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# The Analysis of the Internet Development Based on the Complex Model of the Discursive Space

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**Abstract:** This paper aims to present a new way of understanding and elaborating the current state of reality which has a substantial dependency on technology. An example of such a relatively mature technology is the Internet. The discursive space (DS) is a proposed new cognitive tool, which can be used for this purpose. DS is constructed based on the idea of the discourse and the idea of the configuration space, state space, phase space, and space-time, etc. Discourse is understood as the representation/creation of reality, which means that it can also be understood as a carrier of knowledge. The configuration space, etc., is a tool elaborated in the field of physics for describing complex phenomena. DS is a tool for acquiring knowledge analogous to formal information processes, but is based on another interpretation of the existence of knowledge. This interpretation sees knowledge as a social construction and not as an independent entity, which can be described by rigorous formal procedure. The necessity of such tools comes inter alia from management, particularly from humanistic management, where it can describe the Internet as a dynamic and complex environment for organizations that understand it as a basic unit of the social space of reality.

**Keywords:** complexity; humanistic management; internet; discourse; knowledge; technology; humanities; sociology

## 1. Introduction

This paper aims to present a new way of understanding and elaborating on the current state of reality, which has a substantial dependency on technology. This analysis allows the creation of a coherent descriptive schema of this phenomenon in accordance with the conditions expanded in this text [1,2]. This schema is named the discursive space (DS) due to the double base of its creation: the idea of discourse which comes from the humanities and the idea of configuration space, state space, phase space, and space-time, etc., which comes from physics. The idea of such a type of combination is not new, but this paper proposes a new version, substantially changing the output structure that is widely described later.

The most important context of DS is the phenomenon of knowledge, which is the appropriate field of interpretation of the functioning of the proposed tool. The knowledge is also the main subject of concern from the point of view of information science, where the information and the knowledge are treated mostly in a rigorous and formal way. However, this kind of approach does not exhaust the possibilities of interpretation, which are numerous. Although it does not mean that a unified and synthetic approach is not possible; a very good example of such holistic approach is [3]. Hence, information science can also serve as a fundamental platform where knowledge can be studied from many different points of view, for example, such points of view that are presented here.

The other reason that the field of research defined by [3] should also be enriched by the reflection of the kind presented here comes from the subject of digital technology. Today, technology is a main area of the arising problems of every kind, especially problems concerning the situation of knowledge,

which can also be seen as a social problem that reflects on the situation of man, social, and cultural order, etc. It is obvious that we are dealing with one sphere of concern that should be investigated in a transdisciplinary way. The last idea is of great interest in the field and forms the ground of this paper i.e., humanistic management (HM), which is based on disciplines such as sociology, philosophy, anthropology, etc., and is an extension of traditional management which focuses on the efficiency or effectiveness of organizations. From the point of view of HM, the knowledge issue should be studied as a borderline phenomenon concerning many different approaches.

So far, the model of describing the presence and impact of technology based on the so-called technological determinism still dominates, and is used almost by default, though could be criticized because of the insufficiency or oversimplification of the subject description, due primarily to the casual mode of its reasoning. High hopes have been associated with the concept of Bruno Latour [4], which was based on a completely different type of understanding of the world of phenomena, above all social, which was also applied in management by [5]; however, it has not achieved similar popularity. The idea of complexity (in a way, similar to the idea of Latour) provides a very promising description mode. This idea is not new in the sense that it has been developed for many years, but also because there have been a number of attempts to use it within the social sciences, and even the humanities [6–16]. The special place take reflection which tries to combine the three issues: complexity, social science, and information [17,18]. Complexity is often understood as a source of paradigmatical turn in science, and the subject of a separate area: the science of complexity.

The Internet served as the starting point of the reasoning on which this paper was based, and as an example of the DS application. The Internet has proved to be an aptly chosen example of digital technology due to its maturity, the multiplicity of the identified forms, consequences, processes, and phenomena. However, the method of analysis presented here may also be used for other technologies such as artificial intelligence. The author is convinced of the value of the described analytical proposition, as it has practical and cognitive values since the presence of technology (e.g., the Internet or AI) is an extremely important factor for all activities undertaken in the social, economic, and cultural fields by various actors including organizations of various types and levels. The last aspect is underlined, as the main source of research perspective in this paper is the HM.

## 2. Results

The result described in this paper is epistemological construction i.e., discursive space (DS), which is the method for the description of the massive and ubiquitous phenomena of which the Internet was chosen as an example. This method can be also treated as the model of knowledge of the 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 knowledge is treated by them as a social, temporary, and spatially local creation. Such an approach allows for the reconstruction of such knowledge as a real environment for such entities like the organization, and can serve as a base for decisions of every kind. Furthermore, it allows the creation of a dynamic picture of the current state of knowledge as revealed in social and cultural processes. DS presents in such situations a kind of model of the current beliefs, which is crucial from the point of view of stakeholders like the organizations of any type. Such organizations can be understood as the main actors of social reality.

The model of DS was visualized by the parallel coordinates system usually used to present the development of the phenomenon in a multidimensional space. Chosen dimensions, which were the result of the analysis of the discourse, allows the trajectory of the relevant factors to be shown during the chosen period of time. This model opens further possibilities of the description of the phenomena, which until today did not allow such parameterization, and opens the discussion about mutual relations between the quantitative and qualitative approach. This discussion in the context of the idea of the configuration space, state space, phase space, and space-time, etc. is described later. This paper and DS is a kind of contribution to this discussion and an attempt to propose a possible

solution. This is also an introduction of the idea and method of the description presented as DS and demands further development.

On one hand, DS is new, but based on existing achievements tools for the description of the reality and on the other, is proof that such a construction is possible and coherent. DS retains the main and fundamental direction of the cognitive process going from the world to knowledge, which is widely described in the literature. One of the last and comprehensive examples of such descriptions is in [3]. This issue opens the separate and extensive field of theoretical reflection. Humanistic management proposes a more pragmatic and compact platform to show the process of constructing a DS as an alternative way for acquiring knowledge in relation to the formal processes of information because of its transdisciplinary and pragmatic character. This means that first of all, the closer connection to real processes of social, economic, cultural, etc. kinds demand attention and reflection.

Two essential ingredients appear as the base of DS: complexity as a generic model and discourse as its direct substance. Complexity is treated here as a paradigmatic research approach, which can be applied to the description and interpretation of the phenomena of the world, while discourse is treated as a representation of the world. This approach is not evident particularly in the context of the natural sciences, based on the belief in the direct access to the phenomena, taken as par excellence “reality”. Although this kind of tacit agreement in that regard exists, it does not exist in the social sciences and humanities. The issue of discourse contributes to this situation in a fundamental way. Certainly, discourse can be considered as the phenomenon of the world, while on the other hand, it is also possible to assign it an unobvious ability to create such phenomena. Discourse, in particular, can be considered as a form of mediation between the world and human and serve as a double tool allowing insight in the world as well as create it.

This duality has emerged from serious reflection on the role played by language, which was developed in the twentieth century. Ludwig Wittgenstein is considered to be the symbolic father of this reflection, whose two works, *Tractatus Logico-Philosophicus* and *Philosophical Investigations* [19, 20], became the inspiration for further study, strongly developed since the 1950s (e.g., J. L. Austin; J. Searle; M. Foucault; R. Rorty). These studies inherently also include the text, making it the main subject of different inquiries, depending on the type of approach. In the humanities, the widely understood literature has become such a field of investigation, delivering notions (e.g., narration) able to capture—through its textual and linguistic foundations creating the universe of human activity—the processes and phenomena of the most general nature: social and cultural. Humanities also has used its own rich and older research concepts such as hermeneutics, significantly expanding the research area. Knowledge has become a separate and fundamental thread of this reflection, which is obvious, considering that the issue here is the epistemological competence of man: his ability to describe and understand the world. This reflection has enriched ongoing parallel discussion on science as a source of legitimate judgments about the world. Discourse can be understood as an effective reflection of knowledge, specifically understood, having the fundamental importance not only for the perception of phenomena, but in accordance with the properties of discourse, especially because of its constructivist power, for their existence which emerged in this perception. Similar notion of universe of discourse invented by Augustus De Morgan and George Boole is also present in the science, but it is not the subject of interest here. The Internet can be perceived in the same way: as emerging from the discourses which concern it.

Discourse and its specifics are also crucial from the perspective of the information phenomenon. Due to its power to describe and construct reality, it must be regarded as a parallel and pragmatic mechanism of the acquisition and use of knowledge. As discussed later, this is an existing process that should be considered as an important base for many pragmatic social and cultural activities of man that affect such important fields as economics, politics, etc. This is the reason why it is also the subject of interest of the so called humanistic management, which is the basis for this paper. Knowledge is one of the most important issues from the information science point of view (The problem of mutual

dependence of knowledge and information is considered for example in [21]). This paper proposes a speculative approach that is different to the formal approach, but understood to be complementary.

As has been said the starting point of reflection that led to the idea of DS was the Internet. Understanding the Internet in the context of complexity as proposed here refers to an idea that appears primarily in the field of physics in accordance with its Greek formative base: *physis* (nature). Thanks to a certain basic physical approach in the 20th century, a specific way of seeing nature emerged based on an abstract representation of the dynamics of phenomena and the abandonment of the Newtonian idea of describing the world as the field of direct reactions between material bodies. The description of physical reality is based on capturing the wholeness of the phenomena during their development in time. As this description was made using a variety of variables and is the result of a complex calculation, the simple physical world taken as the literal space, where the moving bodies are located, was discarded. The reasoning was transferred to a higher level of abstraction where space was created with the dimensions of any kind and quantity: “A unifying viewpoint of physics has emerged, over the past century, that studying the geometric properties of special points and curves within dynamical spaces makes it possible to gain a global view of the dynamical behavior, rather than focusing on individual trajectories. Dynamical spaces can have many different dimensions and many different symmetries” [22] (p. 2). The dynamics of the world, which is still understood as a change in time (though it also seems possible for time to be the subject of similar operation as space), occurs in a much more complex way in the sense that there is any number of variables of any nature, limited only by practical considerations. Therefore, the unified and generalized space allows you to simultaneously capture unlimited, freely chosen, and specific entities moving in this space.

This kind of concept of abstract space was used to build the discursive space of the Internet, which is presented later. All entities actively present in the Internet such as organizations (all kinds of, existing in all areas, and at all levels of social life) and individuals form a very large set. All have relatively well described pragmatics (The fundamental specificity of this image of the world consists in departing from thinking about individual entities in favor of their numerous, internally determined sets, and this change is of a qualitative nature). Although various entities can have different pragmatics, they also form broader groups of the same or very similar pragmatics. Hereby, we had to deal with complex mutual interaction of these entities and groups, like in the other massive sets. Examples of similar relationships are the interactions of gas molecules that make up the atmosphere and the environment of the development of the weather, which is an emergent result of the complex interactions of those molecules. The premise of this work is to propose an analogue environment for entities existing on the Internet. It claims that interactions in the case of the Internet proceed in a single, but very diverse space, creating the reality of its functioning, which is equivalent to the configuration space, state space, phase space, and space-time, etc. [22] in the physical interpretation. The space of discourses is such a space, and has its own special and rich interpretation which allows other phenomena such as knowledge to be captured and described.

### 3. Discussion

Due to the character of the constructed model of DS, this section is divided into three parts, each of which is dedicated to a separate component of DS: discourse, complexity, and knowledge. The first two are essential for the construction; the third is necessary as it allows the importance of DS to be understood, although due to the substantial reflection on it, it is presented here in the shortened form.

#### 3.1. Discourse

The space that appears in the case of the Internet uses the idea of the abstract geometry of space and is described as a reality of language utterances, where the notion or the idea of the Internet appears. These utterances are conceptualized as a discourse in the sense defined by Foucault [23–25] as an emanation of knowledge (and power, but this aspect was not examined). The discourse is thus a construction allowing a transition from the experimental level to the theoretical and epistemological

level; the latter gathers different utterances into more general assemblages. The experimental level is realized by different kinds of speeches about the Internet or in connection with it in the different utterances occurring in different kinds of science, media, business, politics, law, and in the cultural discourses, which are different and most difficult to document: ethical, moral, aesthetic, symbolic, etc. The mentioned assemblages are the collective thematic prejudices of different natures and sources, and most importantly, they are the result of a social practice, which means that every time they produce their own rules of validity, correctness, accuracy, or veracity. They are also the articulation of knowledge, which is local and rooted in social and cultural processes, and on the other hand, it reflects the actual, historical state that changes over time. The variability of the prejudices (and knowledge) is equivalent to the variability of the values of the dimensions in the physical interpretation. Per analogy, discourses can be considered as dimensions created in the space of discourses.

Such discourses can be articulated differently at different points in time. Although it is difficult to parameterize them, they are not excluded since they are entities of language and are real. Different articulation of the discourses can be understood as a different level of the intensity, the degree of impact, universality, nature of the prejudices, etc. Entities actively present in the Internet move in a space of real discourses in the manner determined by the existence (articulation) of specific discourses, which can be understood as the presence of certain trends, developments, tendencies, etc., emerging over the level of the individual, pragmatic ways of individual entities, but collecting a lot of them and retaining an effect on all others. This behavior remains in close correlation with the dynamics of knowledge represented in discourses. These trends and tendencies can be thought of as general phenomena, present at the level of the Internet as a whole. As they change over time, and at any given time designate a state of the Internet related to real discourses, they can be treated as components of the complex trajectory arising in this way (or a collection of different trajectories). They are emergent as they are the nonlinear effect of the behaviors of individual entities, bringing a new quality that is absent on their level.

The most famous contemporary understanding of discourse has been stated by van Dijk, which draws attention first of all to the constructivist nature of the discourse that is justified on the basis of psychology and cognitive science: “The mental representations derived from reading a text are not simply copies of the text or its meaning, but the result of strategic processes of construction or sense-making which may use elements of the text, elements of what language users know about the context, and elements of beliefs they already had before they started to communicate.” [26] (p. 18). The hard base of research of that kind were not known to Foucault and is good to confirm his speculative reflection. It shows that, as mainly predicted by him, the fundamental role of discourse as “structure and process”, to paraphrase van Dijk, in creating a social and cultural environment of the human being. Van Dijk considers this property by the proven: “if we want to explain what discourse is all about, it would be insufficient to merely analyze its internal structures, the actions being accomplished, or the cognitive operations involved in language use. We need to account for the fact that discourse as social action is being engaged in within a framework of understanding, communication and interaction which is in turn part of broader sociocultural structures and processes” [26] (p. 21).

The van Dijk approach, however, is focused on the observation of a rather experimental kind; his psychological or cognitivist background can be described in this way. From the perspective of cultural contexts based on highly advanced symbolic communication such as text, this approach seems insufficient. Hence the need to return and appeal to the starting point proposed by Foucault, presenting a much more general perspective. However, van Dijk also stressed the connection between discourse and knowledge: “the role of context in the production and understanding of discourse is fundamental. Since knowledge is part of the context, each level of discourse structure depends on the knowledge of the participants” [27] (p. 592). This stance is also confirmed in [28–30], and others. An essential task aimed at Foucault is to restore and make clear the awareness of discourse, which is equivalent to accepting its fundamental role. At the time, when he wrote *L'Ordre du Discours*, the role of language as a cognitive system was not yet so widely accepted. The discourse that Foucault speaks



about is not as simple as speaking out words; it is located very deep and it is impossible to define explicitly its ontological base; it represents a specific ontological case.

To organize work on discourse, Foucault defines the four rules of conduct, having the character of the guidelines fence at the same time a discourse in its properties [31] (p. 67). They have basic importance from our point of view; they are the *de facto* source of our proposed investigation. The first rule refers to the dynamics of the discourse. Foucault called it the principle of the reversal. It describes the denial of Western philosophical thought that is willing to create big topics that cover or falsify the presence of discourse—thoughts that are treated by him with great suspicion. These are topics such as the subject (playing the role of author in the discourse), establishing himself an authoritative center of thought; as a discipline, which can be understood as a methodological, rational order, suggesting that the presence of such order (“objective”, transcendental) is possible at all, as will and the instance of the truth at the end. Meanwhile, in fact, these places are the strongest work of the discourse and offer his creations, which only wear the mask of liberation from its impact. Masking is described by Foucault as a “rarefaction”, which here serves as the role of opposition to the compression and emergence: working present robust discourse. Current, cohesive discourse is subjected to the act of refraction, which leads to its hiding and repression.

These three topics (the author, discipline, and truth) also determine the three main issues of Western philosophy becoming at least the subject of distrust and refutation: the Cartesian separation of the world and the human, the ability for the ordered, reflective work of reason, and the possibility of truth. These are also the most important basis of epistemological Western thought, laying down explicitly the possibility of knowledge, including scientific knowledge. In place of these just removed constructions, discourse is poured, which is not only the language, but a new way of that knowledge existing. The properties of that discourse are specified by the following next three rules by Foucault: discontinuity, specificity, and exteriority. Rarefaction as a step against the disclosure of the discourse does not mean that the discourse is continuous and uniform, and runs underneath the mentioned topics, waiting for the discovery. Discontinuity lies in the fact that the “Discourses must be treated as discontinuous practices, which cross each other, are sometimes juxtaposed with one another, but can just as well exclude or be unaware of each other” [31] (*ibidem*). The rule of specificity determines discourse as an event existing outside the world to which it refers. It exists rather on the side of human activity directed to the world and appears as a tool to influence the world, but not a tool through which the world becomes visible: “we must not resolve discourse into a play of pre-existing significations; we must not imagine that the world turns towards us a legible face which we would have only to decipher; the world is not the accomplice of our knowledge; there is no prediscursive providence which disposes the world in our favour” [31]. The third rule, exteriority, calls for the abandonment of the immanence of discourse, that reveals itself as the action, but not as the substance. It is also the most courageous thought by Foucault, where he defines the entity deprived of matter, but acting only through the impact, through making changes: “we must not go from discourse towards its interior, hidden nucleus, towards the heart of a thought or a signification supposed to be manifested in it; but, on the basis of discourse itself, its appearance and its regularity, go towards its external conditions of possibility, towards what gives rise to the aleatory series of these events, and fixes its limits” [31].

Rule one: reversal is the call for a kind of vigilance to the perverse nature of discourse; this rule actually touches whole thoughts that Foucault tried to cope and formulate undoubtedly with the awareness of its revolutionary nature and resistance against the ordinary analysis practice. The three further principles of discontinuity, specificity, and exteriority are more important from the point of view of this paper as they unintentionally comply with certain essential characteristics commonly associated with the phenomenon of complexity. Discontinuity strongly highlights the perception of discourse not as a single and uniform, but diverse and plural form. Rule two: specificity refers to a special way of existence of the discourse, which suspends duality having an obligatory character in Western thought (since the time of Descartes): *res extensa* vs. *res cogitans*, establishing another instance, which dramatically modifies this duality, although it is not about the ontological innovation

here, but about the paradigmatic change in thinking about the world and humans. Thanks to this change the latter categories become present as creations of the work of the discourse, losing their prior or initial character. Rule three: externality highlights and is precise in the way the existence of the discourse shows up; its ontological suspension makes it unable to be seen directly, but only through the changes it makes in the surrounding. This approach is extremely advanced and like the previous, directly connects with the idea of complexity [14,32] (p. 5).

Management science also tries to use discourse as an analytical tool. It could not, however, free itself from its materialistic, experimental, and pragmatic nature. This attachment to reality and facts makes discourse understood in a much simpler way: “I see discourses as ways of representing aspects of the world—the processes, relations and structures of the material world, the ‘mental world’ of thoughts, feelings, beliefs and so forth, and the social world. (...) Discourses not only represent the world as it is (or rather is seen to be), they are also projective, imaginaries, representing possible worlds which are different from the actual world, and tied in to projects to change the world in particular directions” [33] (p. 124). The reason for this simplification is simple and touches the fundamental issue: managing, which derives both from its history as well as the simplest of prejudices, deals with the social world. This makes it empirically ballasted, though examples such as Luhmann or Latour have shown that this ballast could be interpreted in very advanced ways. Typically, however, the practice of discourse is underscored in this field, what seems a narrowing compared to the humanistic reflection: “(discourse analysis) is the structure of a systematic study of collections of interrelated texts and processes of their production, dissemination, and consumption, and their effects on the context in which they occur” [34] (p. 551). Nonetheless management does not have to be similarly limited. An example is the humanistic management i.e., the management intentionally placed in the humanities and benefiting from its ideas. It brings a different understanding of the management itself, which is much wider and abandons existing bonds with such entities as organization. An example of such an approach is the pragmatic management concept proposed by the author, which is also the afar basis of this paper. It refers to the space of discourse as the reality that the whole epistemic activity is grounded and thus also includes rhetoric tools as notions, cognitive structures, etc. [2].

### 3.2. Complexity

This paper was written as a result of the merging of the ideas of two authors: David D. Nolte and Michel Foucault. Nolte, in his book, describes the possibilities of the application of the space model: “there is still a surprisingly wide range of complex behavior that can be captured using the simple concept that the geometry of a dynamic space dictates the set of all possible trajectories in that space” [22] (p. vii). Foucault in the text *L'Ordre du Discours* defined discourse in a way that is intensively similar to the phenomenon of complexity [31] (p. 33), directing reflection toward a kind of “physics” of discourse based on the modern model of space that Nolte writes about. Of course, there are also very serious obstacles, among which the most important is the inability (or at least serious difficulty) to formalize the discourse, which, does not preclude the construction of a speculative model.

Complexity as a phenomenon is the subject of a very large and diverse reflection in many areas of science. One of the most important places for the development of this reflection which is so recognized and so it presents itself is the Santa Fe Institute, which is a nonprofit, independent research center located in Santa Fe, New Mexico (<https://www.santafe.edu>, 5 May 2017). Part of this reflection is also the thread developed intensively in the area potentially closest to this study i.e., the social sciences, especially including the ideas developed in the humanities, e.g., philosophy [7,32] or names itself precisely as a humanistic reflection [11,16]. As a result of this reflection, publications of a synthetic and broad character appear [7,8]. The intensity of the problems within the social sciences is provided by an important text by John Urry, which defines the appearance of complexity as a new turn in social studies, following similar earlier turns: “Marxism in the 1970s, the linguistic turn and postmodernism in the 1980s, the body, performative and global culture turns in the 1990s” [35] (p. 1). The complexity turn is the result of research in many sciences such as physics, biology, mathematics, ecology, chemistry,

and economics, but also new currents within social thought, and is associated with concepts such as chaos, complexity, non-linearity, and dynamical systems analysis. Urry also described the concept of complexity in many unscientific discourses, as well as a large number of books taking up its subject, issued in the 1990s and at the beginning of the 21st century.

Castellani and Hafferty believe that Western sociology has always been “a profession of complexity” for the simple reason that “to study society is, by definition, to study complexity” [8] (p. 4). Of course, the course of the studies, and the awareness of their character had a very different shape. The origins of the structured approach involved a group of scientists: physicists, mathematicians, and biologists, who in the 1970s and 1980s established a network under the name of complexity science, developing the idea of systems that also included the area of their interest in society [8]. Castellani and Hafferty published the schema of the historical development of complexity science that showed, however, the source of the emerging new scientific approach dating back to the 1940s. This new approach was different to the previous one which was reductionist (that is, reducing a complex studied object to simple and explicable parts) and statistical (that is, generalizing the most representative features of the particular tested objects). The development of the new approach was in itself complex and consisted of mutually affecting each other threads in the beginnings of which lay such fields as systems theory, artificial intelligence, and cybernetics [8] (p. 244). Castellani published in 2014 an updated map of complexity science, where the starting point is cybernetics and systems science, which develop into five major paths: (1) from dynamical systems theory to multi-level complex systems through chaos theory and physics and computation, (2) from systems science to computational biology through complex living systems and managerial organizational complexity, (3) from complex system theory to spatial/geographical complexity through complex adaptive systems, network science and global network society, (4) from cybernetics to data science through social systems theory and social complexity, (5) from artificial intelligence and cognitive science to case-based modeling through cellular automata, agent base modeling and computational modeling (<http://www.theoryculturesociety.org/brian-castellani-on-the-complexity-sciences/>, 5 May 2017). In light of this reasoning, it is difficult to talk about science in the sense that it was understood in the Western world since the time of Galileo: “Social complexity theory is more a conceptual framework than a traditional theory. Traditional theories, particularly scientific ones, try to explain things. They provide concepts and causal connections (particularly when mathematical) that offer insight into some social phenomena. (...) Scientific frameworks, in contrast, are less interested in explanation. They provide researchers effective ways to organize the world; logical structures to arrange their topics of study; scaffolds to assemble the models they construct. When using a scientific framework, ‘theoretical explanation’ is something the researcher creates, not the other way around” [8] (p. 34).

Byrne and Callaghan defined this type of science similarly: “for us complexity theory is an ontologically founded framework of understanding and not a theory of causation, although it can, as we will show, generate theories of causation” [7] (p. 8). The notion of ontology appears in this definition as a special emphasis of the fundamental nature of their approach: complexity is a major feature of the existence of the world as such and not just a cognitive attitude or the methodology. Two simple definitions of complex systems for example: the definition of the complex system by Melanie Mitchel: Complex system is “a system in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated information processing, and adaptation via learning or evolution” [13] (p. 13). The definition of the complex system by Ladyman et al.: “A complex system is an ensemble of many elements which are interacting in a disordered way, resulting in robust organisation and memory” [12] (p. 57). Ladyman et al. also enumerated some core properties of complex systems as nonlinearity, spontaneous order, robustness and lack of central control, emergence, and numerosity. Byrne and Callaghan described the definition properties of complexity such as non-linearity, emergence, or lack of equilibrium, but the most important place from our point of view is the part devoted to the fundamental opposition of the quantitative (mathematical) and qualitative approaches, which Byrne and Callaghan try to undermine,



and even show as limiting. Described here, the idea of DS is based on a similar approach, though due to the humanities chosen as the field of reflection, it is easier to justify.

Byrne and Callaghan based their justification for the weakening problem of qualitative and quantitative approaches on the rejection of the causal order reasoning and treating science as a general framework and not as a closed set of solutions. In this way, they bring reasoning to a higher level of abstraction, a metascientific one: “When mathematics is applied it is considered to be isomorphic with reality itself, in other words it stands as a description of reality. For Aristotelians like us, in contrast to Platonists, this does not mean that mathematics prescribes the form of the world but rather that it serves as a useful way of describing it, as a metaphor” [7] (p. 27). Such reasoning does not need to have a clear point of destination or a particular purpose e.g., a precise, formal model as it assumes that the complexity of the subject of study by its nature (for example, because of the phenomenon of emergency effect. DeLanda described emergency through its extraordinary ontological status: “it still refers to something that is objectively irreducible” [36] (p. 3). may be unexpected or eluding the available models. In this situation, any restriction on the methodology becomes a potential threat to the survey itself, which should not be limited in taking new levels of generality (and abstraction). A natural application of such reasoning in the field of social sciences is to attack the Holy Grail of these fields, which is a division on quantitative (statistical, generalizing) and qualitative (descriptive, particular) methodologies: “For us one of the great promises of complexity science, of complexity as an ontology or frame of reference, is that it offers the possibility of a transcending of the sterile arguments between quantity and quality, between the ‘hard’ and the ‘human’ sciences and opens up the possibility of a unified approach to understanding” [7] (p. 38).

Byrne and Callaghan did not abandon descriptive structures created on the basis of science e.g., physics; these include the state space (phase space) as a universal environment for description mass dynamic phenomena: “(a phase space) is a space in which all possible states of a system are represented. It is described in terms of dimensions which correspond to the parameters describing the state of the system” [7] (p. 26). The observed system moves in such space in a specific trajectory which is relative to the accepted dimensions. A natural problem that arises here is the adaptation of a formal mathematical construct to describe items which are very difficult to formalize such as social systems. Byrne and Callaghan—relying on DeLanda and his interpretation of Deleuze—described the difference that distinguished a metric space based on Euclidean geometry and topological space, “where fixed distances cannot define proximities since distances do not remain fixed” [37] (p. 23), which means that the latter is not subject to similar discipline in terms of dimensions as a metric space. The “topological turn” [7] (p. 28) allows much more freedom when modeling the working space. The described system does not need to be formally parameterized; its shape (multidimensional) is more interesting and its changes during time are possible observe with the topological approach. The special meaning of the notion of metaphor is revealed in this way, the notion that Byrne and Callaghan used to describe the relationship between the space used by them and the reality that this space should reflect. This relationship is essentially different from the one that appears in the case of applied mathematics. By analyzing the given example of this approach, they emphasized: “Actually what we have in this example is not a set of models calibrated against real data in terms of initial inputs but rather a modelling process which establishes its correspondence to reality through a qualitative appreciation of how things are working out in reality” [7] (p. 162).

The reasoning of Byrne and Callaghan supports the approach showed in this text, although the obligation, which could be named as the epistemologist correctness, is weaker in the case of the humanist approach than that of social science, because of the greater distance of the first one from the experiential world of events. In the physical interpretation, the state space (configuration space, phase space, etc.) exists as an a priori and complete registration form of the states of the system, that becomes possible to describe (and to predict). Even more so, it becomes possible to construct some order of the sets of such trajectories that allows a higher level of description. The dimensions of this space are based on the parameters of a mathematical nature and are a priori assumptions. The equivalent

of this space used here for the description of the Internet i.e., DS, appears as a result of the gradual uncovering and reconstruction of the most expressive or prevalent elements of the trajectory of the Internet in this space (that is, collecting and ordering the expressions of discourses dedicated to the Internet). Thus, the opposite is happening: discourses are revealed a posteriori, as they follow the development of the analysis of the phenomenon over time, but of course they also require preliminary findings of much greater generality such as political, cultural, or other aspects.

Anticipating future system states in this situation becomes difficult. However, the image of the composite character of the Internet as a whole remains available, where the emphasis is not just on the wholeness, but complexity (though of course the wholeness is also one of the features of an approach based on the idea of space). In this way, the idiographic approach prevails above the nomothetic one, referring to the Windelband nomenclature. This is the image that considers the possibility of the emergent phenomena e.g., the duration of the idea of freedom and openness on the Internet, the dominance of a new understanding of human subjectivity, the dominance of economizing and financialization the world of human experience and very many others, which can be explained in this way. This is undoubtedly an incomplete interpretation from the point of view of its mathematical source, however, it has led to a new significant type of insight, also of practical importance for any internet activity, forced to take into account not only individual dimensions (discourses), but trajectories reflecting their variable and interdependent, nonlinear and emergent character. If it is assumed that the world is complex (also the world of non-physical facts), according to the complexity model, both trajectories and dimensions can be expected. However, in the case of the Internet, it is difficult to talk about the system in the strictest sense, since there is no full, a priori state space (phase, etc.).

Byrne and Callaghan, who tried to combine a qualitative and quantitative approach, referred to a slightly different, but similar construction of the narratives. A narrative approach in the social sciences has its own theory, whose representative is Barbara Czarniawska [38]. For Byrne and Callaghan, social study remains fundamentally an empirical study. Actually, this property has been extended by them to all of the sciences. Fulfillment of this property in the case of the state space is easy for physics, but becomes difficult when the formalistic side of the approach becomes weak. The question arises about the type of experience that should serve as the basis for the construction of the space. Furthermore, Byrne and Callaghan proposed a methodological tool called trending: “Trending requires a description of how entities change through space and/or time. We are using the word here for the process of the scientific description of change or stability. Trending is what we do when we map the trajectories of complex systems. When we trend, we construct narratives. We tell the stories of how things have come to be what they are, how they stay as they are, and—projecting into the future—how they might come to be different from what they are” [7] (p. 154). Narratives are, however, understood very broadly by them and “may be presented in a variety of forms—textual as words; numerical as a series of measurements including the nominal classifications at time points of the kind of the systems; and indeed, visual through the presentation of a series of images” [7] (p. 171). They fulfill the condition of empirical origin; however, they clearly ignore the upper layer of abstraction that is revealed in the case of discourse, which also applies to the formation of meanings. This fact, well known for the humanities, also notes Cilliers, when considering the relationship of deconstruction and complexity in the context of the concept of Derrida: “meanings are constituted in a context, in a discourse” [14] (p. 31).

Discourses are certain social structures with a nature that is, as mentioned, linguistic. Language studies, that gained extraordinary momentum and breadth in the twentieth century have revealed some of its characteristics; on the one hand, strengthening the relationship with reality and at the same time complicating it in an unusual way. This is an area of very extensive reflection (L. Wittgenstein, F. de Saussure, J.L. Austin, J. Derrida, M. Foucault, R. Rorty, etc.), also called linguistic turn, also open by modern hermeneutics (M. Heidegger, H. Gadamer) with many continuations. One of the important new operational research fields that should also be considered is the development of the latest language technologies such as NLP or neural translation, which provides an unexpected contribution

to understanding the existence of language. This field is of great importance and incorporating it into the design complexity is not a hindrance, but an opportunity to take up and sort out this problem. In particular, this decision can be understood as an extension of the idea of complexity in the area of symbolic representation of reality made mathematically into different symbolic representation, which is language, exhausting in this way the possible symbolizations and close opportunities of the description. This can be treated as important reinforcement in the informal approach used in this paper. The informal approach is primordially the approach specific for the speculative i.e., humanistic type of reflection, where the language is treated as completely sufficient for the task of the description.

Discourses, due to their language nature cannot be regarded as an ontological basis of reality, which is what takes a place in the case of the facts investigated and parameterized by physics. Discourses, however, are constructions designed to represent these facts, made within societies. Therefore, they establish a type of medium between a certain, unreachable reality, and man who is limited in his cognition to his own design, which is language. The decision to choose discourse as an element of the research does not necessarily mean the choice of ontological worldview does not involve research in a dispute about the existence of the world. Discourses in accordance with the pragmatics of management are one part of the environment where organizations exist, a part that is extremely important, revealed, and efficiently portrayed by them. In accordance with more advanced reasoning [39,40], discourses are also the main way that knowledge exists with a simple, minimalistic, and realistic view that there is no other way of articulating knowledge than through language.

In light of the described concept of complexity, as well as the way that Byrne and Callaghan used this concept, the relevance of the proposal by Foucault is easy to explain. This proposal was formulated in the form of the four rules of conducting discourse analysis: reversal, discontinuity, specificity, and exteriority. These can be interpreted as a methodical undermining of the basis of Western thought, the rejection of the image of the phenomenon under investigation as a single and consistent whole for chaos, the abandonment of the simple structure of the Cartesian opposition prevalent in the present understanding of cognition, ontological, and cognitive invention on the phenomenon of discourse, excluding direct insight, but including indirect impact analysis only, which excludes causality (the level of reflection must be abstract and general). Foucault anticipated an approach based on the concept of complexity, which, of course, is to rely only on indirect forms of cognition and imagination of the existence of the world, especially as a human experience. The Foucault program is a retreat from the Enlightenment project of science and cognition and the opening of a completely new proposal whose assumptions one can also find in a more disciplined form in the concept of complexity. Mutual relationships of the discursive existence of the human world in Foucault's approach and complexity require a much deeper analysis beyond the framework of this text. The application of this concept allows one to interpret another important phenomenon that appears in this text not only as a speculative, but also a practical problem: knowledge. The practical aspect of knowledge is obvious in the light of e.g., advanced informatics (AI, massive data sets, etc.).

### 3.3. Knowledge

The problem of knowledge is an extremely comprehensive field of reflection, which is difficult to take here in its entirety. This paper merely introduces a certain way of understanding it and is intended to signal its obvious presence in the continued reflection in the model of DS. The discursive way of existence of knowledge is undoubtedly for Foucault as well as for other authors, among them it is necessary to mention Jean-François Lyotard. They belong to the postmodernist trend, which improperly suggests the uniqueness or distinctiveness of their approach. This error appears, for example, in a model very strongly present in the management theory proposed by Burrell and Morgan [41]. Foucault and Lyotard's reconstruction of the ideas of knowledge was made in the context of the wider crisis of the perception of cognitive competence of man, which was also articulated as a specific crisis of the legitimization of science. The beginnings of this crisis originated from the nineteenth century and are related with new concepts in geometry, but quickly move into the field of

mathematics and metamathematics. The latter is an attempt of the mathematization of the mathematics itself in the hope of subjugating mathematical reasoning and formalism to the same principles [42]. This was accompanied by a separate stream of the development of logic as a universal science, capable of also embracing mathematics in its formalism. Both programs suffered a disaster, which Kurt Gödel eventually sealed in the 1930s. However, the important and lasting effects of these turbulent transformations, having their own rich history, which I tried to describe in a separate book [43], was the collapse of the ontological and epistemological ideals of the Enlightenment promising a relatively easy, coherent, and complete description of the world, and making it rationally organized. The world, however, turned out to be a place full of uncertainty, locality, approximations, and probabilities, etc. Science and the conditions of its legitimization must also be a subject of fundamental reconstruction, but also implies a fundamental transformation of the beliefs on social phenomena such as knowledge, understood as a social and historical construct. Such ideas have rapidly multiplied—especially in the second half of the twentieth century—in different areas of thought by adopting variants suitable for each field of research. Within the philosophy of science, this trend is called constructivist and involves such researchers as Tomas Kuhn, Paul Feyerabend, or Imre Lakatos. In the social sciences, these are Peter L. Berger and Thomas Luckmann, Bruno Latour, or Niklas Luhmann. Within the humanities this is the postmodern current. A separate topic is a search within logic. Of course, this is a very brief list. The discourse-based approach is not a separate and specific articulation, but rather part of a broader process. DS seems promising and justified in this regard.

An important property of DS in the context of knowledge is its general and non-specific status: “Knowledge is that of which one can speak in a discursive practice, and which is specified by that fact: the domain constituted by the different objects that will or will not acquire a scientific status” [44] (p. 182). Lyotard gives the discourse a wider and more basic character: “Simplifying to the extreme, I define *postmodern* as incredulity toward metanarratives. This incredulity is undoubtedly a product of progress in the sciences: but that progress in turn presupposes it. To the obsolescence of the metanarrative apparatus of legitimation corresponds; most notably, the crisis of metaphysical philosophy and of the university institution which in the past relied on it. The narrative function is losing its functors, its great hero, its great dangers, its great voyages; its great goal. It is being dispersed in clouds of narrative language elements—narrative, but also denotative, prescriptive, descriptive, and so on. Conveyed within each cloud are pragmatic valencies specific to its kind. Each of us lives at the intersection of many of these.” [45] (p. xxiv). Knowledge loses its metaphysical foundation and is perceived as a local, historic, and uncertain social product. The described revolt, especially in the second half of the twentieth century, can be described as giving up hope of transcendently legitimized knowledge and revealing its constructivist character, making language its core and axis. By opening the way to creating the construction of discourse, it also poses a new challenge to the humanities. In the light of the presented interpretation, knowledge appears as a triad element: language—discourse—knowledge, which in turn becomes the basis of the construction of DS.

For the purposes of this text, three different approaches to knowledge were identified, which are also related to specific research fields: the first, the broadest, can be called theoretical and mainly philosophical, tries to answer general epistemological questions, but also questions that provide justification to scientific truths and developing in the critical area of the philosophy of science [46]. The second field is pragmatic and developed as the subject of management. Knowledge is an extremely important cognitive category within management science where it has formed the separate and extensive field of Knowledge Management (KM). In 2005, Dalkir found more than a hundred definitions of KM and regarded most of them as meaningful [47] (p. 6). The idea behind KM coming to existence in the 1990s was thanks to researchers like Dr. K. Wiig [48], Ikuirō Nonaka, and Hirotaka Takeuchi [49,50]. Generally, the idea of knowledge developed in the field of management is based on more general and earlier statements considering the state of society [51–53]. Management refers to knowledge as a phenomenon that is the axis of the problems of the modern world where it performs the role of resource, forms the basis of the functioning of such entities as organizations, enables them to expand,

and lets them locate themselves in their environment, etc. Knowledge in this field is primarily treated instrumentally; however, it can also open metatheoretical analytical insight where issues related to the status and meaning of science, including management, appear. This is due to the location of this field, which is between the first field, that is strongly speculative, and the third one, which is particularly interesting in the context of the Internet and ICT (Information and Communication Technologies). In the third field, knowledge is treated in terms of information, and therefore moves its pragmatism into the ontological domain: knowledge becomes described as a physical entity. The third field has experienced a rapid period of development in recent years, especially because of the hope of crossing the boundary so far for machines is unreachable, which is the boundary between the record and its meaning. Knowledge in this area is treated operationally, serving as the basis for the machine construction, e.g., artificial intelligence [54,55], or is the basis for building generic models e.g., [56,57]. Of course, the three fields, which can also be interpreted as the levels of generality of the knowledge problematics, clearly interfere with each other in a significant way.

A very good example of such interference, and at the same time is a very important and comprehensive theoretical work devoted to knowledge, is the book by Mark Burgin [3]. The basis of thought for Burgin was the revolutionary idea that undermined the long-standing conviction associated with knowledge that it is necessarily connected with the subject (human). This interpretation originated from the Plato Theaetetus dialog. Coming from the field of the theory of information, Burgin claims that “For a long time, it was assumed that knowledge is something that exists only in the mentality of people. Some researchers believe that this is the crucial difference between knowledge and information, which exists in anything. However, the technological development changed the situation. Indeed, because knowledge is vital to the whole existence of people, various artificial tools have been invented for knowledge acquisition, storage, transmission, and transformation. (...) This brought an understanding that knowledge also existed not only in people’s mentality but also in various physical things but not in all in contrast to information. As a result, researchers started to explore knowledge in artificial systems only after computers came into being and the research area called AI emerged.” [3] (p. 91). He constructed the fundamental theory about the existence of the world he called “The Existential Triad”, which consisted of three parts: the world of structures, the physical world, and the mental world. Thanks to this theory, he could describe the ontological base of knowledge: “According to the existential stratification of reality, knowledge exists as structure in the world of structures but has many representations in two other worlds” [3] (p. 90). Therefore, Burgin could ultimately break the connection between human and knowledge since the ontological status of knowledge is independent and could attribute the ability to use knowledge to any observer of reality and also the technical system [3] (p. 83). A similar idea of the rejection of the instance of the human subject as a necessary management component, opening the field for non-human agents that I proposed in [2] (p. 116). Burgin’s approach extensively widened the view of knowledge acquisition and also the non-human agents as active actors of reality, which is crucial from the point of view of management considering the present development of technology.

#### 4. Materials and Methods

DS can be applied to the description of the Internet. The basis of the construction was the research material gathered by the author in two books [1,2], where one can find a synthetic schema of Internet development (Figure 1). This was created through the observation of various discourses where the Internet appeared, which was revealed mainly from the literature. The analysis of the historical development of the Internet was based on the structure divided between three fundamental issues: technological, economical, and social and humanistic. This analysis revealed some regularities and identified some major discursive trends.



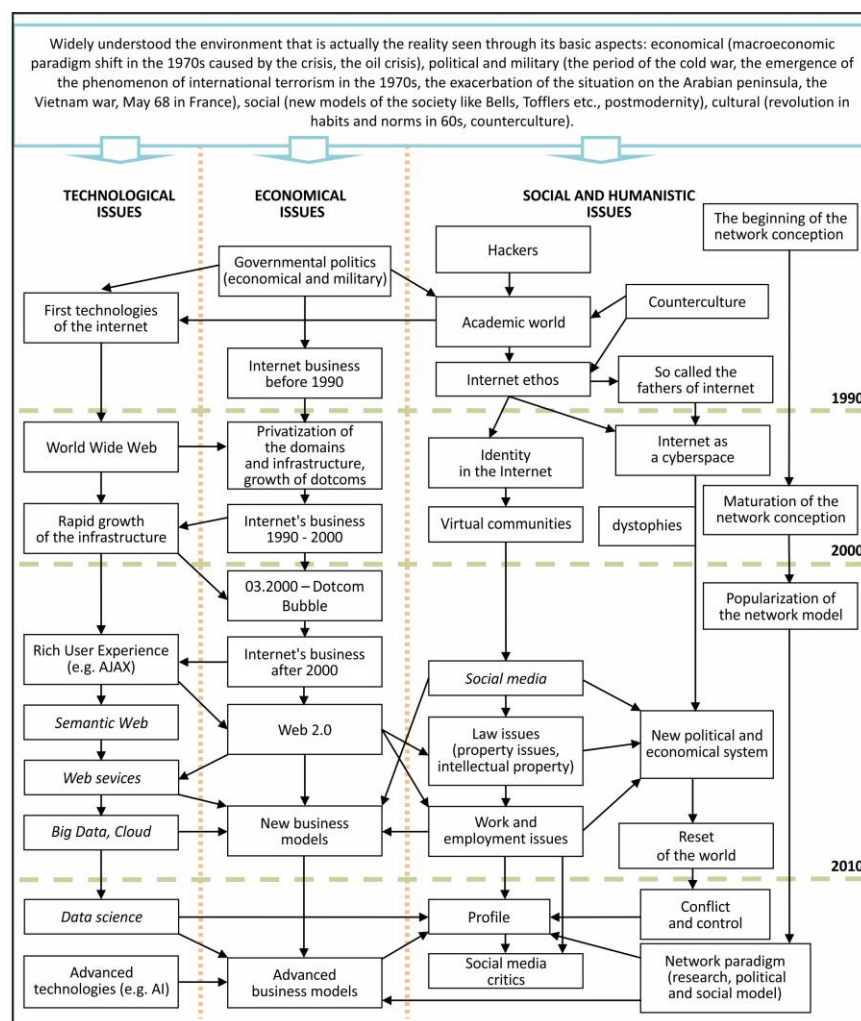


Figure 1. Internet development scheme, source [2] (p. 131).

An example of one of the discourses that determines the behavior of the entities in the Internet is a political discourse that can be seen as a rich history of events, beginning at the time of the first computers in the 1950s when the first statements about freedom and anarchism were formulated [58]. It also manifested by setting up an organization that defended the idea of a libertarian Internet [59,60]. Furthermore, the question of power was part of this discourse [61,62]. Another similarly permanent and significant discourse was the discourse of business in the Internet. The scheme was created by the author as a result of the attempt to sketch the dynamics of changes and the mutual influences creating the world of the Internet in the space of discourse (see Figure 1). Its detailed description was beyond the scope of this text, but is available in the source text [2]. Here, the presented schema is thought to present the possibility of consolidating this perspective and introduced a synthetic type of insight on the level above the discourses. It cannot be thought of as a destination of the proposed approach here, but its point of departure.

These trends were defined by the design: “Internet as ...”:

- Internet as an ideology
- Internet as an ethical space
- Internet as a Being
- Internet as a market
- Internet as a new social form

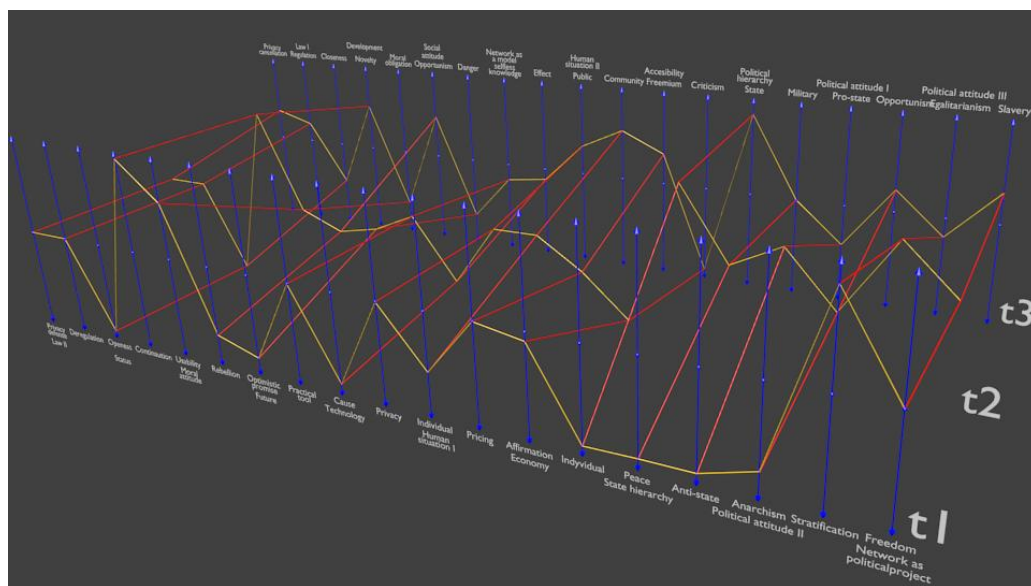
- Internet as an economic space
- Internet as a community
- Internet as a social network and other types of networks
- Internet as a technology
- Internet as an area of automated services
- Internet as a field of definition of the subject, or human
- Internet as a threat
- Internet as a future
- Internet as art [2] (p. 123 *passim*).

These trends have been used to create arbitrarily chosen terms that serve as discursive dimensions. Discursive dimensions have non-parametrical, deliberative, “non-monotonic” (accidental, local, modular) and qualitative characters. Of course, it is possible to widen the list, thereby introducing more dimensions. Their credibility remains under discussion. This situation is the result of the discursive i.e., qualitative character.

The list of these terms consisted of the following items:

- Political hierarchy: individual vs. state
- State hierarchy: peace vs. military
- Political attitude I: pro-state vs. anti-state
- Political attitude II: anarchism vs. opportunism
- Political attitude III: egalitarianism vs. stratification
- Economy: affirmation vs. criticism
- Accessibility: freemium vs. pricing
- Network as a political project: freedom vs. slavery
- Human situation: individual vs. community
- Technology as a dominant: cause vs. effect
- Network as a model: selfless knowledge vs. practical tool
- The future: optimistic promise vs. danger
- Social attitude: opportunism vs. rebellion
- Development: novelty vs. continuation
- Attitude: usability vs. moral obligation
- Status: openness vs. closeness
- Law: regulation vs. deregulation

The parallel coordinates system [63] was created based on assumed dimensions. Next, three points of the time were chosen, which was the beginning of the 1990s (t1), the turn of the twentieth and twenty-first century (t2), and the breakthrough of the first and second decade of the twenty-first century (t3). The plot shows the state of intensity, and the significance of each type of discourse over time. Evaluation of this intensity and significance is arbitrary, and needs to be supplemented and further developed. However, these dimensions allowed us to build the model shown in Figure 2. It uses a multidimensional visualization tool to present the reality of a qualitative nature, although it keeps the main advantages of this tool [63] (p. 1). Thanks to this tool, an abstract model of the development of the Internet in the space of discourses could be created.



**Figure 2.** Internet discourses as dimensions in a parallel coordinate system.

## 5. Conclusions

One should remember that management, which can also be understood in general and abstract terms thanks to HM, provides the beginning of an advanced, transdisciplinary type of reflection, that refers to the epistemology. This kind of approach in a full and self-conscious way developed within the so-called humanistic management [2], which became a suitable field for the construction of a similarly generic model such as DS. HM has the unique ability to combine pragmatic and speculative (rhetorical) aspects, which allow the fullness of knowledge issue to be captured. The science of management mostly uses research methodologies developed in the field of social sciences, however, it must refer to areas such as economics or humanities. Social science, relatively long ago, adapted the descriptive model of complexity that has been also applied to organizations, which has already been mentioned here.

One can see that the approach described in this paper takes inspiration from Niklas Luhmann, who perceived social reality as a reality of systems existing in a certain environment and by varying to it: “The concepts of function and function analysis no longer refer to “the system” (in a sense of a mass that is preserved, or of an effect to be brought about) but to the relationship between system and environment. The final reference of all functional analyses lays in the difference between system and environment. This is why systems that relate their operations to this difference are guided by functional equivalences (...). The equivalences used in functionalism are thus operative counterparts of the difference in gradients of complexity between system and environment. A corresponding perception of reality would be neither meaningful nor possible without these gradients in complexity.” [64] (p. 176). His approach weakened a physicalist type of attitude in favor of some abstract and speculative models. This proposition was a combination of the two extremes through strengthening the role of linguistic structures such as discourse and implementing the type of mediation between these extremes. The latter reasoning can be extended by claiming that the proposed model of DS implements a transgressive approach and mediates in the oppositions located in at least three levels: first, in terms of the nature of the research, which is the empirical approach vs. the speculative approach; second, in terms of the type of the research of humanities vs. natural sciences; and third, in a narrower methodological sense of the quantitative approach vs. qualitative approach. Such a position is obviously risky, but at the same time very promising. The abstract level of discourse seems to be an effective tool for insights into the presence of technology in the world. The proposed mode of the analysis could be used, for example, for artificial intelligence, which significantly determines social reactions (e.g., by anxiety about the labor market), business strategy (e.g., sense of social responsibility),

or reorganization strategies (e.g., new health strategies), and other phenomena which has reached a sufficient level of ubiquity to make enough the number of utterances that can be considered as discourse (discourses).

An example of the application of the DS concept has been used to describe the Internet, thus building a unique model of it. The Internet has been a sufficiently developed and ubiquitous phenomenon, now affecting every part of reality. Due to its tremendous impact on the economy and social life, a unified model of the Internet is necessary. Despite the conviction that such a model was too difficult to establish and that even such a level of generality was impossible, or falling down to the unacceptable simplicity, the presented model showed the development of the Internet in many—actually arbitrary chosen—aspects during time. This should bring advantages that usually come with the model itself: the synthetic picture, structure of the construction, and prediction of the future tendencies, etc. The ultimate result of the DS application is the visualization of the phenomenon which is itself valuable: “Understanding the underlying geometry of multidimensional problems can provide insights into what is possible and what is not” [63] (p. 2).

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