned (Siakas & Siakas, 2007), an analysis prior to the transformation to define the current and desired culture needs to be undertaken (Willcoxson & Millett, 2000; Sahota, 2012; Gupta et al., 2019). According to Schneider et al. (2013), this analysis is in reality crucial since cultural change concentrates on closing the gap between the current and desired cultures. In view of best supporting a cultural change, Gray and Osterwalder (2016, p. n./a.) assert that the use of tools is essential. More precisely, the same authors argue that "*When you want to change from one state to a future state (...) you need to make it tangible so you can actually work on it*". In a similar way, Proctor (2015) emphasises on the need for tools because according to the author, addressing culture change by solely relying on conversations is deeply ineffective. Therefore, when addressing culture change, a tool is argued to be a necessity in order to tackle the subject in an efficient manner (Proctor, 2015; Gray & Osterwalder, 2016; Osterwalder et al., 2016).

Furthermore, Gray and Osterwalder (2016) argue that solutions developed to address issues relating to a topic such as culture change must engage the users by creating an experience and making the big picture's issues tangible and visible. Gray (2016) asserts that visually mapping the organisational culture is in fact important in view understanding it, and thus working on it. Tools that meet those requirements are named Visual Inquiry Tools (Avdiji et al., 2020). Visual Inquiry Tools are founded on design thinking techniques (e.g., visual thinking, ideation, prototyping and storytelling) and are employed to solve strategic managerial problems in a joint inquiry manner (Avdiji et al., 2020). Joint inquiry refers to the process of jointly defining and exploring a problem, and subsequently iterating on the possible solutions (Avdiji et al., 2020). Such tools provide an innovative, iterative, and social alternative to an otherwise linear and rigid approach (Boland et al., 2008 cited in Avdiji et al., 2020). In essence, a Visual Inquiry Tool allows the exploration of a problem space, the generation of alternative solutions and, the visual representation and review of the solution (Avdiji et al., 2020). Therefore, since culture change is an ill-defined problem, Visual Inquiry Tools are a suitable type of tool as they are employed to solve such managerial problems in a joint inquiry manner (Avdiji et al., 2020).

Consequently, in the context of their agile transformation, traditional organisations must ideally be able to visually and collaboratively map their current and agile cultures to subsequently be able to bridge the existing gap. However, on one hand the many existing agile tools (e.g., Qumer & Henderson-Sellers, 2008; Abidin et al., 2017) do not seem to fulfil those requirements and on the other hand, tools which fulfil those requirements are too generic and lack theoretical foundations (e.g., Culture Map, Gray et al., 2015) (c.f. section 4). A design opportunity consequently lies in the vast number of existing tools. Specifically, the design of a tool which is founded on solid academic grounds, allows for dynamic, collaborative, and visual inquiry, is tailored towards agile culture and developed for traditional organisations.

### 3. Method

We address the gap by following the Design Science Research (DSR) paradigm (Nunamaker et al., 1990; Hevner et al., 2004; Gregor & Hevner, 2013), a recognised approach in information systems which aims to create innovative artefacts that solve relevant organisational issues in an iterative way (Hevner et al., 2004). Such an objective is achieved by following an iterative approach where insights from the environment and knowledge base (e.g., existing literature) are leveraged in order to design and then evaluate the designed artefact. Accordingly, since this research aims to produce an innovative solution to drive agile transformations from a cultural perspective, DSR seems to be the sensible choice.



**Figure 1: Our Design Science Research process model (adapted from Peffers et al. 2007, p.54)**

This paper launches our DSR project. Such a design process is long and can be rather confusing due its many iterations. Thus, for clarity reasons we decided to structure it with Peffers et al.'s (2007) DSR process model (figure 1). Accordingly, in this paper we initiate the DSR's first cycle (figure 1: the red annotations are added by the authors and relate to the specific sections of this paper) by identifying the problem in the environment (i.e., relevance cycle, Hevner, 2007) and motivating it by relying on the existing literature (i.e., rigour cycle, Hevner, 2007). Subsequently, the solution's objectives are drawn up. The solution's design and development are then addressed by leveraging Avdiji et al.'s (2020) design theory for Visual Inquiry Tools. The mobilised theory is composed of three design principles – namely, the development of a conceptual model that frames the subject of interest, its instantiation into a shared visualisation, and the development of directions of use that allow joint inquiry. In this paper we focus on the first design principle. Specifically, we develop a conceptual model and evaluate it with two agile practitioners. The two remaining design principles are outside the scope of this paper and will be addressed by future research.

### 4. Problem identification and motivation – rigour and relevance cycle

We followed Peffers et al.'s (2007) process method and began our research by identifying a problem. To this end, we took into consideration Hevner's (2007) recommendation for DSR and sought out a relevant problem by identifying it in the industry (i.e., relevance cycle). In order to do so, we conducted an empirical problem investigation by means of observation and fieldwork (Morana, 2020). Additionally, we provide theoretical motivation in view of supporting the rigour cycle.

In the course of an internship, we conducted a nine-month field study from 1<sup>st</sup> September 2019 to 31<sup>st</sup> May 2020 in a large (i.e., 1,500 employees), swiss, aviation company undertaking a

comprehensive top-down agile transformation since end 2018. We categorise this firm as “traditional” since it is vertically structured, bureaucratic, has a command- control management style, and silo-thinking dynamics (Zaitsev et al., 2018; Denning, 2019). In 2015, agility was introduced bottom-up in the organisation due to a number of new hired project managers who each brought with them different ways of using agile methods. Number of projects started following, to a certain extent, agile methods. However, employees had not been trained, nor had agile been introduced as a culture. Consequently, a misconception of agile and a misapplication of its methods rose in the organisation. In 2018, due to the growing confusion, the organisation’s executives decided to undertake an orchestrated agile transformation. By agile transformation they did not only want to achieve a correct adoption of the agile methods, but also a culture shift in view of converging towards an agile culture. The company’s internal culture change group, formed of six key people, was thereby appointed to drive the organisation’s agile transformation. Accordingly, our empirical problem investigation’s objective was to uncover what exact difficulties the company was facing in their cultural change journey in the context of their agile transformation. In this regard, we conducted fieldwork by engaging with employees during the nine-months period, took part in five meetings held by the culture change group and conducted four unstructured interviews. The interviewees were two agile practitioners with over six years’ experience (one of which was part of the culture change group), the head of people development responsible for the culture change group and an additional member of the culture change group whose expertise lies in applied psychology.

Altogether, the fieldwork highlighted a generalised and multi-levelled misconception regarding agile. Particularly, the organisation’s agile transformation is hindered by the misunderstanding of agile and the inability to define the desired agile culture. This problem breaks down as follows: First, on the executive level, the group in charge of the top-down change initiative was encountering difficulties in defining the desired agile culture. As a matter of fact, much confusion laid in the understanding of agile and what it meant as a culture. Admittedly, a large range of agile culture definitions have been proposed by both scholars and practitioners and it thereby comes as no surprise that the culture change group was confused and overwhelmed by the matter. However, not having a clear definition of the desired culture represents an impediment to such a change initiative. It is in fact argued that to adapt a company’s culture, the definition of the current (Tolfo et al., 2011; Schneider et al., 2013) and desired (Willcoxson & Millett, 2000) cultures need to be undertaken. The culture change concentrates on bridging the gap between both states (Schneider et al., 2013). Therefore, given that having a clear definition of the to-be culture is a prerequisite to a culture change, the fact that the culture change group did not have a clear vision of the desired agile culture represents a large drawback to their agile transformation. Second, on the operational level, most employees did not view agile as a culture but rather as a project management method such as Scrum for instance. In reality, the concept of culture in agility was greatly overlooked by many. In this regard Denning (2019) argues that culture change initiatives typically thrive when they are supported by both a bottom-up and a top-down engagement. Therefore, in order to have a greater chance at a successful agile transformation, both the “top” and “bottom” need to be engaged and, thus, understand the meaning of agile and what it represents as a culture. However, as noted by an employee from the IT department: “*Confusion persists between the agile "mind-set and culture" and agile "frameworks"*”. Altogether, the fieldwork highlighted the existing confusion regarding agile and what it means as a culture.

Although we identified the problem (i.e., the misunderstanding and inability to define agile culture in view of an agile transformation) in a specific environment, it can be traced back to a class of problems that is frequently encountered by organisations undertaking an agile

transformation: cultural hindrances in view of an agile transformation. Indeed, on the first page of the 14<sup>th</sup> Annual State of agile Report (2020) one could read in big: “*Culture is still a thing: the highest-ranked challenges to adopting (...) agile continue to be related to organisational culture*”. Furthermore, this claim is held by many scholars in the existing literature (e.g., Iivari & Iivari, 2011; Gandomani & Nafchi, 2016; Gerster et al., 2018; Gupta et al., 2019; Kischelewski & Richter, 2020). Therefore, not only is organisational culture a common problem in agile transformations, but it is particularly the case for companies which have a traditional culture since it is notably different from an agile one (Denning, 2019). Consequently, established organisations such as the one we inquired ought to pay special attention to their culture change initiative in view of conducting a successful agile transformation. Hence, despite the problem identification brought to light only one traditional organisation’s experience, thinking that it merely concerns this specific organisation would be minimising the problem’s scope. Such a culture change requires great diligence and as previously discussed, could benefit from a Visual Inquiry Tool.

On that matter, the Culture Map (Gray et al., 2015) possesses most of a Visual Inquiry Tool feature’s – namely, it offers a visual space for users to map out their current culture, allows the users to discuss the topic, and overall enables joint inquiry. Despite that, the Culture Map cannot be considered as a suitable solution for the above-described problem for the following reasons. Firstly, the tool’s theoretical foundations are opaque, and we consequently cannot tell how rigorous its basis is. Secondly, we consider the Culture Map to be too generic to address the identified issue. Indeed, since the problem analysis revealed that organisations found it difficult to picture their agile culture, the solution would need to integrate the fundamentals of an agile culture to help users define their agile culture. The Culture Map is thus not specific enough since it is not built around such concepts and does not guide its users towards an agile culture. However, while the Culture Map does not provide a solution to the identified problem, it will nonetheless later on be leveraged for the solution’s design and development stage (cf. section 6).

## **5. Objectives of a solution**

In light of the identified problem, we aim to develop a solution which targets established organisations needing to undergo a culture change in view of their agile transformation. Accordingly, since we discovered that organisations struggle to define their agile culture, we need to design a solution which provides an accessible yet rigorous representation of an agile culture. Additionally, we must involve both the teams and the management to create a simultaneous top-down and bottom-up effect (Denning, 2019), and thus have everyone onboard the culture change journey. Hence, our solution intends to engage its users into collectively and visually mapping their current culture around the constituting components of an agile culture and subsequently allow them to perform a gap analysis against it. This objective is met by designing a Visual Inquiry Tool which is built on the key characteristics of an agile culture.

## **6. Conceptual model design and development – design cycle**

To initiate the first design cycle, we mobilised the design theory for Visual Inquiry Tools (Avdiji et al., 2020) and addressed its first design principle as our first step towards the solution’s design. Accordingly, we developed an agile culture conceptual model while taking into consideration the following two aspects: firstly, the problem we identified, and thus the solution we aim to design does not solely concern the organisation we observed, but rather

many organisations. In light of this, as first requirement, we decided to build a conceptual model that is generic enough to suit many organisations in the sense that it is specific to neither an industry nor an agile method (e.g., SAFe, Scrum). Secondly, we had to consider the change of working environment induced by the Covid-19 pandemic. The conceptual model had to make sense in a remote working environment because while Covid-19 might not last for ever, people are eager to continue working from home even if it is not required to anymore (Mancl & Fraser, 2020). This for instance, implies as second requirement, that face-to-face communication, which is a principle listed in the agile Manifesto (Beck et al., 2001), does not make much sense anymore since we now rely on virtual means to work together (Mancl & Fraser, 2020). While bearing these two requirements in mind, we proceeded to develop the conceptual model.

### **6.1 Justificatory knowledge**

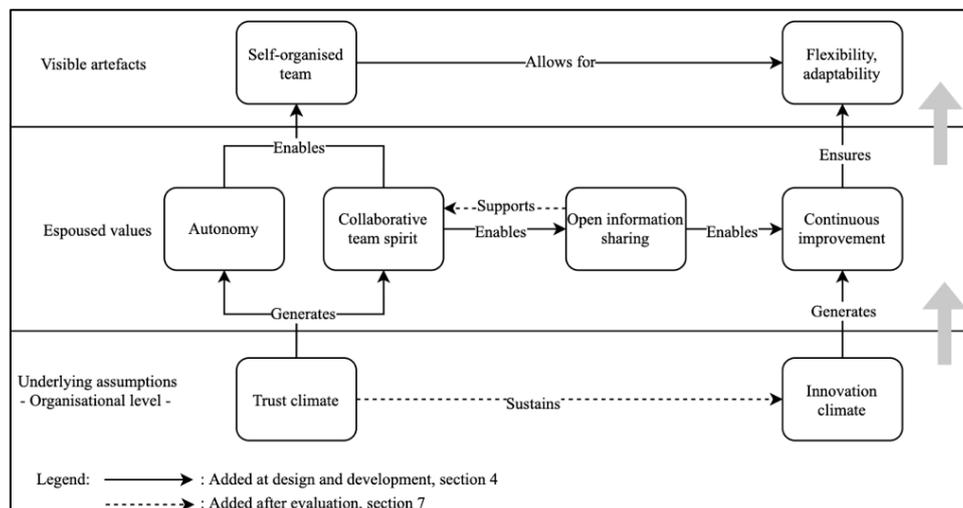
For this purpose, we followed the three sub-design principles for the development of a conceptual model provided by the design theory (Avdiji et al., 2020). The first sub-design principle states that the conceptual model must properly *frame* the concept of interest by identifying its components and integrating them together. The second sub-principle refers to the *rigour and relevance* offered by the conceptual model. While rigour is ensured by leveraging the existing knowledge base, relevance is ensured by evaluating the model with practitioners. Finally, the third sub-principle, *parsimony*, argues that the conceptual model must be kept simple and clear to guarantee its accessibility and understandability. To *frame* the concept of interest (i.e., agile culture), we decided to use a deductive approach, and thus drew upon the existing knowledge base to develop the conceptual model. Furthermore, we decided to structure our conceptual model using Schein's seminal model of culture levels (1988) since this model is well-established and despite its age continues to be relevant for both professionals and scholars (e.g., the Culture Map, Gray et al., 2015 and Tolfo et al., 2011). The model was built based on the main assumption that organisational culture possesses three different levels, each of which varying in tangibility. The most tangible level is named *Visible artefacts*. It includes the visible structures and processes, such as elements that can be seen, heard and felt. The second level, *Espoused values* includes the goals, ideals, and aspirations. Finally, while culture manifests itself within the two first layers, the third and deepest one, *Underlying assumptions*, represents a culture's foundation. These assumptions are shared, taken for granted and define how information is interpreted. As a reminder, in this paper we discuss agile transformation from an organisational standpoint, and not solely from a team perspective. We therefore take into consideration the dynamics from both the organisational level and team level. In this regard, it is mostly the management that influences the culture's basic underlying assumptions (Schein, 2004) and their effect will then affect the team level. Consequently, a team can only aspire to be agile if it is endorsed by the organisation.

### **6.2 Design search process**

We began by identifying the key agile culture characteristics by turning to the existing body of knowledge. Therefore, since there is a common agreement that agile culture originates from the values and principles included in the agile Manifesto (Beck et al., 2001) (Siakas & Siakas, 2007; Tolfo et al., 2011; Rebentisch et al., 2018), we decided to use the manifest as starting point. Given that the principles are more exhaustive and implicitly encompass the agile Manifesto's values, we took the decision to only consider the principles and not the values. Subsequently, since the principles are solely considered as guidelines and do not strictly define agile culture (Dingsøy et al., 2012), we decided to rely on additional knowledge base inputs

to enrich the agile Manifesto’s principles. In particular, in view of not reinventing the wheel we took advantage of the existing research studies that clearly propose an explicit set of agile culture key characteristics. Three studies met this requirement – namely Strode et al. (2009), Tolfo et al. (2011), Rebentisch et al. (2018) (appendix A). Combined, the three research studies and the agile Manifesto offer 72 characteristics which can be used to describe an agile culture. Therefore, to ensure the model’s parsimony we applied two exclusion criteria: first, we left out characteristics that were either too specific to a method or too engineering driven (marked with “\*” in appendix A). For instance, we decided not to consider elements such as refactoring, pair programming and collective code ownership which were part of Tolfo et al.’s (2011) agile culture depiction. Second, since after applying the first criterion, 58 characteristics still remained, we decided to remove the characteristics which were mentioned by strictly one paper (marked with “\*\*” in appendix A). With help of the literature, we then further built on the existing knowledge by organising the 49 remaining characteristics proposed by the three studies and Manifesto into eight groups (i.e., *self-organised team*, *flexibility and adaptability*, *autonomy*, *collaborative team spirit*, *open information sharing*, *continuous improvement*, *trust climate* and *innovation climate*) (further detail in appendix A). These eight groups will henceforth be referred to as “components”. This step was necessary in order to fully adhere to the parsimony sub-design principle (Avdiji et al., 2020) since many characteristics used to describe an agile culture still remained despite the two applied exclusion criteria. Subsequently, as previously discussed we used the three levels of culture (i.e., visible artefacts, espoused values, and underlying assumptions) to view the eight components. For this purpose, we used Tolfo et al. (2011) study as benchmark to classify the conceptual model’s components since their research paper already organises their agile culture characteristics using Schein’s (1988) levels of culture. Finally, we concluded the conceptual model’s first design cycle by linking the components together (figure 2).

### 6.3 Design artefact description



**Figure 2: agile culture conceptual model**

Figure 2 above illustrates this paper’s proposed agile culture conceptual model. In this model, since in an agile culture it is taken for granted that individuals are both responsible and competent (Tolfo et al. 2011), the individuals are trusted (i.e., *trust climate*) to get the job done (Beck et al., 2001) and are consequently granted the *autonomy* to do so (Stray et al., 2018; Rebentisch et al., 2018). The organisation therefore allows for the people to be empowered (Strode et al., 2009; Rebentisch et al., 2018). In this regard, the management solely serves as

facilitator (Strode et al., 2009), and is both collaborative (Strode et al., 2009; Rebenstisch et al., 2018) and supportive (Rebenstisch et al., 2018). A group which is given autonomy can be considered a *self-organising team* since such a team is responsible to take joint team-decisions (Moe et al., 2009) and is held accountable for them. Such a team evolves in a democratic work environment (Tolfo et al., 2011). Furthermore, when the team is awarded enough freedom, the members will display greater motivation (Tolfo et al., 2011) for the development of their solution since they will have more pride in their work (Packlick, 2007), and thus feel empowered (Tolfo et al., 2011). Additionally, given that the decision-making is in the hands of the team members who are in direct confrontation with the issue, the problem-solving process is carried out in a timelier manner (Moe et al., 2009; Rebenstisch et al., 2018). The team is consequently able to rapidly adapt to the changes that may occur (i.e., *flexibility, adaptability*) while keeping a sustainable pace (Beck et al., 2001; Tolfo et al., 2011; Rebenstisch et al., 2018). Moreover, having a *trust climate* relates to the concept of psychological safety. Edmonson (1999) defines team psychological safety as “*a shared belief held by members of a team that the team is safe for interpersonal risk raking*” (ibidem, p. 350). With this belief, people are more willing to speak their mind and bring up their concerns (Delizonna, 2017), which encourages an honest, trustful, collaborative and respectful interaction scheme (i.e., *collaborative team spirit*) (Strode et al., 2009; Tolfo et al., 2011; Rebenstisch et al., 2018). Since individuals feel safe to speak their mind, the communication is transparent and open (Tolfo et al., 2011) which improves the *information sharing* process (Madi et al., 2011; Rebenstisch et al., 2018). Furthermore, information sharing takes into account the feedback (Strode et al., 2009; Tolfo et al., 2011) that individuals are able to receive which allows them to learn, and thus *continuously improve* (Beck et al., 2001; Strode et al., 2009; Tolfo et al., 2011; Rebenstisch et al., 2018). Finally, the organisation must have an entrepreneurial and *innovative climate* which drives people towards innovation and risk taking (Tolfo et al., 2011; Rebenstisch et al., 2018), and thus contributes to continuously improve. Finally, having a continuous improvement scheme ensures flexibility and adaptability since nothing is taken for granted and everything is re-thought and reflected on.

## **7. Demonstration and evaluation – design cycle**

As per the followed process model (figure 1), we continue the first design cycle (Hevner, 2007) by demonstrating and evaluating the conceptual model. This evaluation stage is argued to be fundamental to any DSR project (Hevner et al., 2004). Therefore, in view of conducting a proper evaluation, we decided to follow the four steps included in the Framework for Evaluation in Design Science (FEDS) proposed by Venable et al., (2016). Additionally, it is worth noting that considering the iterative nature of DSR, the evaluation presented in this paper is the first of many to come.

The first step included in the FEDS is defining the evaluation’s goal. Accordingly, at this stage, the evaluation’s objective was to reduce the uncertainty and risk (Venable et al., 2016). The main risk we perceived was that the conceptual might not properly frame the concept of agile culture from the environment perspective. It was a considerable risk we had to take into account since the conceptual model will later on serve as basis for further design by being instantiated into a shared visualisation (design principle 2, Avdiji et al., 2020). This formative evaluation (i.e., first dimension of FEDS) therefore aims to identify the issues regarding the conceptual model as early as possible and correct them appropriately. The evaluation is deemed formative in the sense that the goal is to take actions in improving the conceptual model based on the evaluation results. Regarding the FEDS second step, we selected the *Human Risk & Effectiveness* strategy evaluation which starts off by several formative evaluations early on in

the project. This strategy then evolves and suggests conducting summative evaluations. In this paper we conduct the first formative evaluation and therefore solely concentrate on this particular evaluation. Subsequently, we addressed the FETS third step and defined what needed to be evaluated. We wanted to evaluate the conceptual model's components' and links' validity. They were deemed valid if they achieved the objective they were designed for (Gregor & Hevner, 2013): articulate and frame the concept of agile culture. Finally, in relation to the last step, we designed the evaluation episode. In this regard, we followed Venable et al. (2016) proposed heuristics and analysed our constraints in terms of available resources (i.e., time, people, budget), prioritised what was essential and built the evaluation plan accordingly. We opted for a naturalistic evaluation, and thus conducted this first evaluation cycle with two certified agile practitioners. While one of them is certified with SAFe 5 program consultant and lean portfolio management, the other is a certified Scrum product owner. The former practitioner works as a PMO (project management office) expert in the inquired organisation (c.f. section 4) and the latter works in the agile centre of another traditional organisation. Overall, the aim was to know whether the two agile practitioners thought that the model's components and the relations between those components made sense, if some were missing, and more generally, if according to them, the conceptual model correctly framed the concept of agile culture (i.e., validity).

The two agile practitioners were therefore asked questions such as: “*Do you think this simple representation covers the basic agile culture?*”, “*Is something missing to properly describe an agile culture? If so, what?*”, “*In your opinion, are the arrows correct? Should they be pointing the opposite way?*” and “*Should some arrows be deleted and/or added?*”. The evaluation was conducted face-to-face via a semi-structured interview for one, and remotely and asynchronously due to Covid-19 restrictions, for the other. The asynchronous and remote evaluation was conducted by means of a document which illustrated the conceptual model and included the questions the respondent was asked to answer and send back. The evaluation brought to light two noteworthy aspects which impacted the conceptual model design (cf. dotted line in figure 2). First, both practitioners emphasised on the importance of trust in an agile culture: one respondent noted: “*It's OK to fail, it's OK to disagree*” which relates to the concept of psychological safety included under the *Trust climate* umbrella, and the other brought up that it could fundamentally be linked to every other component in the model. Therefore, considering *trust climate* had not been linked to *innovative climate*, we adjusted the model to take the feedback into account (cf. dotted line in figure 2). Second, a respondent mentioned that although having a team spirit certainly enables open information sharing, the opposite is also true. The agile practitioner mentioned that receiving and providing feedback from/to other team members reinforces the team cohesion. Thus, we took this comment into consideration and adapted the model by adding an arrow pointing into the opposite direction (cf. dotted line in figure 2). Besides the two above mentioned points, the inquired practitioners considered that as well as properly framing the concept of agile culture, the conceptual model's eight components (i.e., *empowered self-organised team*, *flexibility and adaptability*, *autonomy*, *collaborative team spirit*, *open information sharing*, *continuous improvement*, *trust climate*, and *innovation climate*) made sense as well as the three levels of culture used to view the components. Special emphasis was made concerning the relevance of *continuous improvement*. For instance, one respondent noted: “*Learn from failures as well as successes*” and the same practitioner pursued by mentioning that continuous improvement could occur if there was continuous feedback as well as a correct exploitation of the lessons learned (i.e., validating the link: *open information sharing* and *continuous improvement*). Overall, this formative intermediate test stage (Gregor & Hevner, 2013) participated in ensuring the conceptual model's validity.

## 8. Conclusions and future cycles

“By now, agility in the company is no longer viewed as just hype or a trend; rather, it is considered an essential basis for future growth. This is particularly true during the COVID-19 crisis”. (Peters et al., 2020, p. 36) – This is the first key statement included in the 2020 Future Organization Report. It is consequently rather clear that organisations ought to engage in an agile transformation (Aghina et al., 2020) and make it comprehensive by extending it beyond the borders of IT development teams. It is now practically common knowledge that organisational culture represents an agile transformation’s largest impediment. However, despite it being widely recognised, and the fact that culture change is inherently difficult (Ogbonna, 1992), no suitable tool exists to help traditional organisations address their needed culture change in the context of their agile transformation. By suitable we refer to a tool that would allow its users to collaboratively and visually map the culture in order to represent the big picture change (Gray, 2016; Gray & Osterwalder, 2016). Moreover, after a nine-month empirical problem investigation in a traditional organisation currently undertaking an agile transformation, we found out that the concept of agile culture was difficult to grasp.

Therefore, although culture change in view of an agile transformation is important and difficult, no appropriate tool seems to exist to help drive such a journey. In view of this, we decided to develop a solution by relying on DSR (Peffer et al., 2007) and by mobilising the design theory for the development of Visual Inquiry Tools (Avdiji et al., 2020). As a result, this research paper’s main contribution is a conceptual model which frames the concept of agile culture. Its development was conducted following the sub-design principles offered by the design theory (Avdiji et al., 2020) thereby its rigour, relevance and parsimony are ensured. This is a necessary contribution as it serves as basis for the future development of a Visual Inquiry Tool which would help traditional organisations cross the bridge to meet an agile culture in the context of their agile transformation. In particular, such a solution would allow its users to visually map their current culture around the key components of an agile culture, to subsequently perform a gap analysis. The soon-to-be designed Visual Inquiry Tool’s contribution can be defined as an *Improvement* since it will be an innovative artefact designed to solve a known problem (Gregor & Hevner, 2013). Additionally, our research offers a methodological contribution by exploiting DSR in information systems.

We recognise limitations to both the research process and the resulting conceptual model. Notably the fact that the empirical study was conducted in one organisation, and that the conceptual model’s evaluation relied on only two agile practitioners. This was however to be expected since this research paper represents the first step in a long and iterative DSR project. The proposed conceptual model is consequently still in an iterative phase. Therefore, as an imminent next step we aim to further evaluate and iterate on the conceptual model’s design to ensure a strong foundation to our Visual Inquiry Tool. To this extent, we will follow the selected evaluation strategy (i.e., *Human Risk & Effectiveness*, Venable et al., 2016) and consequently conduct further formative face-to-face evaluations with additional agile practitioners. The objective would be to gather additional feedback regarding the model’s components, the links and their view concerning the lens used to view the agile culture with (Schein, 1988). With these insights we would subsequently iterate on the conceptual model’s design. Once the conceptual model iterations are concluded (i.e., no new insights are being gathered from the formative evaluations), we aim to instantiate the model into a shared visualisation (2<sup>nd</sup> design principle: Avdiji et al., 2020). And as per the chosen evaluation strategy, we will proceed to conduct summative evaluations in a naturalistic setting (i.e., field setting) and thereby turn to the inquired organisation discussed in section 4. Furthermore, in

order to do guide our summative evaluation we aim to use the five testable propositions proposed by the design theory as criteria to guide the evaluation (i.e., efficacy, effectiveness, efficiency, elegance, and ethicality, Checkland, 2000 cited in Avdiji et al., 2020). Finally, we will address the 3<sup>rd</sup> design principle (Avdiji et al., 2020) by defining how the tool must be used in a way that allows for joint inquiry.

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## Appendix

### Appendix A. agile culture conceptual model components' details

Table 1 below offers further detail regarding the component's construction. The table exhibits how the characteristics describing an agile culture were grouped into the conceptual model's eight key components (i.e., listed in the second column).

Schein (1988)		Tolfo et al., (2011, p.430)	Strode et al., (2009, p.7)	Rebenisch et al., (2018, p.2116)	Beck et al., (2001)
Levels of culture	Key component	Iceberg of agile culture	Organisational culture factors	Constructs that determine an agile culture	agile Manifesto principles
Visible artefacts	Self-organised team	<ul style="list-style-type: none"> <li>- empowered</li> <li>- motivated</li> <li>- democratic work environment</li> <li>- horizontal hierarchy</li> </ul>			<ul style="list-style-type: none"> <li>- businesspeople and developers must work together daily through the project</li> <li>- the best architectures, requirements, and designs emerge from self-organising teams</li> </ul>
	Flexibility, adaptability	<ul style="list-style-type: none"> <li>- emphasize flexibility and spontaneity</li> <li>- proactive and adaptive</li> <li>- sustainable pace</li> </ul>		<ul style="list-style-type: none"> <li>- comfort with change and uncertainty</li> <li>- fast, team driven decision making</li> </ul>	<ul style="list-style-type: none"> <li>- welcome changing requirements, even late in development</li> <li>- agile processes harness change for the customer's competitive advantage</li> <li>- agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely</li> </ul>
Espoused values	Autonomy	<ul style="list-style-type: none"> <li>- responsibility</li> <li>- self-organisation</li> </ul>	<ul style="list-style-type: none"> <li>- the project manager acts as a facilitator</li> <li>- the management style is that of leadership and collaboration</li> </ul>	<ul style="list-style-type: none"> <li>- supportive and collaborative management</li> <li>- autonomy and empowerment of people</li> </ul>	
	Open information sharing	<ul style="list-style-type: none"> <li>- transparency</li> <li>- openness</li> <li>- communication</li> <li>- discussion</li> </ul>		<ul style="list-style-type: none"> <li>- open information sharing</li> </ul>	<ul style="list-style-type: none"> <li>- the most efficient and effective method of conveying information to and within a development team is face-to-face conversation</li> </ul>
	Collaborative team spirit	<ul style="list-style-type: none"> <li>- honesty</li> <li>- respect and consensus</li> <li>- trust</li> <li>- equity</li> <li>- commitment</li> </ul>	<ul style="list-style-type: none"> <li>- the organisation is based on loyalty and mutual trust and commitment</li> <li>- social interaction in the organisation is trustful, collaborative, and competent</li> <li>- the organisation encourages social interaction</li> </ul>	<ul style="list-style-type: none"> <li>- team orientation</li> <li>- intensified personal communication</li> </ul>	

	Continuous improvement	<ul style="list-style-type: none"> <li>- feedback</li> <li>- simplicity</li> <li>- learning and continuous improvement</li> </ul>	<ul style="list-style-type: none"> <li>- the organisation values feedback and learning</li> <li>- the organisation is result oriented</li> </ul>	<ul style="list-style-type: none"> <li>- willingness to continuously learn and improve</li> </ul>	<ul style="list-style-type: none"> <li>- at regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behaviour accordingly</li> <li>- simplicity - the art of maximising the amount of work not done - is essential</li> </ul>
Underlying assumptions	Trust climate	<ul style="list-style-type: none"> <li>- belief in the competence and responsibility of individuals</li> </ul>	<ul style="list-style-type: none"> <li>- the organisation enables empowerment of people</li> </ul>		<ul style="list-style-type: none"> <li>- give them the environment and support they need and trust them to get the job done.</li> </ul>
	Innovative climate	<ul style="list-style-type: none"> <li>- stimulus to creativity, to foster innovation and take moderate risks</li> <li>- mental models that enhance adaptation, cooperation, and continuous learning and improvement</li> </ul>	<ul style="list-style-type: none"> <li>- the leadership in the organisation is entrepreneurial, innovative and risk taking</li> <li>- the organisation values teamwork is flexible and participative</li> </ul>		
<b>Excluded characteristics</b>					
		<ul style="list-style-type: none"> <li>- daily meeting*</li> <li>- refactoring*</li> <li>- coding standards*</li> <li>- collective ownership*</li> <li>- test driven development*</li> <li>- agile modelling and simple design*</li> <li>- small releases in incremental and iterative software development*</li> <li>- pair programming*</li> <li>- continuous integration*</li> <li>- consultation**</li> <li>- coherence**</li> <li>- balance between technical excellence, personal achievement, deliver value to the customer and organisational success**</li> <li>- negotiated scope contracts**</li> <li>- onsite customer and active stakeholders' participation**</li> <li>- awareness that agile philosophy must be in line with the mission of the organisation and the satisfaction of different stakeholders**</li> <li>- participation**</li> <li>- focus**</li> <li>- courage**</li> </ul>			<ul style="list-style-type: none"> <li>- our highest priority is to satisfy the customer through early and continuous delivery of valuable software*</li> <li>- working software is the primary measure of progress*</li> <li>- deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale*</li> <li>- continuous attention to technical excellence and good design enhances agility*</li> </ul>

### **Table 1: agile culture conceptual model's components**

In addition to the agile Manifesto's 12 principles (Beck et al., 2001), we leveraged three studies which already propose a clear set of agile culture characteristics. First, by means of a multiple-case study, Strode et al. (2009) identify ten organisational culture factors that display a significant correlation with an effective use of an agile method. Thus, defining the best suited environment to foster agility. Second, Rebentisch et al. (2018) on the other hand, propose eight agile culture constructs after having conducted a systematic literature review. Third, in their paper Tolfo et al. (2011) present a large set of agile culture characteristics and view them using Schein's (1988) model of organisational culture.

We left out the characteristics that were either too specific to a method or too engineering driven (marked with "\*" at the bottom of the table 1). Additionally, the characteristics which were strictly mentioned by only one paper (marked with "\*\*\*" at the bottom of the table 1) were also excluded from the selection in view of ensuring the parsimony (sub-design principle for the design of a conceptual model, Avdiji et al., 2020). We then viewed the 49 remaining characteristics using the three cultural levels proposed by Schein (1988) as a lens. To do so, we made the most of the already existing knowledge and structured the characteristics following Tolfo et al.'s (2011) research study. This decision was made since their study already sorts their 42 proposed characteristics into the three cultural levels proposed by Schein (1988).