

# Digital Transformation as the Subject of the Knowledge Model of the Discursive Space

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**Abstract**—Due to the development of the current civilization, one must create suitable models of its pervasive massive phenomena. Such a phenomenon is the digital transformation, which has a substantial number of disciplined, methodical interpretations forming the diversified reflection. This reflection could be understood pragmatically as the current temporal, a local differential state of knowledge. The model of the discursive space is proposed as a model for the analysis and description of this knowledge. Discursive space is understood as an autonomous multidimensional space where separate discourses traverse specific trajectories of what can be presented in multidimensional parallel coordinate system. Discursive space built on the world of facts preserves the complex character of that world. Digital transformation as a discursive space has a relativistic character that means that at the same time, it is created by the dynamic discourses and these discourses are molded by the shape of this space.

**Keywords**—Knowledge, digital transformation, discourse, discursive space, complexity.

## I. INTRODUCTION

DIGITAL transformation as a phenomenon/process appearing in different areas of reality is the subject of research referring to different disciplines of science, however, the entrepreneurial sector is the most important initial domain of it. Especially in relatively recent years, increased interest in this phenomenon can be observed, which is certainly associated with intensive modernization of many domains using digital technologies. This is easy to explain since the digital technology is treated mostly as a commercial product and is subject to the logic of the economics.

Reflection on the digital transformation is observed as an increasingly widespread, multifaceted, complex and necessarily social, political or psychological phenomenon, creating a heterogeneous conglomerate. One can say that, the described situation of the phenomenon of the digital transformation is a natural state in science dealing with similarly complex issues. But the fact of the complexity could also open a new way of analysis which tries to observe the complex phenomenon in its wholeness. This demands the higher level of perspective and intentionally crosses the boundaries of different kinds of academic approaches. Such a step immediately actualizes the fundamental epistemological problems of the justification of the scientific conduct of research and raises questions about the status of the knowledge itself.

The second necessary component of the idea of the

description of the digital transformation and of the reasoning presented here comes also from the theoretical reflection devoted to knowledge in the 20<sup>th</sup> century. In short, it is based on the assumption that knowledge does not have to poses the ultimate, objective even true image of the reality but it is only the temporary, pragmatic and local construction. That assumption, as Kukla briefly points, is based on the epistemological claim which says that ‘there is no absolute warrant for any belief – that rational warrant makes sense only relative to culture, or an individual, or a paradigm’. [1, p.4]. This relatively old assumption – the beginnings reach the metamatematical crisis in the end of the 19<sup>th</sup> century – has many variants in the 20<sup>th</sup> century grounded in different approaches like the sociology of knowledge and sociology of science e.g. [2], [3], social constructivism [4], and postmodern idea of narrations [5], [6], etc.

The idea of discursive space is proposed as a proper model of digital transformation, as well as other mass technosocial phenomena. It is based on the idea created by Foucault, who understands discourse as articulation and retention of knowledge. Discourse is a social creation based on language but its ontological status is not simple considering the description presented in a lecture in 1970 [7]. However discourse is understood as the realization of knowledge finds is also widely supported in the literature e.g. [8]-[13].

The definition of the discursive space is as follows: “the discursive space (DS) [...] is the method of the description of the massive and ubiquitous phenomena like the internet chosen as an example. This method could be also treated as the model of knowledge about chosen phenomenon. This knowledge is understood from the point of view brought by sociology and philosophy which present the so-called constructivist attitude which means that the knowledge is treated by them as a social, temporary and spatially local creation. [...] Two essential ingredients appear as the base of DS: complexity as a generic model and discourse as its direct substance” [14].

The formal representation of the discursive space is a dynamical space having an unlimited number of dimensions [15], [16]. These dimensions are created through the qualitative analysis of the existing discourses. Such a technique is not entirely new, e.g. Byrne and Callaghan justify it and use [17]. Mentioned discourses traverse the trajectories in such a space in time representing the changeable state of the knowledge which is the subject of these discourses. In order to gather different kinds of discourses possible to be described by the different sets of dimensions, the higher construction of manifold is possible to use. This model could be also in this

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way expanded to formulate the generic model of knowledge as such.

The constructivist idea of knowledge is generalized to all its articulations not necessarily connected with social circumstances or the human instance. This implication finds support from the theoretical approaches trying to interpret knowledge in the context of artificial systems e.g. [18, p.83]. Constructivist approach assumes that knowledge is a product of local, temporal and specific circumstances, i.e. it remains valid and relevant from the particular point of view of its disposer, who does not have to be human [19].

## II. METHODS

The reasoning presented in this paper has a conceptual character due to the extensive character of the described phenomenon: digital transformation [20]; although the base of the thought remains also the numerous literature which has pragmatic or even practical character. Thanks to such approach, the creation of the higher conceptual model is possible to create. Such a reasoning maintains coherence both on the level of deduction and coherence of the adopted assumptions, fulfilling on the one hand Popper's postulate [21], and on the other, the assumption of the axiomatic approach [22], [23].

## III. RESULTS

Digital transformation can be regarded as an epistemological category, i.e. the cognitive construction which is pre-designated to describe the assumed phenomenon and is understood here as a discursive creation. However discursive interpretation has linguistic basements it regards the higher level of understanding which is knowledge. One of the consequences of this status is overstepping by it the level of words and notions. The discourse described by Foucault has several properties which were presented by the four rules of its comprehension: reversal, discontinuity, specificity and exteriority [24, p.67]. This description widely justifies the specific and higher ontological status of discourse exceeding the level of language [14], [25].

Digital transformation can be understood then as an emergent effect of the complexity of the discursive space which is the representation of the knowledge about the set of mutually related discourses devoted to digital transformation. Such a process is the immanent property of complex systems e.g. [26]-[29]. The complexity of the discursive space is inherited from the source of this space, namely the reality represented by the knowledge retained/articulated by discourses. This reality is described as world of facts (state of affairs) which is the interpretation delivered by Wittgenstein and Armstrong [30], [31]. Discursive space and world of facts are related through the supervenience, defined by Armstrong as follows: 'We shall say that entity Q supervenes upon entity P if and only if it is impossible that P should exist and Q not exist, where P is possible' [30, p.11].

Such general state of the mutual relation means the inseparable dependence between the discursive space and the

complex system which is the source of that space (i.e. world of facts). This relationship can be observed during the process of establishing of discourses on one hand and the process of establishing the dimensions of the discursive space. Both of these processes are simultaneous and interdependent. Such reasoning leads to the conclusion which could be named as the 'relativistic' idea of the discursive space. That space at the same time is shaped by the existing discourses and shapes these discourses. The notion 'relativistic' is used here by the analogy to the idea of the general relativity by Mach and Einstein which was based on approach described by Cheng: 'space and time are nothing but expressing relationships among physical processes in the world— "space is not a thing."' [32, p.10]. Recalled analogy stresses the mutual interdependence between the constructions used for description of the wide environment i.e. the space and the entities moving across this space (discourses). Actually, it has been done by transferring whole the importance on that entities (discourses) and treating that construction only as a kind of temporary description, not the transcendental or autonomous part of reality.

Such an interpretation leads to the following definition of the digital transformation: digital transformation is the space of the instances of the knowledge about the digital transformation (discourses) which determine the shape of this space – its 'curvature' – which is local and temporary. Such a space creates the environment for any kind of entity which could be interpreted in the context of digital transformation i.e., of everything. This environment is not physical but epistemological and reflects the locally and temporally variable state of knowledge which is represented by the trajectories of the discourses dedicated to the digital transformation.

## IV. DISCUSSION

Digital transformation is not a new or barely known concept. In fact, in the last years of 2018 and 2019, a huge number of books devoted to digital transformation have been published that can be counted in dozens. It is impossible to refer to all of them. For the purpose of this study, it can be assumed that as an object of disciplined reflection, it appears in the literature in three basic variants: (1) as description of a certain business and organizational reality of enterprises e.g. [33]-[38]; (2) as a source of technological modernization of enterprises e.g. [39]-[42]; and, (3) as a broader social, cultural or even psychological process e.g. [43]-[48]. Each of them sets a specific and separate perspective on the perception of digital transformation and aims at a slightly different definition. Some of them are also connecting the phenomenon of the digital transformation with the digitalization process e.g. [35], [48] or trying to understand it in the context of the similar ideas like Industry 4.0 [42] opening up further ways of understanding.

As has been said, the main stream of reflection presents the entrepreneurial approach or is based on the narrow analysis of the digital technology impact, as can be seen in the following definitions: 'The digital transformation can be understood as

the changes that the digital technology causes or influences in all aspects of human life.' [49, p.689], 'Digital transformation is a continuous complex undertaking that can substantially shape a company and its operations' [36, p.341], 'Digital transformation is a new development in the use of digital artefacts, systems and symbols within and around organizations' [35, p.20], 'Digital transformation is the changes associated with the application of digital technology in all aspects of human society' [46, p.198], 'we define digital transformation as a sustainable, company-level transformation via revised or newly created business operations and business models achieved through value-added digitization initiatives, ultimately resulting in improved profitability' [37, p.4]. More similar definitions can be found in Schallmo and Williams [37, p.10].

Digital transformation is also the subject of interest of the political institutions of different kinds like the European Commission or the World Economic Forum. That fact makes it a complex political and economic issue. As such, it becomes the subject of comprehensive analysis of many accounting firms like KPMG, Ernst & Young, Deloitte, PricewaterhouseCoopers and others. Such situation justifies two necessary assumptions: first, an approach based on the idea of the complexity which could provide suitable a proper kind of analysis and second, in light of the abundance of reflection only the higher level of reasoning could meet the conditions of the legitimate analysis of digital transformation. Such a level could be provided by the analysis of the knowledge itself where knowledge would be understood as a constructivist phenomenon i.e. the result of current and local processes. Such an approach can deliver the dynamic image of the state of the beliefs, convictions, judgments, etc. that actually guide the decisions and acts of humans. Discourses are regarded as a realization of such knowledge.

Complexity as a systematic and justified approach emerges from the transformations and innovations of science. As Castellani and Hafferty claim that, the beginnings of this approach came from the group of scientists: physicists, mathematicians and biologists who in the 1970's and 1980's created a network known as complexity science. That network was intended to develop the idea of systems and it soon included social issues [50, pp.17, 119]: "in an effort to understand the nonlinear, dynamic, evolving, emergent, negotiated, conflicted, highly interdependent, distributed, far-from-equilibrium, self-organizing properties of complex systems, complexity science has had to develop new ways of doing science, including new epistemologies, methods, concepts and theories" [50, p.20].

In 2005, Urry announces 'the complexity turn' in social and cultural sciences [51], in what can be considered as a final overrun of the borders between the different types of methodological (epistemological) perspectives including the quantitative/qualitative division. The superior and universal position of the complexity idea make it the paradigmatically different from the traditional approaches based on the simple causal assumption and makes it suitable to analysis such massive and multifaceted phenomena like the digital

transformation. In particular, it allows to borrow from physics an idea of the dynamical space for the description of changing over time and multidimensional entities at the same time leaving freedom both in defining these entities and their dimensions [15], [16].

The idea of the multidimensional space despite its geometrical (quantitative) character is also used by the qualitative approach e.g. as an idea of the conceptual spaces by Gärdenfors [52]-[54] or an idea of complexity as a proper tool for social analysis [17]. Also, the concept of a dynamical system was proposed by Poincaré as a combination of the qualitative and quantitative approach in a geometric concept [55, p.xviii]. The idea of dynamical space seems to be an appropriate tool for describing the trajectories of discourses in multidimensional spaces. There is also a good way to visualize this space based on a parallel coordinate system [56]. The idea of the manifold could serve as an extension of the idea of space especially since Riemann, who was an inventor of it, did not understand manifold as formally as modern topology [57]. Manifold has been understood in a more general way also by Husserl [58]. However, knowledge was the subject of grave reflection from Plato [59], [60]; the understanding of it in the 20<sup>th</sup> century has undergone an intense evolution that is also evolving today. This process could be named as domination of the pragmatic approach which appeared after fundamental changes in mathematics and physics in the 19<sup>th</sup> century e.g. [61], [62]. This approach can manifest in many variants, also such sophisticated as a 'historical turn' in the understanding of science as a product of current historical and social circumstances [63, p.21]. The social context becomes crucial e.g. [2], [3], [64]-[66]. One of the most sophisticated, philosophical realizations of such an approach is represented by Michel Foucault [7], [67], [68] and Jean-Françoise Lyotard [5]. This kind of approach can be very general in nature and appear at the level of civilizational or social political projects [69]-[71], in which knowledge is understood as a key factor in social or political change. It can also lead to operational treatment of knowledge, e.g. as the concept applied to the analysis of economic phenomena (the concept of knowledge economy has been introduced by Machlup in 1962 [72] or management, where it becomes the basis for a separate approach under the name of knowledge management [73]-[75].

The very important pragmatic variant of knowledge understanding can be observed today in the field of digital technology, where it can appear as a separate asset, e.g. as a massive resource of data which can be acquire by the mining technique [76], [77] or the foundation of further computational processes [78], [79].

The social context of knowledge creation naturally favors a construction like discourse. This concept was introduced in 1952 by Harris and since then has developed into a lot of approaches that 'range from textually-oriented views of discourse analysis which concentrate mostly on language features of texts, to more socially-oriented views of discourse analysis which consider what text is doing in the social and cultural setting in which it occurs' [80, p.1]. Discourse is

considered by many scholars to be an emanation of knowledge e.g. [8, p.6], [11, p.592], [12, p.39], [13, p.2].

The literature devoted to the discourse is numerous and has different paths. Two main branches are built on different fundamental approaches: quantitative and qualitative, although there are also some attempts to join them, as for example, the idea of computational discourse. One of the first such discourse parsing systems was presented between 1958 and 1959 by mentioned Harris [81, p.10]. The currently presented discursive theory is one of them. Historically, probably the quantitative tradition is older, founded on the idea proposed by de Morgan and developed and described by Boole [82]. The qualitative one remains under the strong influence of Foucault [13, p.13], [83, p.2] and has also several implementations [83, p.3].

Foucault proposed enough disciplined approach to discourse to use the formalism of the dynamical space i.e. discursive space. He described it in his lecture in 1970 [7]. It is based on four rules of analyzing discourse: reversal, discontinuity, specificity, exteriority. They mean the necessity of the fundamental change of approach to the specific existence of discourse which can be considered then as a complex phenomenon and then lead to the formal model such as dynamical space [14], [19]. Hence, the question about the source of the discourse arises out of necessity here. The ontological proposition made by Wittgenstein and Russell is used here as an answer, which is based on the relational idea of the world of facts or state of affairs [31] and entities like individuals, connected by relations [84, p.94]. These concepts were developed further by the Armstrong: "The general structure of states of affairs will be argued to be this. A state of affairs exists if and only if a particular (at a later point to be dubbed a thin particular) has a property or, instead, a relation holds between two or more particulars. Each state of affairs, and each constituent of each state of affairs, meaning by their constituents the particulars, properties, relations and, in the case of higher-order states of affairs, lower-order states of affairs, is a contingent existent. The properties and the relations are universals, not particulars. The relations are all external relations" [30, p.1].

The relational (networked) and then necessarily complex world of facts is the source of the discourses. These discourses are built upon it through the infinite development of the supervenience relation through the time. Thanks to that ontological interpretation, the formal model of the massive phenomena like digital transformation could be built and defined.

#### ACKNOWLEDGMENT

This work was supported by the National Science Centre, Poland under Grant number 2018/29/B/HS1/01882.

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