EASST

9th International Symposium
on Leveraging Applications of Formal Methods,
Verification and Validation - Doctoral Symposium, 2021
(ISoLA DS 2021)

Asking Why:
Towards Conscious Decision-making in Times of VUCA

Barbara Steffen

24 Pages

Asking Why:
Towards Conscious Decision-making in Times of VUCA

Barbara Steffen

University of Potsdam

Abstract: To ensure an organization's long-term success in times of vulnerability, uncertainty, complexity and ambiguity it is fundamental that organizations focus on continuous adaptation. The key to success is to understand why to adapt and what to achieve to ensure that all initiatives and measures provide new internal and/or external value for the organization. This concerns, in particular, digitalization that due to its unclear definition is today simultaneously perceived as threat and opportunity. It is important that organizations understand that digitalization is not a goal in itself but a means to increase success. The *from **Digital Vagueness** to Aligned, Lifelong Understanding and Evaluation Canvas* (Digital VALUE Canvas) aims to support and guide organizations in identifying, designing and implementing value-driven digitalization solutions: To ensure unique value propositions and competitiveness it is essential that these solutions build on the organization's strengths and are enabled by today's digital possibilities.

Keywords: Digitalization Strategy, VUCA Challenge, Asking Why, Conscious Decisions, Value-driven, Technology-driven, Software-enabled

1 Introduction

"The real disruption is coming. […] If you believe with electric cars alone, we've arrived in the future already, you're wrong. The key is digitalization. The car is now a software-driven product."[1] This statement by Volkswagen CEO Ralf Brandstätter in 2021 indicates that the future belongs to software-driven organizations. Tesla demonstrated the paradigm shift from engineering- to software-driven cars for years. Today, Tesla is worth $952.03 billion which is more than the nine largest carmakers around the world combined while selling less than 1% of global cars [2, 3]. Although Tesla is a car company it gets treated and valued by Wall Street like a tech company [3]. Tesla, Google, Amazon, Uber and new unicorns like Stripe are some of many examples for a competitive advantage of software-driven organizations.

But this paradigm shift is not new. We already philosophize of the fourth revolution's impact for over 30 years. More than 10 years ago in 2011 the industry-led initiative "Industrie 4.0" was initiated. It later got promoted by the German federal government to support the German manufacturers' competitiveness [4–6]. Today we got used to add the *4.0* to any upgradeable domain e.g., Manufacturing 4.0, Healthcare 4.0 and Education 4.0.

The fourth revolution is difficult to grasp as no common shared understanding nor standards exist [7]. The definitions are as varied as the praised digitalization measures. Despite the different perceptions one thing is clear – the continuous and accelerating change cannot be stopped. New capabilities, competences, technologies, approaches and business models lead to today's VUCA conditions [8]. VUCA stands for volatility, uncertainty, complexity and

ambiguity and describes our intangible and wicked world – where knowledge gained in the past must not hold true in the future [9, 10].

However, just talking about the fourth revolution is not enough. Digitalization needs to be understood, adopted, formed and lived. Today, the global software industry already grows faster than its GDP [11]. From 2016 to 2018 Germany's software industry grew by only 4.13% while Europe (5.2%), the US (5.6%) and China (13.07%) showed steeper growth curves [11]. In 2020 Germany imported €39.5 billion worth of IT services while it exported €36.2 billion in the same year [12, 13]. Thus, Germany only exports about 90% of what it imports – showing that Germany is already behind.

In 2020 a McKinsey study found that the COVID-19 pandemic drastically accelerated the adoption of digitalization [14]. Change normally taking years just took a few months to be implemented. Despite this trend Germany has almost none of its public services online in 2021. Also, its health authorities are still relying on fax machines in the fight of the pandemic while schools and students had to keep the teaching running on outdated hardware [15].

Looking at Germany's progress in the last decade it is not surprising that the German government is worried that too little happens too slow. As a Fraunhofer report from 2021 stated ([11], p.6) "Germany still underestimates the strategic relevance of software for the economy". Especially industries without international competition like healthcare, education and state/city administration lag behind. To ensure that the German economy stays competitive and adopts new technologies, the government initiated many different regulations that promote, foster and enforce the digital transformation in institutions and organizations. The goal is clear: the successful transition from an industry-driven to a digitally-driven nation, as Dorothee Bär, the federal government Commissioner for Digitalization, put it in 2020 ([16], p.4). Three of the many initiatives are the Digital Pact for Schools worth €5 billion, the Online Access Act aiming at making all 575 government services digitally available by the end of 2022 and the AI strategy funding over 100 new AI professorships to ensure that AI made in Germany is world leading [16].

However, studies show that a successful transition does not consist of just adopting digital technologies. Today about 70% of digital transformation projects fail as reports of several consulting firms like McKinsey and Boston Consulting Group show [17, 18]. A common reason is that digital projects focus more on implementing currently praised technologies than on solving the organization's deeper problems. But without knowing why to act (motivation and goals) and what problem to solve, the solution cannot be a good fit and instead adds to the *trough of disillusionment* [18, 19]: solely adopting digital technologies is no investment with guaranteed success.

Instead, thriving organizations follow Steve Jobs' mantra: "You've got to start with the customer experience and work back toward the technology – not the other way around". Today's success stories often excel at software, but they outperform their competition because they understand that "the value is in what gets used, not in what gets built" as stated by Kris Gale [20]. Important is that the transformation is *value-driven* and *software-enabled*. Digital transformations building on hyped technologies and/or focusing on sustaining current competences rather than solving identified challenges are doomed to fail.

This paper focuses exemplary on Germany and its journey towards a digital nation. To evaluate Germany's digitalization strategy, this paper analyzes the Hospital Future Act (Krankenhauszukunftsgesetz - KHZG) in force since the 28th October 2020. It aims at guiding digitally-distant hospitals towards their digitalization. We observe that the given time frame is

insufficient for a value-oriented analysis and enforces a technology push that, combined with the lack of adequately educated IT personnel, will end up in a collection of additional silo-ed solutions covering the KHZG's individual requirements with high follow-up costs and low user acceptance. This paper therefore aims at answering the following research question:

How to move from a technology-driven towards a value-driven digitalization strategy?

i.e., how to avoid the mentioned shortcomings.

This paper is structured as follows: Section 1 motivates this paper. Section 2 introduces digitalization and its winners and losers. Section 3 analyzes the German government's approach towards digitalizing its hospitals. Then Section 4 defines project success and introduces the Digital VALUE Canvas. In Section 5 the Digital VALUE Canvas gets adopted to the KHZG context to derive its domain-specific interval of possible digitalization strategies. Section 6 summarizes and discusses the results before the paper closes in Section 7 with its conclusion and outlook.

2 Digitalization

This section defines digitalization and describes why it is relevant and difficult to adopt. As markets and their digitalization-induced changes cannot be tricked, organizations should adopt it rather sooner than later.

2.1 What is Digitalization?

Digitalization is the enabling driver of the 4th revolution. Unfortunately, no generally accepted definition exists, and the definitions that exist are rather vague, like *adopting digital technologies* [6]. The missing shared understanding and tangibility complicate its successful adoption. Interestingly, digitalization does not refer to the innovation of IT-technologies, but to its novel integration in the adopting industry [6].

Digitalization can be described through its associated technologies, ranging from mobile and cloud computing, advanced analytics, machine-2-machine communication, community platforms, 3D printing and advanced robotics [21]. They are used in different constellations to realize and enable cyber-physical systems (integrating computation capabilities with physical processes [22]), Internet of Things ((inter-) connecting things, objects and/or machines so that they can interact and cooperate [23]), Internet of Services (the availability of services via the internet [24]) and Smart Factories (assisting and/or even automating production tasks [25]). These technologies aim at a new level of connectivity, transparency, aggregation, alignment, optimization, automation, adaptability and customization. These benefits can be adopted at the production and output stages.

For organizations, digitalization is an important enabler of product and service improvements and innovations. It may even enable novel business models, that change how to offer value to customers. In addition, it can increase an organization's effectiveness and efficiency. The smart factory is an example of adopting digitalization to connect, assist and automate the internal processes. Thus, the technologies impact the way of working and collaborating between staff (e.g., digital meetings via Zoom and Microsoft Teams got

established during the COVID-19 pandemic), between people and machines and from machine to machine.

Examples of organizations that transformed traditional industries through new digitally enabled offers are Airbnb, Uber and Tesla. The first two are digital platforms: they turned the traditional hotel and taxicab industries into *the winner-takes-all markets* by changing how value is generated, at the expense of the previous market leaders [26, 27]. They disrupted an industry by means of a new value proposition: greater customer service via digital platforms. In contrast, Tesla entered a previously engineering-driven industry and built the first software-driven (electric) car. They were one of the first to demonstrate a successful digital transformation of a traditional industry's core product. All three organizations entered their markets during the fourth revolution having identified previously unsatisfied customer requirements and are built on digital capabilities without being held back by legacy.

2.2 Why is Digitalization Relevant and Difficult?

Darwin taught us that evolution means *survival of the fittest* [28]: once the environment changes, so do the survivors. The same happens to organizations: to ensure their survival they have to *keep running to stay where they are* [29]. Thus, they have to adapt to their constantly changing environment, in a situation of accelerating change. Today the average US S&P 500 company lives 15 years. Compared to 80 years ago where a company's life averaged 67 years companies lost 80% of their lifespan [30].

Digitalization is an additional accelerator for change due to shorter innovation cycles in IT and more disruptions of the status-quo than ever before. This development increases the pressure to constantly adapt by embracing dynamic capabilities [31]. MGI estimated in 2018 that an additional $13 trillion global GDP could be possible by 2030 due to the adoption of digitalization, automation and AI [32]. These technologies have the lever to significantly increase productivity and enable new business models.

As digitalization is profitable, it cannot be stopped. Organizations can only decide whether to perceive it as a threat or as an opportunity. Especially traditional industries and their established organizations should take the VUCA dynamics of digitalization seriously and prepare themselves [8]. The power of digitalization with its great lever increases the *vulnerability* of the industry's developments by increasing the *uncertainty, complexity* and *ambiguity* of what is to come and how to best prepare for the change. Thus, organizations need to constantly be aware of the market dynamics (outside-in perspective) and their in-house capabilities (inside-out possibilities) to match them. To achieve this match, organizations need to engage in close interdisciplinary collaborations. Only this multi-competence and multi-perspective approach ensures the value proposition's or internal value's desirability, feasibility and viability. Thus, the challenge is to achieve a holistic understanding and alignment making *conscious decisions* possible (see Figure 1) [7].

2.3 Winners and Losers of Digitalization

The digitalization changes today's innovation-game and leads to new winners and losers (see Figure 2). New entrants like start-ups benefit from digitalization as it offers them many opportunities to reshuffle the market rules and dynamics and enables world-wide visibility

over the internet almost at no cost. They benefit from the radicality of this progress by completely changing the offered value and the way of doing business.
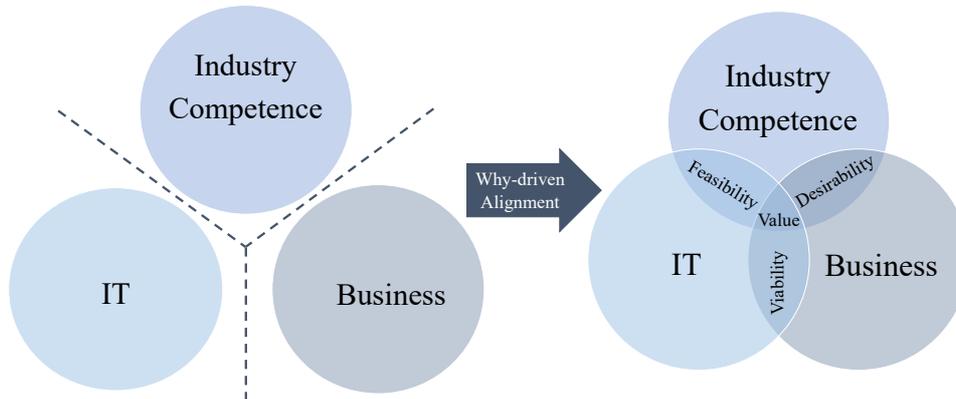

Figure 1: Towards conscious decision-making based on the why-alignment ([7, 33]*)*

Additionally, digitalization significantly reduces the entry barriers: it may reduce the required investments, offer untapped possibilities to generate new value and enable fast experiments and iterations of the value proposition. It is not surprising that digitally native organizations already generate about 54% of their industry's total revenue [32]. Thus, start-ups are prime examples of Porter's fifth, often overlooked, competitive force: Porter identified that organizations are mostly focused on their *direct competition, customers*, *suppliers* and *substitutes* and tend to neglect the threat of *new entrants* [34].

To a good extent, start-ups owe their success to the failure of established organizations to successfully innovate. This is the innovator's dilemma as described by Clayton Christensen [35, 36]: when new technologies cause great firms to fail. Christensen observed that the innovations which initially led to the success of an organization later on become their Achille's heel: Organizations are so focused on their past and current successes that they cannot imagine to be seriously threatened by new technologies.
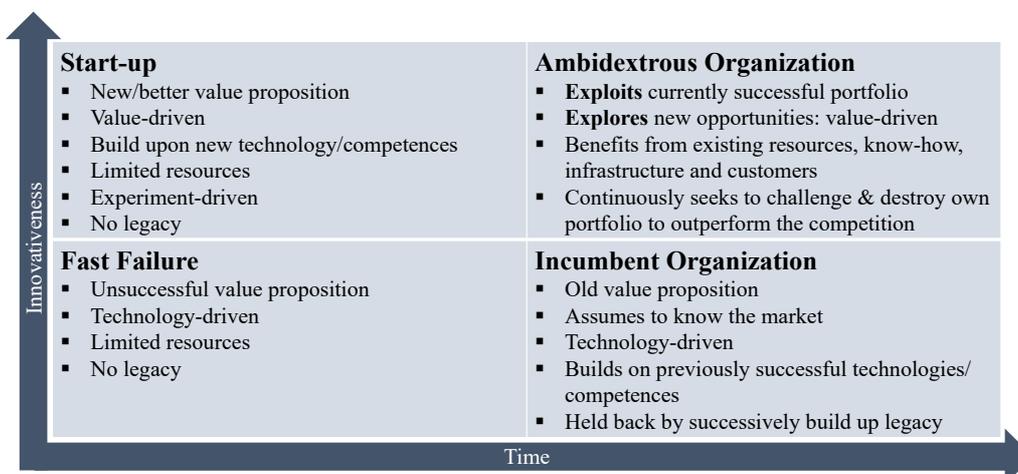

Figure 2: The innovativeness of organizations and their strategies over time

Embracing new technologies like digitalization also means acknowledging that current core competences may lose importance [37] and that further improvements of their current portfolio only may have marginal effects. This insight is important for organizations to not fall victim to the innovator's dilemma as their competitors' innovations already threatens their existence.

2.4 Towards the Successful Adoption of Digitalization

To prevent falling victim to the innovator's dilemma, established organizations should invest into becoming an ambidextrous organization [31, 38] which are characterized by two complementing parts: the *exploitative* part focusing on continuously improving the existing portfolio, and the *explorative* part constantly seeking for inventions and innovations (see Figure 3). These two parts need separate cultures, structures and processes and yet must remain connected and intertwined. Senior executives are responsible for this alignment and must steer the organization's holistic vision, direction and strategy accordingly. In the digitalization context, the explorative part searches specifically for digitally enabled value propositions to prepare the digital transformation and also transfer it to the exploitative part over time.
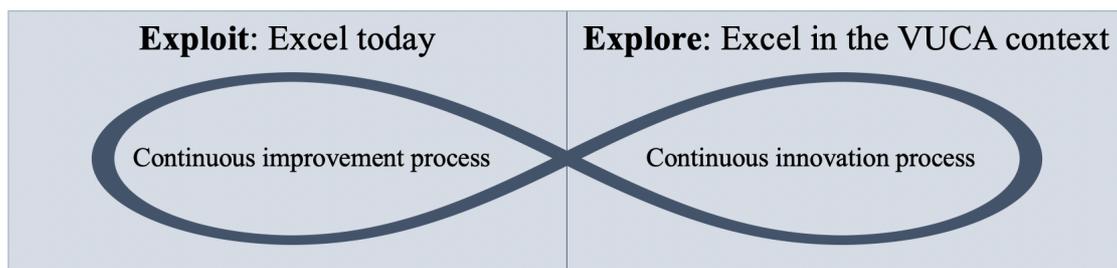

Figure 3: Ambidextrous organizations: The continuous symbiosis between exploit and explore

However, an exploration focus does not guarantee success by itself. Innovation can be driven by either technology or value. The technology-driven approach focuses on adopting technologies as solution while the value-driven approach focuses on understanding the problem first (see Table 1). As less then 30% of digital transformation projects succeed, just adopting digitalization (measures) is not enough. Digitalization needs to serve a purpose: it is a means to an end rather than an end in itself. Digitalization was presented as a threat to the status-quo for years. However, as it is a vague concept, especially small to medium sized enterprises adopted a "wait and see" approach. They perceived the value-driven approach of digitalization as riskier than the less-invasive approach of adding hyped technologies like the cloud to their infrastructure. E.g., being "in the cloud" seemed sufficient for progressive marketing strategies satisfying customers and even had advantages like eased storage and sharing of data.

This strategy suffices as long as the competition innovates at the same speed. However, digitally native organizations benefit from the slow and fear-driven established organizations: When the threat materializes, these established organizations are unprepared: Because of their focus on and (massive) investment in their highly advanced products and services they typically forget to reflect on the impact of these investments and to consider new opportunities.

The "Asking why" approach aims at addressing the innovator's dilemma: It supports organizations in analyzing and checking whether their current digitalization approach achieves value for the organization, its stakeholders and/or its customers [8] (see Table 1). In the following, we analyze the digital transformation strategy of established organizations via six successive *Why* questions:

*1. **Why** do established organizations invest into IT-technologies?*
To decrease the threat of digitalization.

   *2. **Why** do they feel threatened by digitalization?*
   Because digitalization empowers new value propositions and competitors.

      *3. **Why** does it empower new competitors?*
      Because they have a value-driven mindset, new capabilities and are not held back by any legacy enabling them to better serve today's market.

         *4. **Why** do they have a better understanding and capabilities?*
         Because established organizations did not (see the need to) adapt.

            *5. **Why** did not the established organizations adapt?*
            Because they were (always/still) successful with what they did/offered.

               *6. **Why** were they (or are still) successful?*
               Because they served an attractive value proposition at that time.

Just six simple why-questions identify that the goal of digital transformation is not the implementation of digital technologies, but to optimally serve the customers under the conditions of the competition at a given time. Already today, but even more so in the future, the most attractive value propositions are software-enabled.

Table 1: Comparison of the technology- & value-driven digitalization strategies

Category	Technology-Driven	Value-Driven
Initiated	Externally	Internally
Mind-set	Digitalization as threat/risk	Digitalization as opportunity/chance
Motivation	Solves the 'digitalization problem'	Adopts digitalization to create value
Solution	Adopts hyped & standardized technologies	Holistic and customized solution to specific customer/internal problems
Approach	Plan-driven	Change- & Agility-driven
Time horizon	Short-term	Long-term
Result	Sustains (past) competitiveness	Invests into future competitiveness

As summarized in Table 1, the value-driven approach favors holistic and customized solutions that build on the organization's strengths and the market's needs over adopting standardized and hyped technologies. The value-driven approach focuses on long-term adaptation for survival over short-term gains and leads to specific and customized solutions that consider the organization's customer understanding, current goals, strengths and weaknesses. It further strengthens the organization's focus and competitiveness. Ideally, it gets implemented in an agile and learning-oriented fashion to enable iterations and improvements based on integrated feedback loops.

3 Governmental Regulations as Drivers towards Digitalization

Today the German government runs more than 100 projects to promote, foster and enforce the adoption of digitalization. The aim is to enhance Germany's adoption of digitalization by providing guidance, goals, deadlines, incentives and/or sanctions. In this section the digitalization lever of the Krankenhauszukunftsgesetz (KHZG, in English the Hospital Future Act) gets introduced and evaluated in the context of Germany's healthcare system.

3.1 The Krankenhauszukunftsgesetz: Digitalizing the Hospitals

The KHZG invests via its fond - the Krankenhauszukunftsfond (KHZF) - into the digitalization and modernization of German hospitals. Jens Spahn, the federal minister of health from 2018 to 2021, explains that especially the COVID-19 pandemic made the healthcare systems' shortcomings tangible [39]. In 2017 a study by the Technical University Berlin adopted the Electronic Medical Record Adoption Model to analyze the digitalization maturity of Germany's hospitals. The study found that the average German hospital has a digitalization maturity score of 2,3 on a scale of 0 to 7, where 7 represents a paper-free hospital. It also revealed that almost 40% of German hospitals are still on level 0, proving that they are hardly digital at all [40].

"All evaluations show over and over again that hospitals in Germany lag far behind in an international comparison when it comes to IT and the degree of digitization"[1], says Peter Bobbert, MD, member of the board of the Marburger Bund and president of the Berlin Medical Association [40]. He added that despite the conversion of many systems from analog to digital the needed hospital-wide interoperability is still missing. Thus, the double documentation maintains showing that the hospital's silo-system integration neither saves time nor improves the availability of information [40].

Based on this status-quo many experts welcome the KHZG and its vision. They hope that it will accelerate the hospitals' digitalization. The KHZG passed on the 28th October of 2020 and defines 11 digitalization categories (e.g., patient portals, digital care and treatment documentation and digital medication management) [39]. Hospitals were asked to identify their greatest shortcomings to select the most critical categories and apply for financial support until the end of 2021. In total €3 billion federal funding and an additional €1.3 billion of state funding were available [39, 41].

But the KHZG does not just support hospitals in their efforts to digitalize. From 2025 onwards hospitals are threatened with 2% deductions on all invoices for stationary hospital

---

[1] This Section's direct quotes were originally German and got translated to English for this paper.

care, if they do not meet the must-have criteria of the KHZG [42]. This set hospitals under significant pressure as once the application phase closed, they had only three years left to implement eleven major mostly unconnected projects simultaneously. Thus, the KHZG translates into particular pressures for the hospitals which are prepared the least and supported by the fewest IT staff as successful transformations are dependent on the required IT expertise.

To evaluate the KHZG's success and progress all hospitals who applied for funding had to fill out the same digitalization maturity self-assessment twice. This quantitative self-assessment consists of more than 230 questions [43] that are based on the EMRAM digitalization measures [43]. The first deadline for the self-assessment was on the 30.06.2021 defining the hospital's digitalization at the start [44]. The second assessment is due on the 30.06.2023 [44]. The differences are supposed to reveal the progress due to the KHZG's guidance and funding efforts.

3.2 Evaluation of the Approach

This sub-section evaluates the KHZG's effectiveness based on the hospital readiness, (IT-) expertise, time, (IT-) solution, costs and success measures.

3.2.1 Hospital readiness

Within about three years €4.3 billion got invested into Germany's hospitals. The goal is clear *let's digitalize the hospitals*. However, this vision hits a healthcare system still struggling from COVID-19, without the required IT-expertise and very heterogenous internal processes and legacy systems. Thus, the hospitals perceive the vision and its opportunities as immense threat and pressure. Especially, as it also applies to small basic and standard care hospitals "where three to four people work in IT and where the CEO now suddenly sees that IT is not only a cost factor but could also get a relevant budget. These IT departments are overloaded […]," says Ecky Oesterhoff, who heads the hospital division at the health innovation hub of the German Federal Ministry of Health. [45]

In these hospitals the IT departments are normally quite independent and implement projects and new IT solutions even without consulting the envisioned users. In this context it does not surprise that the integrated solutions do not fit the initially intended purpose, a problem also known as the integral quality constraint [33, 46]. This mismatch in addition to the lack of sufficient training to correctly use the newly adopted digital technologies explains why the staff has problems to accept digital transformation [47]. To put it in numbers, only approximately 30% of the hospitals' staff receives training and more than half of the surveyed hospitals' staff are digitalization skeptics [48].

To increase the acceptance of digitalization and the value of the IT systems "users always need to be involved in (their) planning and development, as well as in (their) initial tests," demands Dr. med. Peter Bobbert [40]. This is essential to ensure that the staff benefits and is on board.

3.2.2 (IT-) expertise

Neither the hospitals nor the IT-providers have sufficient qualified staff to implement the needed solutions in the pre-defined period states Michael Waldbrenner, who is the Managing

Director of Deutsche Telekom Clinical Solutions [49]. Two-thirds of the hospitals are worried that the required know-how for the planned projects is not available [48]. In 2019 even before the KHZG was in place a representative study of the auditing firm BDO and the German Hospital Institute DKI found that hospitals were desperately looking for new IT-staff [48]. Every second hospital could not fill its vacant IT positions. Now that the KHZG is in place the supply-demand gap even increases [48]. "The market's demand is huge and the capacities in the industry - especially in terms of personnel - have not increased," says Dr. med. Malte Süß surgeon and head of an interdisciplinary project team for digitalization at Diakovere Krankenhaus gGmbH [40]. He fears a fight between the hospitals over IT-providers.

Not only do too few experts exist, but the available ones might not even have the sufficient qualifications to successfully implement the required IT-solutions. Once IT-providers have completed a one-hour online course with a corresponding learning success check they receive the official KHZG certification by the Federal Social Security Office for software developers [50]. This *KHZG driver's license* is sufficient to become an authorized IT service provider and to advise hospitals, support the application process, design and implement solutions and in some states, it even allows them to certify their own projects' suitability. This certification was a necessary proof of fit in the funding application process [45, 48]. However, it is highly questionable whether this certification is sufficient to evaluate IT strategies and their requirements in complex IT infrastructures [45, 51].

In addition, hospitals do not only depend on IT-experts during the KHZG application and implementation stages, but they are also highly dependent on secured maintenance and operations services once their new IT systems are integrated. If these services are not covered by internal IT-staff or external IT-providers, the IT-systems and thus the overall KHZG investment are at risk to become obsolete. This may have critical consequences as the more IT-solutions the hospitals integrated the more they depend on their IT infrastructure and its operation.

3.2.3 Time

The KHZG dictates a very challenging timeframe. Hospitals struggling for years to progress towards digitalization had only one year to apply for financial support. Just three years later in 2025 they might face first sanctions, if they do not fulfill the required must-have criteria. Not to forget that the KHZG passed in times of extreme pressure. Hospitals have to integrate the KHZG while also handling the COVID-19 pandemic and the implementation of the electronic patient file [45]. It is normal that already small and/or local IT projects like upgrades and enhancements can take years. Now complete hospitals shall get digitalized in just a few years. This leaves hospitals no time to customize the KHZG implementation towards their needs. Instead the time pressure made them susceptible to supposedly easy and ready IT-solutions covering the KHZG's must-have criteria [45]. This solution-first approach does not require shared understanding, but only the selection of standardized solutions covering the KHZG's must-have criteria.

3.2.4 (IT-) solution

The lack of IT-expertise forces hospitals to rely on IT-providers when selecting IT-solutions and applying for the funds [51]. This gives IT-providers an enormous power as they are even

allowed to certify their own solutions in some states. This leads to situations as described by Henning Schneider, CIO of Asklepios who heard statements like "Watch this, we have a ready-made offer here, you just need to sign it and we'll manage the funding application for you." Several other CIO's and IT directors confirmed this kind of all-inclusive offers [45]. In many cases, hospitals have no choice but to accept such offers without understanding their impact.

As the KHZG's must-have criteria and funding conditions left too much room for interpretation the self-certification was even more problematic [51]. Michael Waldbrenner stated that e.g., the maturity model which was supposed to describe the benchmark was made available after the first projects already started. This is particularly problematic as hospitals face sanctions from 2025 onwards if they do not fulfill the (back then unknown) assessment criteria. Further, additional criteria like GDPR and ISO standards drastically increase the solutions' complexity and prices [49]. The fact that the individual states have additional laws that may, e.g., prohibit even suggested technologies further complicates the realization [49].

3.2.5 Total Cost of Ownership

While the KHZG covers the initial investment many costs like maintenance and operations are ongoing. These costs are normally assumed to be up to 20-25% per year of the initial investment [40]. In relation to the KHZG's funding of €4.3 billion it is another billion per year. In addition, also hardware, software and personnel costs incur [45]. Dr. med. Malte Süß expects yearly IT expenditures to double due to the increased maintenance, service and security of the newly integrated IT systems [40]. Thus, the KHZG is a nice kick-off funding, but it does not finance the hospitals' digitalization sustainably in the long-term. Today, it is not clear how hospitals will pay for these ongoing costs of IT operations and whether they will be able to receive further financial support in the future [49].

3.2.6 Success Measures

From 2025 onwards the successful digital transformation of the hospitals and the KHZG's effectiveness and success will be judged based on the self-assessment questionnaire and the evaluation of the must-have criteria fulfillment of the KHZG's 11 categories. Are *important* technologies like AI, cloud and closed-loop systems integrated? Is a digital strategy defined? Do interfaces connecting different IT tools exist? It is questionable whether the self-assessments will be useful and comparable as the questionnaire e.g., neither defines what a digital strategy is nor when a tool can be interpreted as connected and integrated. In addition, these quantitative measures do not measure any newly gained value for the hospitals themselves.

For hospitals especially qualitative measures like increased productivity, staff/patient satisfaction and decreased bureaucracy, mistakes, costs and manual tasks etc. are relevant. These measures could assess the gained hospital value. Unfortunately, these measures are not included in the government's evaluation of success.

To summarize the hospitals' staff already suffers from too much administrative duties and silo-ed IT-solutions. Instead of focusing on the hospitals' current challenges and problems via digitalization measures, the KHZG pushed for pre-defined criteria and technology-driven

solutions. If the hospitals fail to live up to these criteria until 2025, they are punished with sanctions. It is questionable whether the regulators and IT-consultants should be the ones deciding and judging what is best for the hospitals rather than the hospital's stakeholders. In the long run after all funds are spent the market will decide what is successful and what is not. Following Eric Ries' logic where "[…] value means to provide benefit to the customer; anything else is waste", it remains to be hoped that the investments are not wasted and lost.

Today, hospitals neither have the digital expertise nor the power to question the regulators' and consultants' criteria and solutions. In addition to this vulnerability and dependency they even have to fight with other hospitals over the scarce resources supporting their KHZG-conforming digital transformation. Thus, there is a risk that German taxpayers fund a *digital transformation* potentially worsening the existing legacy by adding additional silo-ed IT-solutions. These might further reduce the staff's productiveness by increasing their administrative overhead and frustration. In the worst case it even could lead to a *digitalization phobia* meaning that hospitals strongly abstain any further approaches towards digitalization even if value-driven. For them more digitalization might equal more bureaucracy. Imagine the value which could have been possible with €4.3 billion.

4 Fostering Conscious-Decision Making

This Section proposes an approach towards conscious decision making. Organizations need to be aware of why they do things, what they want to achieve and how to achieve it. Here, it is important that they understand the gap between what is vs. what has to be in order to achieve their goals. Understanding the motivation, goals and the current gap is the basis towards holistic decision making. In sub-section 4.1 project success and value get defined. Sub-section 4.2 defines the Digital VALUE Canvas which gets applied to the KHZG context in Section 5.

4.1 Realized Value: The Definition of Project Success

Any project has a trigger which is the underlying motivation why it started. However, in many cases this trigger does not get clearly defined, questioned and transparently communicated. If this trigger is not clear, it is impossible to judge whether the project actually was a success or not: Even "successful projects" which benefitted from a competent team, a well-defined plan and were finished in time and on budget might never get successfully integrated and used in practice [33, 52]. Such projects are great examples of the violation of the integral quality constraint where "great and well-functioning products and/or solutions do not fit the needs of the actual business development context" ([33], p.4). So, the relevant question is:

How to define a project's success?

The abovementioned examples of "successful IT projects" demonstrate the misunderstanding of assessing a project's success based on its *what* – it's solution description and specified must-have criteria - instead of judging it based on its *why* – the envisioned added-value for the organization. Following the logic of the *why understanding* any IT project which never got successfully integrated nor achieved value for its envisioned users is considered a failure. In a sense, technically successful projects that are never used are a worst-case scenario: They wasted all resources without a benefit for their organizations.

Unfortunately, sub-section 3.2 indicates exactly this worst-case pattern for many hospitals in the context of the KHZG in the coming years: *The hospital will have adopted and implemented new digital measures and IT-systems fulfilling the regulation's must-have criteria*, but (with high follow-up costs and) without (potentially even with reduced) tangible value for their main operation, like mistake reductions, increased quality, increased time and cost efficiencies or enhanced staff satisfaction.

This gap between a *why and what success definition* shows that projects often skip the most important step when planning and implementing projects. To save time project teams often cut corners and jump directly into the definition of the solution. However, to enable conscious decision-making in strategic projects it needs to be ensured that the project team shares a mental model and aligned understanding of its motivation (*why are we here)* to derive suitable goals (*what do we want to achieve)* and according implementation strategies *(how should we proceed*) [8]. The more stakeholders and different expert groups are involved, the more important and complicated it is to achieve this shared understanding.

In addition, understanding the why and what actually makes it possible to evaluate and measure a project's success: It reveals the gap between the envisioned value and the value they actually achieved. Observing this gap increases the overall understanding, reveals mistakes, and allows for agile modifications throughout the implementation stages based on new learnings and potential motivation/goal changes.

In contrast, without the why-understanding of the project, organizations are stuck to measure the success of a project based on non-qualitative measurements like being delivered in time and within budget. Especially, when aiming at digitalization this approach soon leads to frustration as IT project after IT project will fail to deliver the promised results and miss to improve the status-quo.

4.2 The Digital VALUE Canvas

The Digital VALUE Canvas guides (interdisciplinary or inter-organizational) project teams towards a value-based shared holistic digital project understanding. ***Digital VALUE Canvas*** stands for *from **Digital Vagueness** to **Aligned**, **Lifelong Understanding** and **Evaluation*** (see Figure 4 and Figure 5). Canvases are visual tools which enable to define complex designable phenomena like business models or platform design at one glance [53]. This is done by reducing the designable phenomena's complexity by modularizing it typically into 8-15 building blocks. This ensures that no relevant aspects are overlooked and that the ones defined are coherent. A well-known and widely used canvas is the Business Model Canvas by Osterwalder and Pigneur [54]. In a previous project we designed a canvas specifically focusing on the why-dimension to better support digital platform design. Here, it was important to question whether the organization would actually benefit from a platform or whether it is just following the widely held assumption that to be successful one has to build an own platform. To emphasize the why-lever the canvas is called the Platform Alignment Canvas [27].

The Digital VALUE Canvas consists of 14 different building blocks. Each of them is assigned to one of five hierarchical and interdependent dimensions which are understanding *why*, the context *analysis* and the corresponding derived *what* and *how* before it reflects on the designed value proposition's *implications (see* Figure 4*)*. Next to the hierarchical dimensions the canvas also covers both the exploit and explore dimensions of the ambidextrous approach. The left side focuses on what the organization currently does and excels at and the right side

addresses new challenges, goals and digital competences and partnerships. Thus, the canvas supports established organizations in building on their strengths while searching for new (digitally enabled) opportunities. The canvas can be used for internal and external digitalization projects.

The *why dimension* covers three building blocks: the organization's motivation for the project, the definition of the project's target group and the concrete problem(s) and/or challenge(s) to solve. This is the most relevant and most neglected dimension. Asking why and identifying and transparently defining the underlying reasons and motivations for the project owners and the target group aligns the project team [8, 27].

The *analysis dimension* addresses three aspects: the as-is (status-quo) and to-be (envisioned final) states to derive and thus identify, understand and define the states' gap. As the to-be vision sets the goal for the project, it is the project's goal to close this gap.

The *what dimension* defines the project's unique value proposition and thus the solution to the initially identified problem. In addition, the what description also asks to define

- the organization's (applicable) strengths, e.g., its core competences/unfair advantages to assure that the new value proposition fits the organization's profile, and
- the digital needs and requirements, a task requiring digital expertise to prevent organizations from missing new (digital) opportunities.

At this stage it is irrelevant whether the organization can cover it itself or not. This gets addressed in the how-dimension.

The *how dimension* consists of the definition of the organization's change management and partnership strategy. Change management is important for internal digitalization projects in particular to increase the staff's acceptance. The partnership strategy asks to identify potential (complementary) partners to compensate for e.g., lacking internal IT-expertise and/or improve its value proposition.

Finally, the *implications dimension* aims at challenging the designed value proposition given the initial motivation and goals by questioning its desirability, feasibility and viability. The desirability evaluates whether the solution fits the stakeholders' requirements and integral quality constraint. The feasibility examines whether the solution can be built and operated by the organization and/or its partners in the long-term. The viability checks whether the solution makes business-sense given its cost-benefit ratio in the long-term. Only if all three aspects are addressed satisfactorily, it is ensured that the value proposition actually achieves the intended value to the stakeholders once it is implemented.

5 Applying the Digital VALUE Canvas

To illustrate the effects and benefits of the Digital VALUE Canvas it gets applied twice to the context of hospital digitalization as described in Section 3: From the technology-driven perspective which closely focuses on the KHZG requirements in order to avoid sanctions, and from the value-driven perspective which emphasizes on the needs of the hospital. This defines the spectrum in which the hospitals have to position themselves.

5.1 The Technology-Driven Digitalization Approach

Figure 4 depicts the filled out Digital Value Canvas from the technology-driven perspective. In this case the hospital aims at a "KHZG conforming" digitalization strategy in order to avoid

potential sanctions starting in 2025 no matter what. Thus, implementing IT-solutions covering all KHZG related must-have criteria is the dominant goal. The short timeframe and the lack of required digital competences makes hospitals dependent on external IT providers that typically offer (ready-to-use and standardized) KHZG-specific IT-solutions. Success is claimed as soon as the required IT-solutions are in place, independent of their impact on the working situation in the hospital or their follow-up costs like maintenance and support.
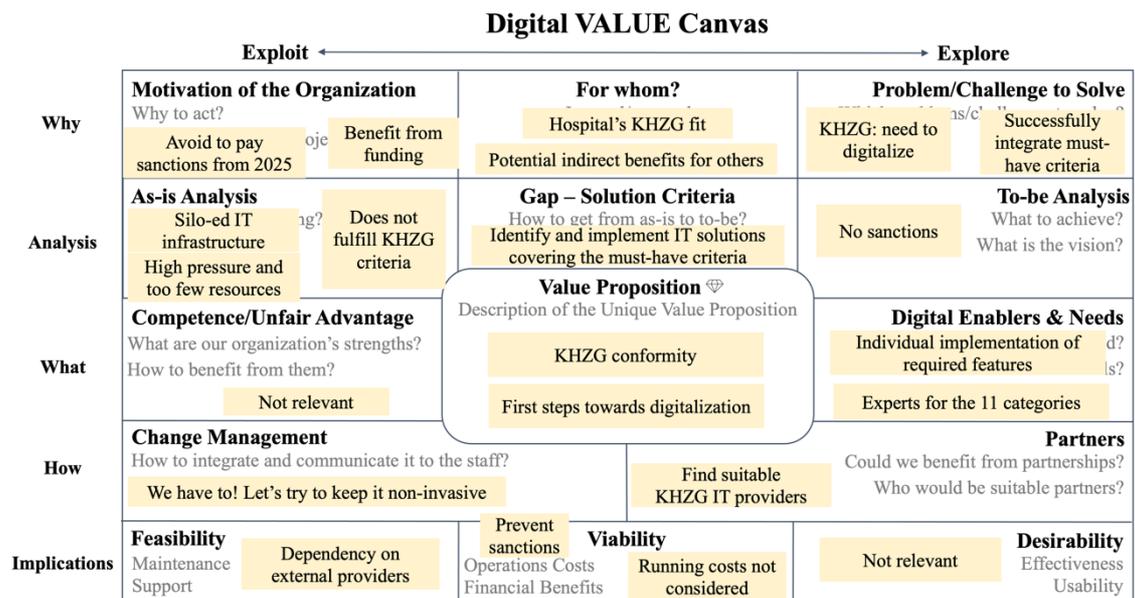

Figure 4: Hospital strategy towards KHZG conformity

In this extreme version of a technology-push approach the stakeholders of the hospital like its staff and patients are hardly integrated, and relevant aspects like a hospital's *as-is analysis, competence/unfair advantage, change management* strategy and assumed *desirability* are only superficially touched. Instead the focus is on the gap between the must-have criteria which are already fulfilled vs. the ones which still need to be fulfilled until 2025. The apparently easiest way to close this gap is by adopting standardized IT-solutions covering the missing must have criteria. This all too often leads to additional silo-solutions, i.e., IT applications with their specific handling that are not integrated in the existing IT infrastructure. Thus, rather than providing benefits to the hospital's staff, this technology-driven approach might even lead to increased bureaucracy and decreased staff satisfaction while incurring high costs to keep the IT solutions running and serviced in the future, a clear violation of the integral quality constraint. As result, the avoided sanctions are paid for with an intransparent IT-infrastructure which is difficult to use, operate and support. This has long-term consequences, as it impairs the stakeholders' motivation and lowers the acceptance of future innovations.

5.2 The Value-Driven Digitalization Approach

In contrast to the technology-driven digitalization approach the value-driven approach focuses on solving hospital-specific problems and challenges as seen in Figure 5. In this case the

stakeholders of the hospital are the driving force of the digital transformation. The Digital VALUE Canvas addresses their motivation, needs, requirements and core competences. This mix is the key to design, plan and implement solutions actually providing value to the hospital and its stakeholders and fulfilling the integral quality constraint.
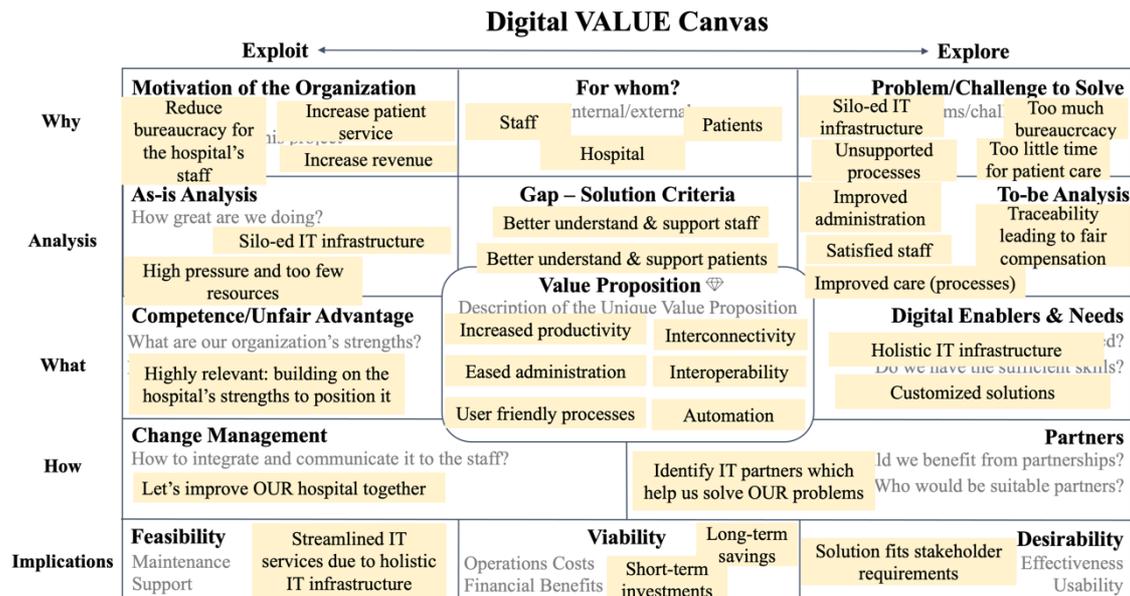

Figure 5: Hospital strategy towards digitalization as enabler

Here, the goal is to find IT solutions suiting the hospital's unique context and needs to ensure that the solutions are desired, get accepted and add value. The goal is to leverage the existing strengths, reduce the weaknesses and start a transformation towards a more holistic and digitally-enabled strategy and infrastructure. This approach trades KHZG conformance for IT solutions that provide tangible benefits to the hospital, e.g., by easing administrative tasks, in particular those, that are additionally required in the future. This approach risks sanctions in favor of better working conditions which does not suffer from inadequate IT-solutions.

5.3 The Domain-Specific Interval of Possible Digitalization Strategies

The Digital VALUE Canvas helps to discuss, design and question an organization's digitalization strategy and its corresponding projects. The earlier it gets applied to a project the better is its support. To evaluate the coherence and holisticity of a digitalization strategy the canvas covers many different aspects from why to change, what to change, and on which strengths and opportunities to build to how to successfully implement it. It even nudges towards questioning the digitalization strategy's value and its fit to the existing strengths and infrastructure by analyzing the value proposition's implications before deriving the needed digital competences and partnerships.

Organizations achieve the best results, if the Digital VALUE Canvas gets filled out by an interdisciplinary team covering (at least) the three competences and perspectives relevant for digitalization projects. These are the organization's core competence, business competence and IT competence. If one of these competences is missing the developed solution lacks the

basis for *desirability, feasibility* and *viability* (see Figure 1). Thus, organizations would risk overlooking opportunities and threats limiting them in defining optimal digitalization strategies.

In this Section the Digital VALUE Canvas was applied to two opposing approaches towards the digital transformation of hospitals: The technology-driven and value-driven approach (see Figure 4 and Figure 5). The canvas-based analysis shows that these opposing approaches lead to quite different digital transformation strategies. While the technology-driven approach is mostly externally driven and aims at the fast implementation of 'dictated' technologies the value-driven approach is internally driven and requires a deeper understanding of the context, the needs and corresponding requirements to ensure that the derived solution actually adds value to the hospital's stakeholders.

The interval between the technology-driven and the value-driven instantiations of the Digital Value Canvas defines a healthcare-specific spectrum for digitalization strategies (see Figure 6). Hospitals have to position their digitalization strategy within this spectrum according to their own profile which, in particular, concerns their current level of digitalization, their IT competence and their administrative bottlenecks. The two extreme sides of the digitalization strategy interval (DSI) provide clear orientation points both, to identify potential gains and to avoid potential pitfalls. In particular, in contexts like the KHZG, which with its threat of sanctions naturally pushes towards a technology-driven emphasis, looking at the DSI helps hospitals to reveal left-shift potential: freeing themselves from the purely technology-oriented perspective with its hidden costs (IT experts assume that maintenance and support costs may yearly well grow to 40% of the overall development budget) and to identify sustainable value via cost reduction and improved administrative performance.
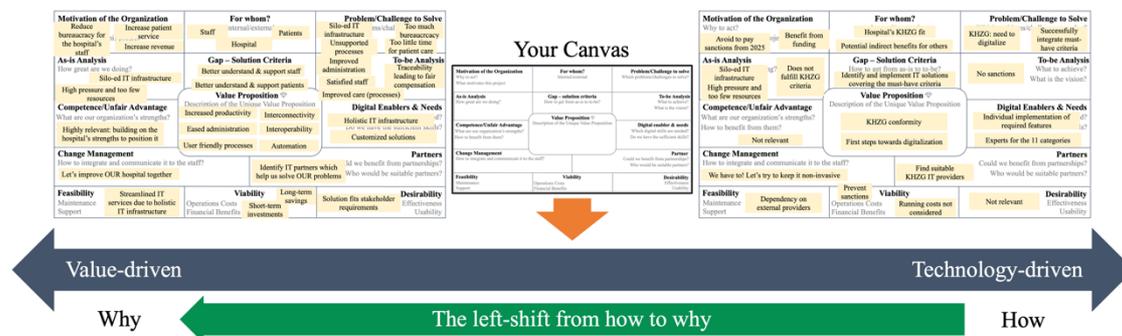

Figure 6: The domain-specific interval to define the possible spectrum of digitalization

6 Results and Discussion

This paper addresses the difference between a technology- and value-driven digital transformation when dealing with today's challenges like the fourth revolution and VUCA. Established organizations tend to assume that the fast route to success is the adoption and integration of (more) digital technologies. Despite these efforts about 70% of digital transformations fail. Many due to the confusion of means with the end. Just becoming more digital by integrating currently hyped IT-technologies is never successful by itself. It always

has to satisfy customer needs to be of value. Thus, this paper aims to answer the question *how to move from a technology-driven towards a value-driven digitalization strategy?*

Interestingly, the key is to analyze the *project's value* by stepping back and reflecting on *what to do* and especially *why to do it* before engaging into *how to do it*. Organizations are often caught in their routines, structures and way of doing things and do not notice that these traditions are probably the root cause of missing results and changes. It is natural to assume that traditions must be grounded on relevance. Thus, they often do not get (re)questioned. The example in Section 2.4 on page 7 revealed that following the *asking why* approach led to a completely different understanding of the motivation and goal. It jumped from a digitalization-first focus to the need of offering the best value available to customers at any point in time. The motivation to offer value to customers seems so trivial and obvious that a dedicated identification seems unnecessary. Experience shows, however, that organizations often overlook this aspect and concentrate on what to do and how to do it. This explains why digitalization is considered an end in itself rather than a means to achieve the concrete underlying vision and corresponding problems to be solved.

The consequences of misinterpreting the real motivation shows the importance of understanding, questioning and evaluating a project's motivation and its envisioned value. If everyone knows *what to achieve* and *why* they can derive the corresponding *how to achieve it* implementation strategies. This has two benefits:

- the why and what levels can be understood by all involved stakeholders easing alignment and allowing to benefit from the interdisciplinary team's complementing expertise and competences, and
- it overcomes alignment efforts on the how-level which are deemed to fail due to the stakeholder's too diverging expert knowledge.

To support this process of questioning and defining a digital project's value in a standardized and structured way the Digital VALUE Canvas was defined. It guides its users towards customized digital transformation strategies by addressing five dimensions: the project's why, its context's analysis, the corresponding what and how and its (long-term) implications. In addition, it also considers the ambidexterity's two sides: *exploit* focuses on the status-quo and existing core competences while *explore* focuses on new challenges and the integration of the fourth revolution's driving force - digital enablement - leading to future driven solutions. The Digital VALUE Canvas is designed accordingly to support the collaboration of interdisciplinary teams.

In Section 5 the Digital VALUE Canvas is used to describe the domain specific DSI for hospitals by defining and comparing two extreme approaches: technology-driven vs. value-driven. The intention of making this interval transparent is to, e.g., help hospitals to move from a less invasive and KHZG-conforming pure technology-driven digitalization strategy towards the often overlooked value-driven strategy where current problems and challenges of hospitals are addressed. The long-term goal is that hospitals benefit from IT-solutions and infrastructures fitting their needs rather than suffering from silo-ed IT-solutions violating the integral quality constraint costing more money and time than saved by e.g., avoiding the sanctions.

In addition to designing concrete digitalization strategies, the Digital VALUE Canvas is meant to continuously observe the status-quo and search for improvement and/or innovation potentials. It supports the reflection of the existing competences/unfair advantages and

supports to reveal (new) digital needs and enablers. Whenever a digital project gets planned the canvas' mix of perspectives ensures that organizations do so in a holistic fashion.

7 Conclusion and Outlook

Given the fourth revolution's impact on competitiveness (established) organizations need to keep adapting to sustain their competitiveness. Digitalization accelerated the pace and impact of an industry's change and increased the vulnerability, uncertainty, complexity and ambiguity of strategic decisions. In this continuously changing environment, it is important to focus on realizing value over implementing new hyped IT-technologies for their own sake. For digitally native organizations this comes quite naturally as they think, live and breathe software-enabled value. In addition, they are not held back by past successes and legacy thinking, systems and infrastructures. To enable a similar spirit for established organizations an *ambidextrous* approach could help to simultaneously exploit their current portfolio and successes while explore new (digitally enabled) business models which get gradually transferred to the main portfolio (see Figure 3).

One particular industry currently struggling with its digital transformation is the healthcare industry and its hospitals. To accelerate the digitalization of Germany's hospitals in only a few years' time the government passed the KHZG in the end of 2020. The KHZG funds the digital transformations with up to €4.3 billion but grants only 4 years until 2025 before hospitals will face sanctions if they do not fulfill the vaguely (pre-)defined must-have criteria by the government. Having analyzed their KHZG's effectiveness based on e.g., the hospital readiness and the available (IT-) expertise and time, it is not surprising that especially small to medium sized hospitals missing relevant IT competences and experts rush for the selection and implementation of standardized IT-solutions. There are numerous external IT providers which exploit this situation and claim to realize the hospital's KHZG conformity.

This situation is caused by the KHZG that pushes technological solutions rather than setting clear goals which are in line with a hospital's key performance indicators, like doctors should be enabled to increase the number of patients seen per hour or patient satisfaction should increase by 20%. Such a focus would ensure that offered IT-solutions are customized to fit the integral quality constraint and ensure that, e.g., the increasing amount of (currently manual) administrative tasks get eased or even automated.

Legal requirements like regulations and laws provide a powerful political lever to initiate change. Here, setting impulses where the final implications actually achieve a concrete value is a challenge. For the KHZG this would mean that the regulations should operate on the why level which directly addresses the hospitals' needs. However, the KHZG concerns mostly the how level which pushes hospitals towards complex heterogeneous IT-infrastructures increasing the time and costs of training the staff, administrative tasks and maintaining the IT-solutions while decreasing the staff's productivity and satisfaction.

To clarify the difference between a technology-driven and a value-driven approach this paper introduced the Digital VALUE Canvas which is designed to collaboratively design and reveal a project's vision, goals and solution approach to achieve desirable, feasible and viable value propositions: Only if the organization is satisfied with the project's vision, goals, value proposition and its implications they should proceed with the implementation of the project. The digitalization strategy interval (DSI) has been proposed to support educated decisions even under complex external (political) conditions.

This paper applied the Digital VALUE Canvas to the KHZG context and derived a corresponding DSI which characterizes the two extreme digitalization approaches that are driven by either technology or value. In the context of the KHZG regulations which favor the introduction of more IT tools (independent of imposed long-term costs) the technology-driven solution is more commonly applied in practice. Moving within the DSI and discussing corresponding consequences helps understanding the impact when, e.g., trading penalties for high maintenance costs. We are convinced that a deeper analysis will reveal that the threatening penalties are a fraction compared to the maintenance costs imposed by a 'scattered' IT landscape. Perhaps it is not too late to adjust some decisions accordingly.

To further test the applicability and usefulness of the Digital VALUE Canvas, it should be adopted by other use cases, domains and industries. In addition to deepen the value-driven approach future research should analyze a multi-perspective approach combining e.g., the asking-why approach, the Digital VALUE Canvas and additional canvases and or frameworks further deepening the value, vision, digitalization and reflection perspectives. Ideally, given a project's vision as described with the Digital VALUE Canvas additional canvases could be derived to refine the value proposition and implementation strategies in a domain-specific way to better support the interdisciplinary team's different disciplines. Such a hierarchy, overarching and intertwined project design and guidance, better supports the organization, but also increases the required conceptual complexity. [7, 55, 56] indicate how this increased complexity can be mastered with adequate IT tool support.

8 References

1. Deagon, B.: The Fourth Industrial Revolution ' s Massive Acceleration Of Progress, https://www.investors.com/news/fourth-industrial-revolution-gathers-momentum/, last accessed 2022/03/03.
2. Google Finanzen - Tesla, Inc., https://www.google.com/finance/quote/TL0:ETR?sa=X&ved=2ahUKEwiD_vrwqNn2 AhWtQvEDHdWsD_YQ3ecFegQIERAg, last accessed 2022/03/18.
3. Daniel, T.: Tesla surpasses $1 trillion valuation after Hertz order, https://www.bbc.com/news/business-59045100, last accessed 2022/03/03.
4. Hermann, M., Pentek, T., Otto, B.: Design principles for Industrie 4.0 scenarios: a literature review. Tech. Univ. Dortmund, Dortmund. 45 (2015).
5. Kagermann, H., Wahlster, W., J. Helbig: Recommendations for implementing the strategic initiative Industrie 4.0. (2013).
6. Steffen, B.: Global Organization aLignment & Decision (GOLD) Framework, (2017).
7. Steffen, B., Boßelmann, S.: GOLD: Global organization alignment and decision - Towards the hierarchical integration of heterogeneous business models. In: 8th International Symposium on Leveraging Applications of Formal Methods, ISoLA 2018, Corfu, Greece (2018).
8. Steffen, B., Steffen, B.: Asking Why. In: Margaria, T. and Steffen, P.D.B. (eds.) Leveraging Applications of Formal Methods, Verification and Validation (2021).
9. Bennett, N., Lemoine, G.J.: What a difference a word makes: Understanding threats to performance in a VUCA world. Bus. Horiz. 57, 311–317 (2014).
10. Hogarth, R.M., Lejarraga, T., Soyer, E.: The Two Settings of Kind and Wicked Learning Environments. Curr. Dir. Psychol. Sci. 24, 379–385 (2015).

11. Fraunhofer: Wertschöpfung durch Software in Deutschland. , Berlin (2021).

12. Statista: Importwert von IT-Services in Deutschland von 2002 bis 2020, https://de.statista.com/statistik/daten/studie/3946/umfrage/import-von-it-dienstleistungen-nach-deutschland-seit-2002/, last accessed 2022/03/10.

13. Statista: Exportwert von IT-Services aus Deutschland bis 2020, https://de.statista.com/statistik/daten/studie/167976/umfrage/export-von-it-dienstleistungen-aus-deutschland-seit-2002/, last accessed 2022/03/10.

14. LaBerge, L., O'Toole, C., Schneider, J., Smaje, K.: How COVID-19 has pushed companies over the technology tipping point-and transformed business forever. McKinsey Glob. Publ. 1–9 (2020).

15. Delcker, J.: Germany and digitalization: Why can't Europe's richest country get up to speed?, https://www.dw.com/en/germany-and-digitalization-why-cant-europes-richest-country-get-up-to-speed/a-58273979, (2021).

16. Kruse, W., Hogrebe, P.D.F.: Deutschland Digital 2020 - E-Government und Modernisierung in Bund, Ländern und Kommunen. ProPress Verlagsgesellschaft mbH (Behörden Spiegel-Gruppe), Bonn (2019).

17. Hortense, B., Alberto, M., Angelika, R.: Unlocking success in digital transformations. McKinsey Co. 1–5 (2018).

18. Verhappen, I.: Beware the industrial digitalization bandwagon, https://www.controlglobal.com/articles/2022/beware-the-industrial-digitalization-bandwagon/, last accessed 2022/03/06.

19. Kietzmann, J., Archer-Brown, C.: From hype to reality: Blockchain grows up. Bus. Horiz. 62, 269–271 (2019).

20. Ali, A.: The Minimalist Product Manager, https://www.businessworld.in/article/The-Minimalist-Product-Manager/21-10-2020-333923/, (2020).

21. Bechtold, J., Kern, A., Lauenstein, C., Bernhofer, L.: Industry 4.0 – The Capgemini Consulting View - Sharpening the Picture beyond the Hype. (2014).

22. Lee, E.A.: Cyber Physical Systems: Design Challenges. In: 11th IEEE Symposium on Object Oriented Real-Time Distributed Computing (ISORC), 363 – 369. (2008).

23. Giusto, D., Iera, A., Morabito, G., Atzori, L.: The internet of things: 20th Tyrrhenian workshop on digital communications. Springer Science \& Business Media (2010).

24. Buxmann, P., Hess, T., Ruggaber, R.: Internet of services. Bus. \& Inf. Syst. Eng. 1, 341–342 (2009).

25. Lucke, D., Constantinescu, C., Westkämper, E.: Smart factory-a step towards the next generation of manufacturing. In: Manufacturing systems and technologies for the new frontier. pp. 115–118. Springer (2008).

26. Kenney, M., Zysman, J.: The rise of the platform economy. Issues Sci. Technol. 32, 61 (2016).

27. Steffen, B., Möller, F., Nowak, L.: Transformer (s) of the logistics industry-enabling logistics companies to excel with digital platforms. In: Proceedings of the 55th Hawaii International Conference on System Sciences (2022).

28. Darwin, Charles annotated by Bynum, W.: On the Origin of Species. Penguin Group, London (2009).

29. Barnett, W.P., Morten, H.T.: The red queen in organizational evolution, (1996).

30. Hill, A., Mellon, L., Goddard, J.: How winning organizations last 100 years. Harv. Bus. Rev. 13 (2018).

31. O'Reilly, C.A., Tushman, M.L.: Ambidexterity as a dynamic capability: Resolving the innovator's dilemma. Res. Organ. Behav. 28, 185–206 (2008).

32. Institute, M.G.: Twenty five years of digitization. (2019).

33. Steffen, B., Howar, F., Tegeler, T., Steffen, B.: Agile Business Engineering: From Transformation Towards ContinuousInnovation. In: International Symposium on Leveraging Applications of Formal Methods. pp. 77–94 (2021).

34. Porter, M.E.: The five competitive forces that shape strategy. Harv. Bus. Rev. 86, 78 (2008).

35. Christensen, C.: The Innovator's Dilemma. Harvard Business School Press (1997).

36. Christensen, C.M.: The innovator's dilemma: when new technologies cause great firms to fail. Harvard Business Review Press (2013).

37. Gatignon, H., Tushman, M.L., Smith, W., Anderson, P.: A structural approach to assessing innovation: Construct development of innovation locus, type, and characteristics. Manage. Sci. 48, 1103–1122 (2002).

38. O'Reilly, C.A., Tushman, M.L.: The ambidextrous organization. Harv. Bus. Rev. 82, 74–83 (2004).

39. Bundesministerium für Gesundheit: Krankenhauszukunftsgesetz für die Digitalisierung von Krankenhäusern, https://www.bundesgesundheitsministerium.de/krankenhauszukunftsgesetz.html, last accessed 2022/03/13.

40. Bensch, H.: Digitalisierung im Krankenhaus: Baustellen gibt es genug, https://www.aerzteblatt.de/archiv/223418/Digitalisierung-im-Krankenhaus-Baustellen-gibt-es-genug, last accessed 2022/03/08.

41. BMG: Richtlinie zur Förderung von Vorhaben zur Digitalisierung der Prozesse und Strukturen im Verlauf eines Krankenausaufenthaltes von Patientinnen und Patienten nach § 21 Absatz 2 KHSFV. Bundesministerium für Gesundh. 02, 1–49 (2020).

42. Spies, C.: Bundesrat gibt grünes Licht für Krankenhauszukunftsgesetz, https://www.bibliomedmanager.de/news/bundesrat-gibt-gruenes-licht-fuer-krankenhauszukunftsgesetz, last accessed 2022/03/03.

43. Konsortium, D.K.: Instrument zur Evaluierung des Reifegrades der Krankenhäuser hinsichtlich der Digitalisierung. (2021).

44. Gesetz für ein Zukunftsprogramm Krankenhäuser (Krankenhauszukunftsgesetz – KHZG). (2020).

45. Doelfs, G.: Augen auf bei der Beraterwahl, https://www.kma-online.de/aktuelles/it-digital-health/detail/augen-auf-bei-der-beraterwahl-a-45314, last accessed 2022/03/03.

46. Weiber, R., Ferreira, K.: Transaktions- versus Geschäftsbeziehungsmarketing. In: Backhaus, K. and Voeth, M. (eds.) Handbuch Business-to-Business- Marketing. pp. 121–146. Springer Gabler, Wiesbaden (2015).

47. Appelganz, S.: KHZG ist einmalige Chance für Krankenhäuser, https://mednic.de/khzg-ist-einmalige-chance-fuer-krankenhaeuser/17450, last accessed 2022/03/03.

48. Schmich, J.: Update für die digitale Patientenversorgung, https://insights.tt-s.com/de/update-fuer-die-digitale-patientenversorgung?gclid=Cj0KCQiAmpyRBhC-ARIsABs2EAolQhxb887S_aCPsD3zq1Y7QCRWhoHMVzBYTxxnuyNXSJ46ZJb3mbUaAiyHEALw_wcB, last accessed 2022/03/03.

49. Redaktion, M.: Das Krankenhauszukunftsgesetz ist eine Aufholjagd,

https://mednic.de/das-krankenhauszukunftsgesetz-ist-eine-aufholjagd/17582, last accessed 2022/03/03.

50. Alle Informationen rund um die Schulung zur Förderung aus dem Krankenhauszukunfsfonds (KHZF), https://www.krankenhauszukunftsfonds.de/DE/UeberDieSchulung/ueberDieSchulung_node.html, last accessed 2022/03/03.

51. ZEQ AG: Krankenhauszukunftsgesetz: Eine konstruktive Kritik, https://www.zeq.de/bestes-krankenhaus/blog/krankenhauszukunftsgesetz-eine-konstruktive-kritik, last accessed 2022/03/03.

52. Dahlberg, T., Lagstedt, A.: Fit to Context Matters--Selecting and Using Information Systems Development Methods to Develop Business in Digitalization Contexts. In: Proceedings of the 54th Hawaii International Conference on System Sciences. p. 6902 (2021).

53. Avdiji, H., Elikan, D., Missonier, S., Pigneur, Y.: A design theory for visual inquiry tools. J. Assoc. Inf. Syst. 21, 3 (2020).

54. Osterwalder, A., Pigneur, Y.: Business model generation. John Wiley & Sons, Inc. (2010).

55. Steffen, B., Möller, F., Rotgang, A., Ryan, S., Margaria, T.: Towards Living Canvases. In: International Symposium on Leveraging Applications of Formal Methods. pp. 95–116 (2021).

56. Steffen, B., Boßelmann, S.: Domain-Specificity as Enabler for Global Organization aLignment and Decision. In: To appear in: International Symposium on Leveraging Applications of Formal Methods. Springer (2022).