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Dynamics of Data Practices for Knowledge Diffusion

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Abstract: This paper begins by distinguishing between data infrastructure, data entry and data points as three distinct, but interrelated situations. Data practices are understood in the general sense of the word here, i.e., such as actions, actions, and consequences, of introducing data-generating technologies for knowledge codification. This paper will investigate both the generics and specificities of data practices to explore the disentanglement of the liveness of data practices, i.e. how such practices are happening with regard to knowledge codification. Within this regard, this study seeks to account for the 'fluid and heterogeneous ontology' of such practices. In other words, the framework conceptualizes data processing as correlational, and aims to provide a technique to explore the disentanglement of these relationships.

Keywords: Big data, Data analytics, Data infrastructure, Explicit knowledge, Knowledge codification, Tacit knowledge.

I. Introduction

Since the outbreak of the COVID-19 epidemic, data trends appear to be increasing rapidly, and it is generally assumed that such practices will continue to develop, validate and consolidate in the future (Williamson, Eynon & Potter, 2019). However, although data methods and comprehensive digital encoding processes are becoming more common, regarded as standardized and standardized, there is currently a continuing shortage of lessons and related method proposals that allow for concrete concrete research, impacts and outputs on social media in general, and the field of study [1, 2]. In this paper, the aim is to draw framework that allow for the opening of a 'black box' of digital data practices for knowledge codification and dissemination to investigate such practices in a critical way and to disrupt their operational results [1, 3].

In line with recent teaching on data processing, this article makes a difference of opinion between three key aspects of these practices:

- First, data demonstration points to the continuation of data practices, and includes 'ongoing data collection at all levels of knowledge codification [4, 5].
- Data points, secondly, are the identifiable effect of data practices: they are the 'sedimentation' or 'summary' of what happens when tasks or information (e.g. individual test results), are stored and represented (i.e. enclosed) in a digital way [5, 14]. Importantly, at present, data points can no longer be separated from the tasks themselves: increasingly, the performance of knowledge management activities - is accompanied by direct and continuous recording ('live', 'real-time') these tasks as data points [6, 7, 8].
- Thirdly, data infrastructure is information systems that allow the creation and maintenance of data systems, allowing actors to generate, edit, communicate and represent these data points [9]. They are often created as combinations of different nature, data building can be found in everyday knowledge management methods (e.g. device system, software and applications) or in different ways (e.g. a collection of daily used profiles, platforms and technologies).

In many recent works, there is a huge gap between these different words, and they are often used interchangeably or precisely in different ways. However, most of the lessons identified in this article start from the shared assumption that data practices do not simply represent specific knowledge tasks or outcomes (e.g. specific performance, output, etc.). Instead, data practices bring these functions and results. Data practices do not consist of neutral tools that simply 'find', 'identify' or 'measure' knowledge practices and activities; rather, these practices actively create, anticipate, empower, create, and thus equally control, certain ways of thinking about - and practicing (actors) [9, 10]. Although this understanding is increasingly gaining momentum in theoretical level, there is still a lack of clarity on the mechanism and clarity of how to accurately track how this happened [11, 12, 20].

Within this regard, this study explores in the next section a relational topology structure towards data practices that is

interested in their liveness [10] that is, in how they originate, evolve and unfold.

II. Related Work

Knowledge evolves as a result of deep processing of information. Michael Polanyi [14] divided knowledge into the following categories:

- *Explicit Knowledge (Articulated Knowledge)*: Explicit knowledge refers to the knowledge with high clarity, which can be encoded [16] and usually exists in the form of texts, pictures and patented inventions, which is easy to display and transmit [15].
- *Tacit Knowledge (Implicit)*: Tacit knowledge refers to the knowledge stored in the mind of the knowledge subject, which is the accumulation of long-term experience, whereas it has not yet been compiled. Its clarity is relatively low, it is hard to encode [14]. It is private, complex, exclusive of the knowledge subject, and the sharing of tacit knowledge requires more efforts and costs [7].

Bostrom (1989) [17] defined knowledge sharing as a knowledge exchange between members within an organization out of mutual respect and trust. Huber extended the scope of knowledge sharing participants to groups within the organization. In a similar vein, Gunnar (1994) considered that knowledge is constantly transferred out through the sharing process between individuals, teams, and organizations. Given the change of users' demand for knowledge, the identity of knowledge providers will also be changed [8].

Given various online social network interaction platforms, knowledge sharing between network interaction subjects involves a variety of knowledge forms, ranging from text, picture, video and other explicit knowledge types. On the other hand, when it comes to the experience of strong personal perception of ownership and skills, willingness to share is restricted by many factors [17, 22, 23]. Network communication in a social network basically refers to other types of communication built between two areas of the network (e.g., a social relationship between two acquaintances, a commercial relationship between two businesses, and a political relationship between two countries) [9].

Depending on the network configuration, the network can be divided into different types. For example, depending on the network relationship, a network can be divided into a target network (one-way network) and a non-target network (a two-way network). Under a two-way network, user A to user B and user B to user A have the same relationship; under each network, user A to user B and user B to user A are considered separate relationships [10, 24, 25, 26].

In one-dimensional networks, a variety of sources of information, information is often found among strangers. Similarly, two-way and one-way networks can be considered as a network with strong relationships between acquaintances and a network of weak relationships between strangers [11].

Tacit knowledge sharing is based on the level of interaction between ownership and self-efficacy perceived by individual holders of knowledge, i.e. individual holders of knowledge feel the knowledge they own (in particular the tacit knowledge with invisible characteristics), which can be recognized by others, thus bringing a strong sense of self-efficacy [12, 13]. The explicit knowledge is easier to receive and understand for its manifestation and complexity, so it is easier to propagate and learn in weak relational networks.

A. Doings

Data practices are becoming increasingly common in public life, and as a result, they are becoming increasingly questionable. This paper begins with the argument that critical scholars should not immediately emerge (meta-) in the discussion of theories of organized vigilance, capitalism or control, because such lenses are seldom data (Goriunova, 2019; Ratner, 2019). In other words, and in line with a plethora of literature emerging from the broader social sense, the basis of this paper is that data methods require close, rich experiments of processes involving the construction and operation of these actions [14].

As Ruppert *et al.,* data practices redefine how we understand social life and how we act - and form different components of that life. It is for this reason, that the critical approach to data collection should not be underestimated in terms of a particular type of context - what data practices are - but should focus on the practical implications of such practices; that is, by the following actions:

"We need to attend to the lives and specificities of devices and data themselves: where and how they happen, who and what they are attached to and the relations they forge, how they get assembled, where they travel, their multiple arrangements and mobilizations, and, of course, their instabilities, durabilities and how they sometimes become disaggregated too" [17].

B. Flatness

In accepting the understanding of relationships, this paper seeks to identify how data practices make certain types of learning work amidst the fluidity of data structures. Importantly, in the interest of pursuing such a goal, this paper makes no distinction between the concept (and has no way of doing it) between the so-called 'real' and the so-called 'digital'.

Following Latour's network theory, the interest is in exploring the 'flatness' [13] meaning that there is no inherent assumption that the 'digital' space is somehow intended to mimic, copy, or represent, a 'real' and/or 'physical' learning environment [14]. This assumption is very common in critical studies of data practices, and is evidenced by, for example, the transmission

of concepts such as 'double data', 'digital representation', 'data tracking', and so on. Such concepts share the assumption that representation that data points (such as digitally recorded activities, performance and learner behavior) have direct communication, and provide direct access to people, 'real' (i.e. real learners). However, in data infrastructure there is no perfect link between data points and (data collection) - instead, data points are regularly compiled, compared, sorted, distributed and re-designed [19]. The digital presentation - the point of the data - of that kind is always temporary and only relevant to the type of category in which it is included [17, 27, 28].

In light of this information, this paper makes the assumption that data structure is 'never static but always changing and always moving' [15]. This means that methods that seek to capture the performance of data practices must continue to provide an opportunity to modify these relationships [14, 29, 30].

C. Topology

The framework proposed in this paper, uses topology as a lens that allows for the consideration of relationships inherent in the data infrastructure. Topology, in this case, is considered as a conceptual lens that shapes how concrete methods (presented in the next section) can be used. Methodology should not be seen as being akin to methods as methods refer to 'tools' or 'instruments', whereas methodology should be considered as informative actions that partially assist in helping researchers construct what they see [17, 36, 38].

In order to investigate data processing, this paper confirms that both are very much needed (see conclusion). Topology provides a big picture that allows researchers to investigate data practices amidst continuous change of relationships [19]. In its most basic form, topology refers to the study of contexts - 'contexts' understood here as sets of relationships (transformations) between different characters of a different genre. As Thompson and Cook (2015, p. 734) point out, topology defines the flow and use of power and submission in certain areas including learning and development. Therefore, it begins in a relationship and this relationship (patterns, flow, speaking, order) has certain effects upon the data structures [19].

In addition, topology has a keen interest in relationship qualities. For example, rather than assuming that space and time are existent according to Euclidian coordinates, the assumption is that space and time are actively produced and brought into being. In doing so, the lens of topology allows and requires a willingness to 'think about spatial and temporal change in an altogether different way' [19]. What does this mean for researching data habits?

- First and foremost, it means that the toolbox presented here allows us to view data practices consisting of complex [19]. The ecosystems aims to consider the formation (or form) of data practices and/or if they occur continuously [19]. This understanding is important as their incomprehensible nature means that correcting such 'habits' in a single stable way will fail to capture the very thing that characterizes them [18]. Instead, the focus should be on how data processing is constructed and how it is performed, transformed (accepting completely different forms; making (giving characters within a dedicated form a form); and so on [16].
- Second, ecosystems allow for the possibility that space and time are the results of data actions; posterioris rather than prioris. Such insights allow researchers to investigate how these practices are evolving, how space and space emerge, and thus how they form highly dependent forms of (de-) stability and (in-) flexibility [14]. Topological methods, in turn, allow simultaneous processing of how data creates spaces and times as a possible outcome.
- Thirdly, ecosystems allow researchers to equally investigate how data processing is constructed and how it occurs (cf. 'liveness'). Topological methods are not limited to questioning the relationship of data processes; they equally investigate how such relationships are made explicitly. Indeed, when something becomes part of the data process, this is always related to decisions made about what (or should be) inside and what (or should be outside of such practices, and what can and cannot fall within these practices [19]. This understanding is important as it encourages ecosystems to pay attention to how data patterns change - and to provide a comprehensive overview of the relationships that exist there.

The consequences of all of this is that instead of thinking and working within either/or binaries, topological approaches look both closer and farther; at a global and local; social and material level and analyzes what is digital and what is human; what is connected and what is disconnected; etc., together - without preferring one particular method over another [16].

III. Methodology

Exploring data infrastructure to explore development trends helps researchers to re-construct the research context; data infrastructure is not just a collection of materials 'out there'; it is a combination of practices, among its many and varied effects, that re-shape the learning environment [16, 40, 41]. This, says Sellar, has a profound effect on how you can explicitly investigate data trends:

"We cannot stand outside the organization or system in order to carry out the critical analysis; all processing, in the end, is in line with the (…) systems we are analyzing and our analysis has contributed to the identification of these systems. It is therefore better (…) to look at our significant contributions in the spirit of

positively changing the nature of the practices we are in, rather than taking a critical stance guaranteed in a strategy to make a mistake, be replaced or disapproved" [16].

It is important to emphasize that even though data paths are rare and open, they come together and evolve as actions. In other words, this paper looks at data creation as incorporating multiple topologies - size, size or location that reflects and dictates their spatial and interdependent and interdependent periods [31, 42, 43].

IV. Results and Discussion

In order to research this liveness, it is important to emphasize that even though data practices are elusive and open-ended, they do cohere and converge as practices. In other words, this paper considers data practices as consisting of multiple topologies – i.e. dimensions or surfaces that generate and drive their own spaces and times - that continuously overlap and enfold each other [21].

A. User

Not much is known about how users interact directly with the platforms, or how they navigate them in real time. While this argument certainly applies to digital learning platforms, it works equally well in the field of data processing in general, as the existing research on how real users interact still remains insufficient [31, 44]. In that sense, interface topologies can (should) be closely monitored according to user topologies.

Given the large size and breadth of data infrastructure and given the fact that their parameters are not easily defined, this means that it does not include the concept of 'user' at the limited level of traditional actors (as a learner), and that actors are also affected during this topological becoming of the data price itself. Instead, in order for the existing body of platform research to be more comprehensive, analytics of user performance equally requires the inclusion of companies (e.g. support staff) and technical actors (e.g. IT staff) who are equally integrated into, and use the platform.

In addition, the analysis of user topologies requires expanding the analytical analysis scale to include sometimes surprising or unexpected characters currently equally included in sites and collections of data-generating sites [32]. For example, and according to some close research, such an analysis may require direct user interaction, but usually requires some form of in-depth, in-depth engagement [33]. Such engagement is often found in ethnographic methods, which can be modified to adapt to the complexities of educational data conflict [33]. The practice of ethnographies and data practices differs from canonical ethnographic imaginaries [32]. Indeed, inquiring about the results of platforms based on data performance and actual user engagement, as well as having more access to those platforms for users more and more than traditional learning practices, requires a mobile, flexible and consistent - changing researcher presence as it requires care and attention due to being fragile [32, 34].

Analyzing user topologies of data processes therefore refers to the general interest in how users enter/open/navigate around the interface, how they are affected by these entities (or not); what types (e.g. compliance) of individual and/or participatory behaviors, practices and cultures that strengthen the use of (and non-existent) governmental governments; how users want to manage and rotate around the limits set by them by the interface (or not) (e.g. Selwyn & Pangrazio, 2018; Thompson & Sellar, 2018; van de Oudeweetering & Decuypere, 2019).

B. Design

Data practices should not be investigated solely by examining user interface and topologies. Another different aspect is the design method. For example, digital learning platforms are not only carefully designed and require a lot of work before the final interface is visible to the user, requiring permanent care [32]. Here, too, it is important to look at the distribution of data practices: inquiring about this topic of information (and) means a mobile and multi-stage researcher following a variety of development methods. For example, inquiring about the design status of any given platform may involve interviewing technical actors who perform platform and/or design in the company, having remote meetings with other participants working in other branches or offices of the company, etc. to inquire about the relationship constraints that are produced behind the real platform display [32].

As with the other topologies, there is a variety of methods to explore the scene 'behind' knowledge management platforms depending on the analytical focus of the inquiry. For instance, if one is interested in how processes of datafication stabilize, take shape as data points, of interest become methodological tools that allow to trace and show the contextual dependencies and messiness that is implicated in the fabrication of data practices (i.e. the making of their liveness - Ratner & Ruppert, 2019). This will require a thoughtful combination of methods, such as Internet search, interviews, audio media, etc. [35]. However, analytical thinking should also be applied equally to the values, ideas and learning ideas that design characters (human and non-human beings) who emerge and want to enter the interface itself.

It is important that adopted approaches control one to see how development methods encourage to create certain types of learning characters (e.g. certain types of learners are easy to describe online), their future aspirations, and ideas for a lifelong learning community, accurately - whether or not these ideas are actually ending up in the eventual interface topology [37].

C. Ecology

Even though data practices crystallize as practices, they are not to be conceived in an isolated manner. Instead, all data practices are always ecologically situated in a broader environment that is not exterior to the data practice itself. In the case of platforms, for instance, this implies approaching a platform not as a technical 'silo' that is operating entirely self-contained, but rather as embedded within a broader (topological and topographical) relational field that is co-shaping and co-forming the platform itself. It is in that sense that this paper proposes the term ecology rather than context, for the notion of context often tends to be viewed in essentializing terms, as a thing 'out there', hanging or circling around a specific data practice [32].

Digital platforms are situated within broader relational environments that are productive of the specific sorts of platform constellations that can or are allowed to emerge - as, for instance, some cases of national platform censorship forcefully show [32]. Adopting a platform in one country is arguably not the same as adopting it in another, and the way in which (as well as the extent to which) such a platform becomes part and parcel of a learning data practice (or not) always comes with considerable local contingencies, specificities and particularities [31].

Moreover, platforms inevitably add reality to the world, instead of merely abstracting, digitizing or technicizing it: they add data points; they 'datafy'; and they are increasingly operating as the very infrastructures on which educational practices run and operate [32].

Methodologically, all this implies that researchers who are investigating data practices should refrain from making sharp demarcations regarding what would be part of a data practice and what not. Indeed, the form of data practices is ever-changing and platforms, for instance, almost always extend into other platforms, as one of their determining features is their capacity to stretch 'beyond' their own boundaries [32].

D. Interface

Platforms necessarily entail interfaces that make the platform visibly appear to its users. One dimension of the toolbox is then directed at everything that materializes on a platform's interface: text, pictures, videos, hyperlinks, etc. Interfaces are, in that respect, probably one of the most evident aspects in investigating data practices, since they allow researchers to explore what happens - in this case - on the platform. Interfaces allow researchers to inquire into the 'conditions of possibilities' for users and user practices [32].

The interface provides a unique insight into what could be called the environment of expected use; that is, in how the platform interface is anticipated to be received, what typical user behavior is anticipated to be (and desired), and how user activities are regulated through the interface's (facilitating or constraining) materialized design [31].

The focus on the environment of expected use - what is referred to as 'on the platform' - is informed by the general idea that

'many platforms (...) remain uniquely ideological in how they are structured and composed, and in how they thereby plan to convey specific messages and frame specific sorts of worlds' [32].

In general, when exploring these elements one can take into account the following aspects:

- How (and what) the interface measures and how (and what) it compares;
- How realities are portrayed and named (e.g. as/in data points);
- How the interface classifies and hierarchizes (e.g. data points);
- What is being numbered and calculated;
- What is being visualized (and how); etc.

The walkthrough method can be identified as one of the most promising techniques allowing the unfolding of highly intricate details about the interface/platform in question. The walkthrough method analyses interfaces to illuminate how designers intended these interfaces to function, and thereby allows researchers to critically examine how an interface works 'at face value' [32].

A last increasingly common method is to analyze how platform interfaces configure specific types of users. Even though platforms should not be considered as fixed masterplans, they can nudge users in specific directions and behaviors. In that sense, some methods seek to show how a platform's interface contains a specific grammar of action that aims to configure users in highly determined ways and to 'ensnare' them in the overall interface design [32].

V. Conclusion and Future Scope

This paper purports to explore data practices for knowledge codification and dissemination. Rather than being conceptualized in a fixed and prescriptive manner, the review should serve as a collection of methods that takes into account the relational and topological features of data practices [39].

Although the paper focused on the role of digital knowledge management platforms with a focus on social networks, the methodology can be implemented for any kind of data practice.

Last, but not least, it should be taken into account that researchers cannot stand outside data practices.

Data practices are changing knowledge spaces profoundly, and researching the topologies of data practices is an efficient way to analyze how these practices can also shape particular

spaces, times, norms, and values. The topological lens allows researchers to develop methods based on the nature of data practices to introduce answerability into data practices as practices that are in need of scrutiny, potential modification, and, more broadly, care.

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