DIGITAL TRANSFORMATION – AN EXPLANATION

Christian Funk
University of Library Studies and Information Technologies

Abstract: This article deals with the question of what Digital Transformation is. Inspired by the countless publications on the topic in all kinds of media about the importance of Digital Transformation the discussion appeared – what is Digital Transformation? This paper provides an overview of the topic as well as a definition of the terms. Furthermore, this paper describes the impact digital transformation has on the business world as well as our daily lives.

Keywords: Digital Transformation, Digitization, Digitalization.

Introduction

Current significance – The topic of digital transformation (DT) is on everyone's lips. The digital revolution, driven by digital transformation, is being proclaimed in the media, business and politics. Everyone is urging companies to invest in the digital transformation and not oversleep the digital transformation. As part of this wave of enthusiasm, almost all companies are initiating major investment programs to implement the digital transformation. With the emergence of GenAI, the topic has become even more relevant.

According to a study by KfW Bank, Germany is only mid-table compared to the leading nations with around EUR 49 billion in 2019, which represents a share of 1.4% of GDP. In order to catch up with the highly developed nations in terms of IT investment, annual investment would have to be increased to around EUR 100 to 150 billion.[1]

If the request is to invest so much money in the digital transformation, first and foremost the question should be answered, what is digital transformation?

Research methodology

For this paper, a comprehensive research methodology incorporating both qualitative and quantitative approaches was adopted. The methodology primarily revolves around a systematic literature review to provide a holistic understanding of AI's applications, challenges, and societal implications.

A systematic literature review was conducted to identify and analyze (ideally) peer-reviewed studies, scholarly articles, and commercial web sources related to digital transformation. This involved defining specific research questions, establishing inclusion and exclusion criteria, and systematically searching electronic databases such as Google Scholar.

The selection criteria for studies and data sources encompassed several key considerations:

Relevance: Studies and sources were selected based on their relevance to the research objectives and questions.

Credibility: Emphasis was placed on peer-reviewed articles, reputable reports, and scholarly publications from recognized institutions and experts in the definition of digital transformation.

Currentness: When it came to Technology newer publications were preferred.

Results

Digitalization vs. Digital Transformation

In everyday language, the terms digital transformation and digitalization are often used synonymously. Digitalization is usually used colloquially when digital transformation processes are described. When viewed in an academic context, the differentiation and definition of the two terms are essential, as different fields of impact can already be derived from the definition, which are important for further consideration of the questions to be answered.

Digitalization

The often-used term digitalization refers to the change of a process from analog process media to digital storage media.

There is currently no uniform definition of the term “digitalization” and it is unlikely that there will be one in the near future, as the term covers a wide range of content used in everyday use. Likewise, the meaning can change depending on the context. A basic and several broader definition is given below. This makes the range that this term encompasses clearer.

The word “digitalization” is derived from the Latin digitus according to the Digital Dictionary of the German Language DWDS: “digital adj. ‘occurring in stages, representing in numbers’, adoption (mid-20th century) of the same. English digital; to English digit ‘finger used for counting, digit (under 10)’. The basis is Latin digitālis ‘belonging to the finger’ and Latin digitus ‘finger’. Previously, the adj.digital comes across as a direct borrowing from Lat. into German medicine. Technical language in the sense of ‘concerning the fingers (or toes), with the finger’.”[2]

In the context of digitalization, the reference to the English term digit can be interpreted as referring to the representation of content using the hexadecimal number system in the digits 0 (zero) and 1 (one).

This idea is also taken up by Hess: “In principle, digitalization means the transfer of analog data into a digital form. The data is made readable for

machines. These can be, for example, characters and symbols from written documents, images or even sounds that are converted into binary form (1 and 0).” (Hess, 8. April 2019)

The form in which the data is stored and presented is one of the most important differences between digital and analog data. This doesn’t just mean the different “physical” storage of data, e.g. on paper vs. a computer hard drive. It should also be noted that digital data can be presented on a wide variety of devices, whereas analog data is tied to its carrier medium.” [1]

The type of origin and expression must also be taken into account: “One of the main differences is that digital data can only be 'discrete', while analog data can also be 'continuous'.”[3]

Discrete

“Discrete” is a statistical term and describes data that can take a countable number of forms. This means that there are any number of data sets that can be distinguished from one another, even if only slightly. This is shown in Figure 1 by the green bars.

Example “digital thermometer”: The temperature on a digital thermometer jumps from 1 C to 2 C at a point when the internal logic of the measuring instrument reflects this. This logic works and represents in steps and not continuously.

Continuous

“Continuous”, on the other hand, describes data where there can be any (infinite) number of events between two events. This means that the data objects can continuously merge into one another. Figure 1 shows this behavior graphically using the orange line.

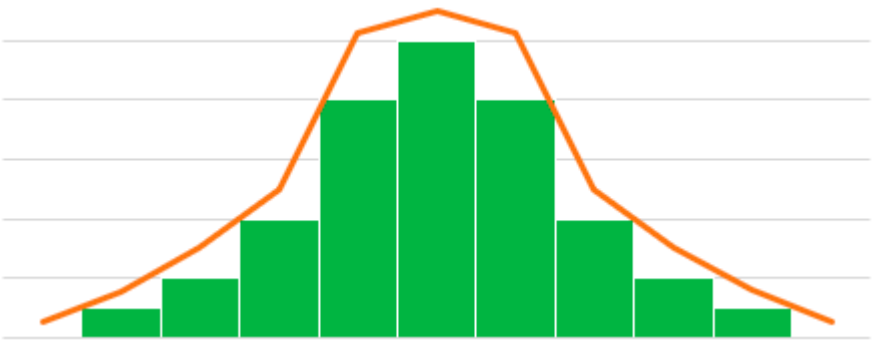

Figure 1. “continuous” vs. “discrete”

Example “analog thermometer (mercury)”: If it were possible to increase the scale infinitely, then every change in temperature, no matter how small, could be displayed continuously.

Another example could also be analogue photography vs. digital photography

As technology has advanced, the granularity of data has decreased to almost an infinitesimal level, but the data is still discrete. Due to the possibility of persisting almost any value based on discrete data, the following advantages arise for digitally available data:

- lower cost of reproduction
- almost infinitely reproducible/copyable
- worldwide distribution in a few seconds
- machinable
- loss-free evaluation and analysis

Discussions

Based on these definitions, digitalization is the change of the carrier media of an existing process. The process remains unchanged, but the analog “carrier media” is replaced. The information that was previously transmitted on analog media such as paper is being transmitted digitally. This usually results in shortened process lead times. Further advantages arise from the space-saving storage of information and the rapid reproduction and distribution.

Along with the change in carrier media, the technical capabilities of the underlying IT products have also developed and created the possibility of (partially) automating process steps. This automation made it possible to reduce process costs and increase efficiencies by reducing manual work.

The basic organization or the business model supported by the process has not been changed.

Maltaverne introduces a more granular classification when it comes to digitalization. The distinction between digitization – digitalization and digital transformation.

- “Digitization is the conversion of analog into digital. Atoms become bits (e.g. digitization of data). You cannot digitize people.
- Digitalization is the process of using digital technology and its effects (e.g. digitizing a process).
- Digital transformation is a “digital-first” approach that encompasses all aspects of the business, regardless of whether it is a digital company or not. It leads to the creation of completely new markets, customers and companies (people, skills, processes, operating models, ...)

Digital transformation is the most comprehensive of the three terms and differs significantly from digitalization. Digitalization is often a step-by-step improvement or adaptation of an existing, non-digital process to increase efficiency. Digital transformation is about finding new ways to create new sources of value. It has more to do with effectiveness. It also encompasses the entire company and not just a specific process or function.[4]

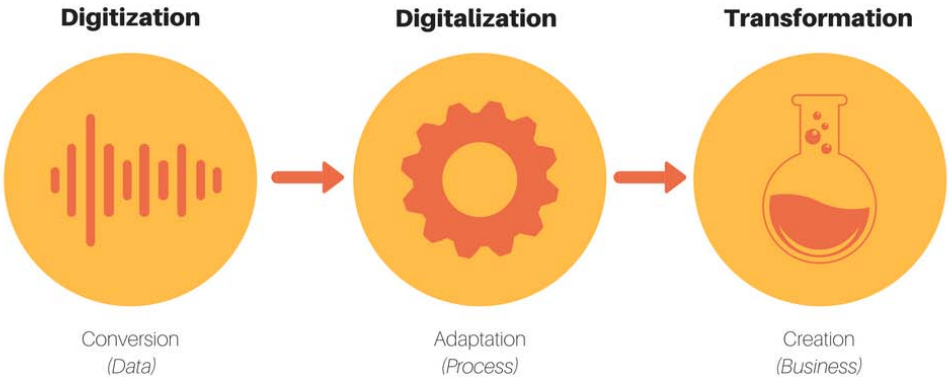

Figure 2. Definition of Digitisation, Digitalization and Digital Transformation (Maltaverne, 2017)

Digital Transformation

Prof. Dr. Key Pousttchi defines the term digital transformation in the Encyclopedia of Business Informatics as follows:

"The term digital transformation refers to significant active changes in everyday life, the economy and society through the use of digital technologies and techniques and their effects. Typically, the term is used in the narrower sense for the subset of corresponding transformations in companies and industries, whereby a distinction can be made between the dimensions of service creation, service offering and customer interaction. Digital transformation is typically the reaction to changing conditions caused by digitalization. If the changes occur suddenly and radically, e.g. due to the digital transformation of an existing or new competitor entering the market, the term disruption is used for this. [2]

The concept of transformation from the Latin *trans*, "over, over" and Latin *formare*, "form, shape"[5] In the context of business administration and economics, "represents a change in form, structure or shape with or without a loss of content and substance from an initial state to a target state." [3]

This conventional view may be valid for the first part of the definition, ... a change in form, structure or shape with or without a loss of content and

substance from a starting point... also for digital transformation. However, the second part ...towards a target state... must be questioned in the context of digital transformation. Due to the rapid innovation cycles and associated changes, in many companies it is difficult to clearly define the goal towards which one wants to develop/develop.

Prof. Dr. Helmut Krcmar describes this with the four unpleasant characteristics of digital transformation:

- It is inevitable
- It is irreversible
- She is incredibly fast
- And provided with uncertainty [4]

The inevitability arises from the fact that it is already happening and the only way to avoid it is to withdraw from current economic life and civilization. Because the interaction with participants in business life takes place digitally and these interactions are constantly developing. A return to analogue processes would probably not be accepted by the actors and interface partners in economic life or would be subject to additional costs.

This also results in Prof. Krcmar's second statement, the irreversibility, “From the customer’s perspective, the digital transformation is irreversible because they no longer want to forego the comfort they have once achieved.” “Inevitable because applications will be implemented as soon as they work and bring added value to the user.” [5]

A reversion to a “pre-digital” form of organization would almost certainly mean the downfall of the organization.

An example of such a (creeping) inevitability is bank transfers. Until the end of the 1990s, these were filled out on paper forms and handed in in person at the bank counter or thrown into the designated mailbox outside opening hours. The paper transfer slips were processed manually by bank employees – entered into the bank's corresponding booking systems via the user interface of the IT systems.

From the beginning of the 2000s, so-called self-service terminals were set up in bank branches in addition to ATMs. Since then, customers have been able to use these to process various service offerings from the bank 24/7 in what is known as self-service. Among other things, transfers can also be carried out via these service terminals. In order to make this approach attractive to customers, fees for processing paper-based transfer forms were introduced at the same time. By shifting the medium (=digitalization), commercial banks were able to reduce personnel costs on the one hand and, on the other hand, a source of income was opened up through processing fees. Despite these cost optimizations, account management fees have not fallen, which could be an indication that the added value is reflected in better company results (profits).

Since around 2010, online banking has been promoted as the next stage of evolution. By providing the functionality via browser or app on the bank customer's device, added value is created for the customer. Access to banking features 24/7 without having to visit a bank branch. It should not be overlooked that by shifting to the customer's technical device, commercial banks in turn realize savings potential. Reducing the number of self-service terminals, closing bank branches or reducing the opening hours of the remaining bank branches and thereby reducing personnel costs.

Conclusion

In accordance with Prof. Krcmar's basic thesis, it can be stated that digital transformation has been in flux for a long time. Sometimes due to the "long" development cycles it can also go unnoticed but is certainly irreversible.

Notes

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About the Author

Christian Funk holds degrees in civil engineering and industrial engineering from Munich University of Applied Sciences. He has been working in IT consulting since 1999, his clients come from the construction & real estate industry, the financial sector and the automotive industry. Christian helps his clients with the digital transformation of their sales, service and marketing processes. He works as a Director at Accenture.

To contact the Author: chfunk@hotmail.com