Holistic Capability Model for Sustainable Evolution of Health Care Providers

Michael Georg Grasser, Erich Sorantin
Research Unit of Digital Information and Image Processing
Medical University Graz
Graz, Austria
e-mail: michael.grasser@medunigraz.at,
erich.sorantin@medunigraz.at

Viktoria Schlaipfer, Robert Priedl
IT-Operations
Hospitaller Order of Saint John of God
Graz, Austria
e-mail: viktoria.schlaipfer@bbito.at, robert.priedl@bbito.at

***Abstract*—Several factors have significantly influenced the digital evolution of health care providers worldwide. Existing consulting models and decision-making strategies are stretched to their limits. To derive sustainable decisions in a holistic manner an innovative digital capability model had to be developed and enforced. On that basis human beings, e.g., medical or nursing staff, are centered in the digital transformation. We have developed a holistic transformation model to successfully support the digital transformation processes of health care providers.**

Keywords-Holistic Capability Model; Human Based Digital Intelligence; Digital Transformation; Sustainable Decision-Making for Health Care Providers.

I. INTRODUCTION

In the whole wide world, hospitals have to compete with each other regarding quality of treatment or exclusiveness of their facilities that patients decide for them. Efficient operation and furthermore sustainable evolution of health care providers like hospitals, retirement homes or care centers, will be influenced and challenged by many factors from their ecosystems. Digitalization is currently one of the biggest challenges, beside the cost cut in public funding or the implementation of the general data protection regulation. For health care providers, it is necessary to develop and optimize their organizations in a digital manner to strategically adapt existing business models.

However, to make sustainable decisions in this fast changing and highly technological environment is difficult. This results in a great demand to use innovative and multifactorial decision-making methods. Our research focused on the development of a new holistic model to engage digital transformation processes. The results can be used as templates for several health care providers worldwide.

In section II we discuss related work and dissociate several models from our approach. A detail explanation of our digital transformation model as well as a transition to a technology from aeronautics is done in section III. Further fields of research and a conclusion can be found in section VI.

II. RELATED WORK

Considerations in digitalization center primarily on technology. So is there any chance to make sustainable decisions just by looking at technology? Or, the opposite, can one do digitalization completely without technology? For health care providers, it is a fact that they need more efficient technology to support the clinical pathways. Is technology the magic bullet for sustainable evolution or are there other alternatives? In several papers we can see that also processes, culture, organizational structure need to be focused.

Back et al. [1] illustrate an exemplifying model, which focuses on the topics mentioned above. This approach uses nine dimensions to measure the level of digitalization. A digital readiness score, which is used to see the companies score and a comparison to others, was published by Jahn and Pfeiffer [2]. Digitalization needs to be evolved from a technical perspective to a management one within the business engineering methodology. Business engineering describes the systematic transformation of organizations from the industrial age into the information age in [3]. This approach can also be derived and applied to healthcare providers. The framework of business engineering is appropriate for investigation of transformational effects and helps to gain a holistic view of necessary activities. The difference between classical and digital transformation is the outcome's enrichment by appropriate products or services.

Digital transformation is a conglomeration of different disciplines to realize digital evolution of organizations and can be described as a combination of adaptions in strategic management, business models, organizational structure, process and project management as well as corporate culture by use of digitalization. It is not an evolution that will automatically be done, but rather a gradual change that health care providers should actively force. Furthermore, it is not only a technical topic, but also a topic that concerns the whole company. There are some consulting companies or integrators that still focus on the usage of new information technology to transform health care providers in a digital perspective.

Digital maturity models describe different capabilities in their scopes that are important in transformation. A maturity model was published in [4] by Forrester Research. A more

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enhanced maturity model containing 8 dimensions and 5 maturity levels was published in [5]. These skills have been subdivided into maturity criteria and the degree to which the organizations meet these abilities.

In addition, the digital maturity models are used to visualize the status quo and to derive future transformation paths for executives and support their decisions. What the models cannot afford is to specify specific transformation instructions. There are no predefined paths for transformation that will follow the same patterns and similarly can be applied to different organizations.

The International Data Corporation (IDC) published a model, called Digital MaturityScape, in which they see digital transformation as multifaceted. This model is illustrated in Fig. 1 and helps organizations to identify the status quo and their future progress in digital transformation. Azhari et al [5] suggested that transforming an organization needs to take place in five maturity dimensions: Leadership, Omni-Experience, Information, Operating Model and WorkSource.

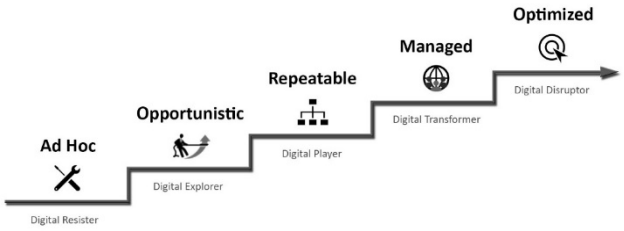

Figure 1. Digital Transformation MaturityScape [5]

IDC already did intensive research and found that 30% of the organizations are at the digital explorer stage, which means that they are working on digital projects. The problem is that the projects are not repeatable and not scalable. Another third are at the digital player stage, which means that they are executing on a repeatable basis, but these digital initiatives are focused in silos. It is terrifying that just 14% of all organizations are at the stage of digital transformers. These numbers arise only from the industrial sector, which can be seen in [6].

Health care providers aspire to solve the following two problems, by use of digital transformation. First, due to limitations in public funding, there is a need to reduce internal costs. Second, to achieve a competitive advantage they have to focus more on their patients. This aspect is just external, but we have recognized that in digital transformation two dimensions seem relevant to the holistic view:

- External: patients
- Internal: employees

In order to achieve excellence in the external dimension, a sustainable internal dimension must exist. Based on the considered maturity models, we have recognized the missing focus on the employees and taken into account in the development of our digital capability model.

III. DIGITAL TRANSFORMATION MODEL

Our digital capability model is derived from different transformation models, such as published in [7], and contains five scopes. The following four are well known:

- Processes
- Organization
- Technology
- Culture

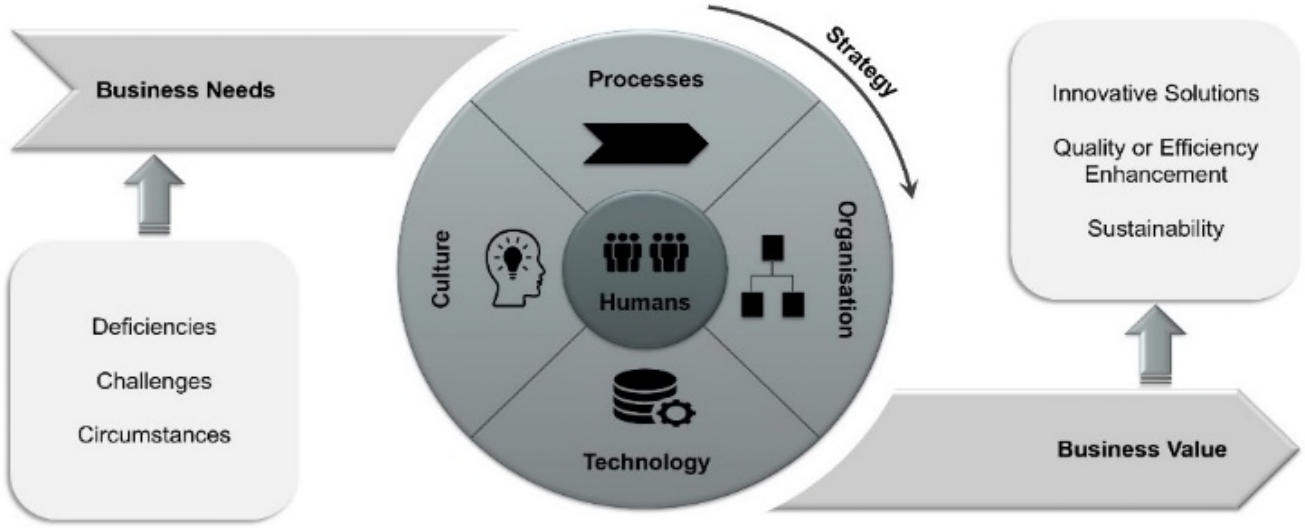

Figure 2. Holistic Transformation Model

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The fifth scope is very important in particular, for health care providers: the humans, focused on employees. These human beings have great influence on the other four scopes of our model, which is illustrated in Fig. 2. Their digital intelligence needs to be measured in combination with each of the other scopes to achieve a holistic view. Digital intelligence, in this case, is defined as the ability of humans to naturally deal with technology based systems.

To support decision-making methods it is necessary, to quantify the status quo and the future state of each scope. We have been inspired by radar technology to gain a 360° view and get a valid positioning on a predefined area. Radar is an abbreviation for radio detection and ranging and was patented in 1904. The ideas were based on the perceptions of Heinrich Hertz in 1888, when Hertz detected the polarization dependent reflection of electromagnetic waves, which can be seen in the patent by Christian Hülsmeyer [8].

The idea of Radar can be used for health care providers' transformation paths. We propose the following three steps to derive a digital transformation path:

- Detect
- Position
- Transform

In the first step (detect), organizations have to identify the status quo - the current capability level of processes, organization, technology and culture. In the next step (position), they need to define the degree of capability they want to achieve with their organizations. Finally (transform), the distance between detection and positioning is the transformation path, which has to be realized by the organization. The second and the third step have a massive influence on the decision-making process, because their impact on the transformation paths' activities and complexity is significant.

The boundary condition of each decision needs to be focused, especially depending on the employees' digital intelligence. Therefore, the focus on the humans is important in the decision making process, because it is the key success factor for sustainability. So these steps can be used for decision-support at management level with considerations in the scopes (processes, organization, technology and culture) of our holistic transformation model.

Fig. 3 shows an example of our holistic capability model, called Social & Health Care (SHC) Radar. The current value (shown as a dark grey line) and the target value (shown as a light grey line), which are illustrated as percentage values, are gained for the four scopes (processes, organization, technology and culture). The transformation gap between these two values identifies the transformational needs of organizations. The cultural scope in an exemplary health care provider was currently evaluated with 25%. The organization is planning to reach 45% in that scope. Several methods have to be developed and applied by the organization to eliminate the calculated transformational gap of 20%.

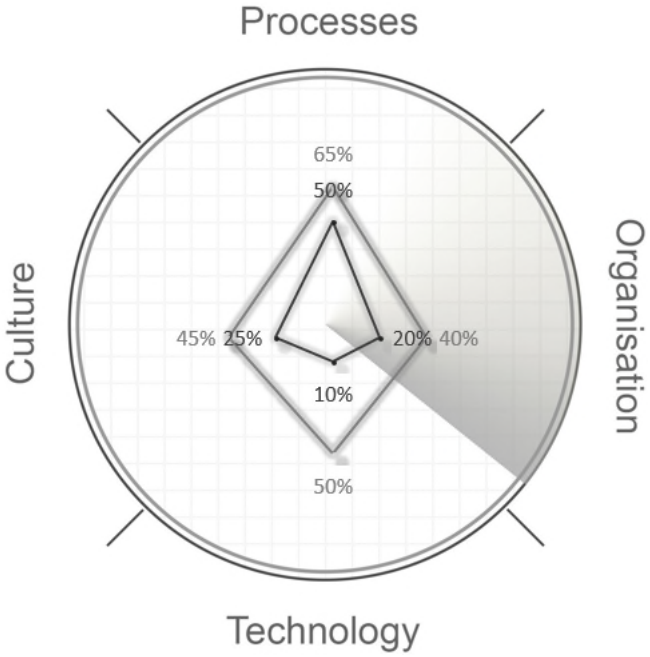

Figure 3. Holistic Capability Model

Table I shows the evaluation of an exemplary health care provider. We recommend to prioritize digital transformation activities based on the amount of the gap.

TABLE I. VALUES OF AN EXEMPLARY HEALTH CARE PROVIDER

Scope of SHC Radar	Current value	Target value	Gap
Processes	50%	65%	15%
Organization	20%	40%	20%
Technology	10%	50%	40%
Culture	25%	45%	20%

IV. CONCLUSION AND FUTURE WORK

Our research gains a valuable insight into different digital maturity models. Consequentially we have recognized the missing focus on the employees and taken this into account in the development of our holistic transformation model. We recommend health care providers to consider their employees' digital intelligence in the decision-making process, because of the strong dependences to all scopes of our model.

Innovative decision-making methods need measureable data. The status quo and future position have to be identified and illustrated in our SHC Radar. In ongoing studies, we define the four scopes more precisely to gain a better level in granularity. Moreover we extend our digital capability model by the fifth dimension: the humans. Our decision-support methodology can be applied for health care providers worldwide to benchmark their digital maturity level.

Furthermore we are going to evaluate whether future technologies such as voice recognition, gesture recognition, artificial intelligence, and others will decrease the need for employees' digital intelligence.

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