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## What is Missing from Research on Data in Information Systems? Insights from the Inaugural Workshop on Data Research

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### Abstract:

Data are the building blocks of the ongoing digital revolution, yet there are still many unresolved questions regarding their role in the study of information systems (IS), management and innovation. As data become increasingly pervasive elements of socio-economic life, we ask whether IS needs to expand the ways in which it conceptualizes data and their role in business and society. This panel report summarizes discussions that took place in the inaugural workshop on data research. The workshop asked what is missing from research on data in IS from four well-known scholars whose work touches upon the topic in different ways. Three main themes emerged from the speakers' statements that were further discussed by the workshop participants: 1) the need to go beyond traditional ways of conceiving data, 2) the need to investigate the relationship between data and meaning, and 3) the need to study new data management and governance approaches. We present these research themes and connect them with future research directions.

**Keywords:** Data, Data Work, Data Science, Data Management.

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## 1 Introduction

Over the last twenty years or so, data have emerged as the key driver of the ongoing digital revolution. Digital data are today a principal medium of organizing and, at the same time, a diffused ingredient of socio-economic life that figure as a central motif in debates about social justice (Dencik et al., 2019; Taylor, 2017), as a critical element of science development (Leonelli & Tempini, 2020), and a shaping force of the emerging platform economy (Alaimo & Kallinikos, 2022; Lyytinen, 2022). Against this background, it is important to ask whether the traditional ways of conceptualizing data in information systems (IS) research are still useful or valid. Do the entrenched assumptions that IS scholars make about data help or hinder analyzing how has their role changed for business and society? To us, it would seem that the engineering-oriented conception of data that has dominated IS may not suffice anymore to capture the variety of ways digital data are involved in our social, organizational and economic affairs (Alaimo et al., 2020).

To instigate a scholarly discussion on what is missing from research on data in the field of IS, we invited Robert Gregory, Sirkka Jarvenpaa, Jannis Kallinikos, and Eric Monteiro to share their views with a group of selected researchers on March 10, 2022, in an online workshop. The four senior scholars have studied digital data extensively in their research and cover a range of topics in our field. We gave the speakers freedom to approach the question in the way they wanted and framed the workshop as an open-ended discussion and debate rather than as an attempt to reach a closure on the question of how to study data. Three main themes emerged from the speakers' statements that were further discussed by the participants: 1) the need to go beyond traditional ways of conceiving data, 2) the need to investigate the relationship between data and meaning, and 3) the need to study new data management and governance approaches. In this report, we present the questions, issues, and insights that led to the identification of the themes and complement each theme with a research agenda for the study of data in the IS field. We try to remain true to the diversity of views that emerged during the workshop while providing enough synthesis to facilitate the reader's engagement with the ideas and viewpoints captured in the report.<sup>1</sup>

## 2 Background

Much of IS research is characterized by a factual perspective on data, that is, data are most often considered narrowly as more or less accurate representations of external events or entities – as 'raw facts', so to speak (Jones, 2019; Kitchin, 2014). Descending from engineering and objectivist philosophy, such a standard view of data is fit for many purposes, including the development and application of data analytics and other sorts of algorithmic processing techniques feeding on data. At the same time, it is becoming increasingly clear that such a factual view entails assumptions that obscure important aspects of digital data that have been explored in a growing body of interdisciplinary research (Aaltonen et al., 2021; Alaimo et al., 2020; boyd & Crawford, 2012; Dalton et al., 2016; Jones, 2019; Parmiggiani et al., 2022; Passi & Jackson, 2018; Swanson, 2022) and research on fields adjacent to IS such as accounting (e.g., Kornberger et al., 2017), information science (Diesner, 2015; Frické, 2015), human geography (Kitchin & Lauriault, 2014; Leszczynski, 2016), media and communication (Beer, 2016; Gerlitz & Helmond, 2013; Plantin, 2021), sociology (Lamont, 2012), or feminist and gender studies (D'Ignazio & Klein, 2020; Guyan, 2022; Mackenzie, 2017). These and many other examples suggest that data and their role in business and organizing present challenges that the field of IS cannot meet without reassessing its fundamental assumptions about data.

Digital data have over the recent years been discussed as semiotic artifacts (Aaltonen & Penttinen, 2021; Alaimo & Kallinikos, 2021, 2022; Lyytinen 2022) used to mark and mediate facts and as infrastructures of knowing (Monteiro & Parmiggiani, 2019; Østerlie & Monteiro, 2020) from which new products, services and forms of organizing are fashioned. In some ways, one could even argue that data have taken primacy over other types of IT artifacts with respect to many important research questions across management and social sciences. Regulators and law scholars investigate data governance, employees strategically adapt to the rules of data collection (e.g., Pachidi et al., 2021), and management scholars call for a 'data-driven' management culture to change organizational decision making. Yet, our theories and methods still

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<sup>1</sup> We see the discussion that emerged in the workshop as a 'common good' and as such not owned by any individual participant, yet whenever we use a direct quotation or refer to a distinct expression of an idea from the discussion or from the lively online chat, we attribute those to a specific participant.

largely consider data as no more than factual inputs to information systems or applications. Digital innovation scholars have discussed data in terms of functional modularity and their capacity to render vastly different matters on a homogenous digital medium (Yoo et al., 2010) while economists have brought attention to attributes such as the non-rivalry and low cost of (re)production of data as an economic resource (Brynjolfsson & McAfee, 2014; Shapiro & Varian, 1998; Varian, 2010). While useful for certain purposes, such conceptualizations must be seen as openings toward a more thorough understanding of data rather than the final word on the matter.

As data become involved in all aspects of socioeconomic life, studying the various ways in which they partake in shaping the reality that data increasingly mediate should be at the core of the IS field. This may require leaving behind some old ideas such as the data-information-knowledge-wisdom pyramid (Ackoff, 1989) or linear data value chain models but also the reappraisal of earlier works that have been somewhat lost in the excitement about data science and analytics such as Tuomi (1999) on data and knowledge or Hirschheim et al. (1995) on different schools in data modeling. Understanding how contingent facts are performed with digital data, how data are made valuable in the form of non-fungible tokens or cryptocurrencies, and the genesis of new types of data will require new ways to approach data as a phenomenon. IS scholars are perfectly positioned to cultivate critical and innovative scholarship that can help advance research on data across different domains (IS, management, innovation, law, strategy, etc.), by acknowledging and theorizing the characteristics of data artifacts and infrastructures, data practices, and the broader organizational configurations that emerge around them (Gregory et al., 2021; Jarvenpaa & Markus, 2020).

### 3 Opening Statements and Workshop Discussion

In the workshop, each speaker had 15 minutes to deliver an opening statement, which was then discussed together with the participants. The key messages from the statements are summarized in Table 1 and discussed in more detail below including main reactions that the statement generated among workshop participants.

**Table 1. Highlights from the Opening Statements**

Speaker	Highlights
<i>Robert Gregory</i>	<ul style="list-style-type: none"> <li>• Digital platforms become data monopolies by harnessing data network effects, which creates legitimacy problems to them as economic institutions.</li> <li>• Blockchain based technologies offer granular data provenance that could support more decentralized forms of data governance.</li> <li>• We need to understand digital transformation of institutions that would make polycentric governance of value creation and value capture from data possible.</li> </ul>
<i>Sirkka Jarvenpaa</i>	<ul style="list-style-type: none"> <li>• We need a cognitive view of data that accounts for how search, attention, selection and interpretation of data are influenced by different contexts beyond singular organizational settings.</li> <li>• The cognitive view should attend temporality (time), relationships (trust), knowledge (theory) that constitute the three Ts of the context of data.</li> <li>• 3Ts call attention to the temporally and contextually limited character of data and their dependence on a particular knowledge processing system that makes the data 'data'.</li> </ul>
<i>Jannis Kallinikos</i>	<ul style="list-style-type: none"> <li>• Theorizing the distinctive makeup of data means to acknowledge their work as filters of perception, instruments of knowledge and media of communication. Understanding data in these terms opens new avenues for the study of social, organizational and market practices in this data age.</li> <li>• We need a social science of data that puts at the center stage the ways in which data are produced in social settings, the predilections they embody and the variety practices they give rise to.</li> <li>• The social science of data must not be limited to narrowly actor-centric views of knowledge but investigate as well how digital technologies themselves condition the production and interpretation of data and shape knowledge.</li> </ul>

<i>Eric Monteiro</i>	<ul style="list-style-type: none"><li>• Research has mainly focused on the supply side, that is, the possibilities offered by novel digital technologies, but we also need more studies on the demand side, that is, what data do and the practices through which data acquire meaning.</li><li>• Instead of artifacts, we should see data as infrastructures that comprise of different types of elements that allow data to travel and support knowledge claims from a setting to another.</li><li>• We need to better harness work done in adjacent field that can help us move forward with the study of data and how they emerge as facts in practice as parts of larger assemblages.</li></ul>
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### 3.1 Robert Gregory

Robert Gregory opened the workshop by pointing out how digital platforms often become data monopolies. They gain control and ownership of large amounts of data from users which are then fed into artificial intelligence capabilities to offer more and more perceived value to the users. Gregory referred to his recent paper that shows how learning from increasing amounts of data about platform users triggers a new type of network effects that interact with direct and indirect network effects (Gregory et al., 2021). Data network effects are different from network effects in economics in that they are not just about the size of the network but also about the capacity of the platform to scale and transfer learnings gained from data to proximate business areas. However, while enabling value creation by platform participants, digital platforms currently centralize the governance of who gets to participate in value creation and, importantly, value capture from data. By becoming data monopolies platforms face the problem of legitimacy as they often fail to legitimize their data practices, which can result in a backlash from external parties.

Central to the backlash against data monopolies and a better way to organize data-based value creation and capture, Gregory saw a coming shift from data monopolies to granular, blockchain-based data provenance. Distributed ledger technology enables effective data provenance as “*the records of inputs, systems, entities and processes that influence the data of interest, and provide historical records of the data and its origins*”. This could result in a backend revolution in the platform economy argued Gregory. There is currently a movement that wants to “*give more control and more possibilities to participate in the value capture to each individual user*”, by building data provenance infrastructures that enable designing systems that decentralize data ownership and governance. For instance, using the music industry as an example, Gregory discussed how new forms of distributed autonomous organizations (DAOs) enable a more decentralized form of governance and participation in value capture by different parties involved in creating the value. To this end, DAOs represent a polycentric form of organizing that is not completely devoid of central functions and roles yet offers much better opportunities to participate in data-based value capture to different parties. Gregory saw tokenization as “*the next wave of digitization*” in which DAOs and granular data provenance will have huge implications for governance and control, and potential transformation of institutions – Gregory ended his opening statement with a question: “*What are the social, cultural, economic, and organizational impacts of the greater control of data representing value by its original creators and owners?*”

In their reactions to the opening statement, Matti Rossi and Kalle Lyytinen wondered what is exactly new about distributed ledger technology and whether its potential will be realized, as we have seen so many technologies fail to live up to their initial promise of decentralization and democratization. To this, Gregory pointed out that the direct control and ownership at the origin of value creation based on effective data provenance enables new forms of decentralized governance in complex value systems such as the music industry, which was not possible based on traditional databases. Ola Henfridsson saw tokenization as an opportunity to close the gap between ownership and control that became the default way of organizing large-scale production in the 19th century, creating the principal–agent problem as well as many other issues that gave rise to managers and, indeed, business schools. However, as Gregory pointed out, much of this is still a vision but there are serious attempts to create, for instance, alternative financial systems such MakerDAO. For such visions to become reality digital innovation is not enough according to Gregory – we need to also understand the digital transformation of institutions (or lack of it) and, as Konstantin Hopf pointed out, the effective use and misuse of data in distributed ledgers.

### 3.2 Sirkka Jarvenpaa

Sirkka Jarvenpaa began by identifying a few ‘known gaps’ concerning research about data, for example the fact that most studies are limited to organizational contexts. In reality, many interesting phenomena

and practical applications happen between organizations, which foreground issues related to data access, security, and privacy in much more complex ways. In her presentation, Jarvenpaa distinguished between three different views on data currently dominating IS research: the economic view that perceives data as a commodity resource, the technological view that sees data as the fuel of complex algorithmic operations, and the socio-cultural perspective on data, for example research around how data travel (Jarvenpaa & Markus, 2020). While the economic view takes an unproblematic view of data as raw or unprocessed facts, the technological view perceives data as indeterminate, co-dependent, and circumscribed by algorithms, and the socio-cultural view emphasizes that data gain value in interactions, making them relational entities. These views are variously present in current studies, but what is missing according to Jarvenpaa is the cognitive view of data. The cognitive view of data is particularly critical for ensuring that data benefits individual and organizational learning with data in a way that is consistent with their value systems.

The cognitive view of data accounts for how search, attention, selection, and interpretation of data are influenced by contexts at different levels, which account for temporality (time), relationships (trust), and knowledge processing systems (theory) in which the data are embedded. The dimensions of time, trust and theory constitute the 3Ts of data discovery context. Traditionally, organizations generated data internally or as a by-product of operations or intentionally close to the unit that attended, selected, and interpreted it. Various internal data challenges as well as the availability of external data have increased the acquisition of data from sources that are distant spatially, temporally, and as domains of knowledge. How are these distances accounted for and influence search, attention, selection, and interpretation of data? The cognitive view focuses on how the mental conceptualization of data impacts their use, value, and applicability: “[users] may have the best technology out there, but what can they conceive in terms of data, the data relationships is really critical,” said Jarvenpaa.

First, focus on time in the context of data, according to Jarvenpaa, can draw researchers’ attention to the temporal aspects of data, escaping the predominant temporal myopia that manifests in research as an assumption that ‘data are forever’ or are atemporal. The attention to the temporal dimension of data could surface issues around timing of data, its past and duration – legacy data. A temporal view of data would account for their duration, timing, and past and future in terms of mental processes such as search, attention, selection, and interpretation. Accounting for these matters requires longitudinal studies of data.

Second, interest in trust focuses on relationships around data. Trust exposes assumptions held about data, directing research towards distrust, ambivalence, and indecision, potentially emphasizing the contextually limited character of data. Distrust and ambivalence can be particularly critical for increasing mindfulness with data that improves mental processes such as attention and selection and avoids mindless practices such as routines and overreliance on rules. Against this background, for instance, organizational governance processes on data can somewhat counterintuitively promote mindlessness if others such as the data quality unit or the research review board is assumed to be held accountable.

Third, theory, defined by Jarvenpaa as subjective mental representations and knowledge processing systems invites a reflection on how data are perceived, conceived, and made sense by those confronted with data. These are influenced by people’s disciplinary, and in this sense narrow, mental representations, which shapes the kind of impact data have on creative thinking, imagination, and foresight. For instance, to what extent does the heavy reliance on data mining tools with their own embedded representations and processing systems limit learning processes including taking ‘long jumps’ to unknown? To what extent do data standards and other governance tools and techniques push us to taking ‘small jumps’ and building on what we already know?

The cognitive view of data in the context of data discovery presented by Jarvenpaa can lead to the following questions currently not investigated in IS: *do digital data promote temporal myopia? Do digital data promote suspicion and mindfulness, or mindlessness and inaction? Do digital data produce narrow and disciplinary mental representations and kill multidisciplinary creativity?* The cognitive view resonated with participants who engaged in a series of questions. The participants raised the issue of the implications of the cognitive view for relations of power and trust. Jarvenpaa suggested that “*we need to learn a lot more about how people become suspicious of data, and how that impacts their actions,*” and emphasized that the cognitive view is not limited only to individuals but can be scaled up to groups and organizations.



### 3.3 Jannis Kallinikos

Jannis Kallinikos began by noting that the current understanding of data is heavily marked by the dominance of data science which, inheriting from statistics, sees data as aggregable occurrences in a world understood in terms of probabilities (Hacking, 1990). As such, contemporary data science grows at the crossroad of statistics and digital technology and treats data as technologically produced data points that are used to calculate or predict patterns and relations across most walks of living (from love to credit scores). There is much to admire about the evolution of data science, but also much to be skeptical about.

Research on data outside the nexus of data science, Kallinikos continued, has mostly focused on the context-embedded nature of data. Research of this kind rightfully avoids treating data as facts (common in statistics and data science) and frames them as objects of social making and human maneuvering. Linked to the interpretive legacy in IS and science and technology studies tradition, most of the research of this kind exhibits a sharp awareness of the social origins of data but seldom reflects upon the nature of data qua sociocultural artifacts that shape social practices along distinct and recurrent paths. These, predominantly, actor-centric approaches are ill equipped to study the wider social, cultural, and technological machineries of knowledge and practice (Knorr Cetina, 1999) and how data are a key element of such machineries. They tell us local stories of data use but tend to leave the big picture unpainted.

Kallinikos argued that theorizing the distinctive makeup of digital data means acknowledging their work as filters of perception, instruments of knowledge and media of communication. These defining qualities of data are currently undertheorized. Data are basic means through which facts are selected, recorded, perceived, and made sense of. The making of data thus coincides with the enactment of several predilections on the part of social actors such as where to look, what to encode, how to encode it. A very simple example is provided by the history of Facebook's likes, as Robert Gehl (2013) described it in his little thoughtful piece that recounts how Facebook came to encode the preferences of people into a digital sign that then became a standardized and aggregable token used across the web. What the study makes evident, Kallinikos claimed, is the fact that data are not inevitable. This is a critical insight. Across a large variety of situations, data could have been otherwise had other predilections been enacted, other areas of life been looked at, or other modes of encoding been practiced (Hacking 1990).

The second important view of data links them to knowledge. Data can and are used to advance our understanding of the world. Learning from data equates to aggregating data to construct social objects from which we learn about things and people (Alaimo & Kallinikos, 2017). Users, customers, traffic patterns are all social objects made out of data. Comparisons of aggregate data across contexts, as it happens often with aggregates such as likes or tags in digital platforms, produce patterns of social events of limited temporal validity (Kallinikos, 2009a, 2009b). Constant up-dating is the rule without which most of the current data culture can hardly be understood. Facebook's likes, transaction updates, monitoring of traffic, and stock trade are all based on the assumption of their constant updating. This type of contingent knowledge, so characteristic of contemporary life, is conditioned by the functionalities of digital technologies and how digital data are used to mark specific areas of life and transform them to relative stable objects of economic and social intervention. Studying knowledge making in these terms transcends the understanding of contemporary knowledge practices as techniques of data aggregation and computation alone and links them to the social objects they help construct and manage (Desrosières, 2002).

The non-inevitable status of data and their social origins should by no means be taken to imply that data are the outcomes of subjective preferences of users. Data are linked with digital technologies by many and often invisible bonds. What is selected and how it is transformed to data are considerably shaped by what digital technologies can handle, store and process. Digital data are homogenizing, content agnostic, and non-neutral (Alaimo & Kallinikos, 2022; Yoo et al., 2010) and in this regard shape the function of data as filters of perception and media of communication. This technological nature of data, Kallinikos claimed, cannot be wished away and shapes humans and their practices even though its workings are often unobtrusive. Asking how this happens is, of course, a very complex undertaking but the point of departure of any serious inquiry about data. One of the most important attributes of our age is the interpenetration and mutual constitution of the technological nature of data with the sociocultural functions they perform. The semiotic and epistemic qualities of data are instrumental in addressing complex issues of social cognition in the modern economy in the form of services that are packaged and exchanged among social actors in commodity markets (Aaltonen et al., 2021). Typical examples are metrics of various kinds, the making of audiences, reviews and ratings, credit and reputation scores. Though traded as commodities,

these services rely on constant updating while requiring steady reinforcement in the form of additional metrics and indicators (summaries of other data) that lend them value, facticity, and, eventually, stability.

These observations suggest that digital data are a diffused element in modern societies and indicative of wider changes in modes of encoding facts, building up and sharing knowledge. Compared to the view from data science, these observations, Kallinikos argued, call for a *social science of data*, that is an inquiry that puts at the center of its attention the ways data are produced in social settings, the predilections they embody, the knowledge they enable and the practices they give rise to (Alaimo & Kallinikos, 2021, 2022; Monteiro & Parmiggiani, 2019; Swanson, 2022). Future research should shed light on areas that data science alone cannot illuminate, which links to the ways data are used to mark areas of social life, to advance knowledge and support the doings of economic actors in the shape of data commodities. Another important avenue along which a social science of data could develop entails the study of institutional and market practices. The advent of digital platforms and ecosystems is central here. Research on these matters cannot avoid confronting the issue of how platforms and ecosystems are associated to data. Data partake in forging the objects and condition the links that epitomize platforms and ecosystems.

In the discussion, Jonny Holmström agreed with Kallinikos and remarked that one of the most dangerous leitmotifs of digital transformation is the ‘more data better prediction’ assertion. He commented that Kallinikos’ position represents a strong answer against it and provides the missing critical perspective. Holmström sees this to apply not only to making sense of data but also as the counter argument of how data lead to alternative views of understanding the social. Kalle Lyytinen remarked the importance of acknowledging the interaction among the three distinctive dimensions of data theorized by Kallinikos. He also raised the issue that, although implied in the opening statement, the economic aspect of data could be discussed more and related to the definition of data advanced by Kallinikos. Data would have not been what they are today apart from the economic functions they perform.

### 3.4 Eric Monteiro

Eric Monteiro started his opening statement by indicating that the IS community concerned with data seems to generally agree on the need to debunk naive representational theories and assumptions that data faithfully represent the real world and facts that are out there ready to be captured. But what happens when we abandon such a notion? According to Monteiro, we should focus on understanding data as representations, that is, the generative, disconnected, and open-ended repurposing of data in different ways. This implies focusing less on what data really ‘are’ and more on what they do, i.e., how and under what circumstances data are used for particular purposes.

This amounts to an epistemological rather than ontological concern inspired by the recognition that meaning and knowing should be read off from what data actually do. If not, Monteiro warned, there is a danger of overly focusing on supply-side and accordingly under-representing demand-side. In studying datafication, IS researchers have so far mostly looked at the possibilities offered by novel digital technologies in terms of the kind of re-presentations they make possible. In doing so, however, we risk missing out on the uptake of the representations in practice. The mere technological possibilities of recombining and algorithmically manipulating data tell us nothing about what data subsequently do in practices of doing and deciding. As a result, we need to further investigate the circumstances through which data acquire meaning. But how does referential attribution happen, Monteiro asked, when we cannot just stare at data to get their meaning? Monteiro’s suggestion is to follow Austin’s performative approach (“what do words do?”) and ask, *what is it that these data actually do?* He illustrated this with three examples from his own research carried out with colleagues in the oil and gas industry.

First, in the case of sand monitoring in oil and gas operation, Monteiro showed how sand monitoring started as a practice based on laboratory testing and gradually evolved into sensor-based remote monitoring based on sensors installed in the oil well path (Østerlie & Monteiro, 2020). In this process, new ways of representing sand have emerged other than sand as a physical phenomenon. The question then becomes, for example, how do these re-presentations of sand gain credibility in organizational practices? He illustrated how sensors do not capture external reality but select and quantify one aspect out of which ‘reality’ is inferred for practical purposes. For instance, oil and gas sensors are almost necessarily off calibration or broken. This comes with the practical challenge of assessing the meaning of false alarms in practice.

Second, studying the conditions through which data become organizationally relevant takes the temporal dimension to the foreground: *when is data?* Monteiro pointed to the need to, on the one hand, trace the historical processes through which data are made and, on the other hand, look forward by exploring ways to interrogate the data, such as through simulations (Mikalsen & Monteiro, 2021).

Third, Monteiro discussed the spatial dimension of data qua re-presentations. He argued that data should not be considered objects or artifacts but rather infrastructures when seen from this perspective: data do not travel alone but have travel companions, i.e., they become facts as they are embedded in larger assemblages or configurations of algorithms, models, strategies, training sets, samples, devices and instruments that help them travel and become part of decision-making processes. He illustrated this point by drawing on the example of the ice edge, the border of permanent ice which is considered as the boundary for safe oil and gas operations in the Arctic and the object of decisions and policies (Monteiro & Parmiggiani, 2019). Monteiro observed that the ice edge emerges as a fact not only based on the data available but also and crucially based on debates and decisions about what among the different datasets, models, risk logics, and political agendas to consider.

Finally, we should not confine our inquiries to the IS field according to Monteiro, but rather draw on different disciplines and follow ideas from other fields, exploring ways of reasoning about data from different angles that can then be later brought into IS. In the subsequent discussion, participants raised questions about the need to debunk the simplistic notion of data as raw facts. According to Monteiro, the need or not for debunking is relative to the audience. Sometimes we should just assume that our audience knows and move on. Kallinikos then problematized the consequences of considering data as infrastructures as opposed to artifacts. According to him, we should not lose sight of the distinctiveness of data. In his response, Monteiro agreed that we should look closely at the specifics of data while not losing sight of matters that the data are always connected, yet what is a healthy balance is up for discussion. Finally, Holmström wondered about the implications for algorithmic reuse in data science, whereas Monteiro suggested that one of the implications is for the data science curriculum. Rather than what most university programs on data science currently teach by diving deeper and deeper into statistical methods, we should use the many commodified methods and experiment and engage in interesting ways with external partners and data to promote a more pragmatic version of data science.

## 4 Discussion: Emergent Themes in Data Research

Three main themes emerged from the speakers' opening statements and workshop discussion. Future research on these themes can reposition IS scholarship at the center of current debates on data and contribute toward generating impactful contributions.

### 4.1 Theme 1: The Need to Go Beyond Traditional Ways of Conceiving Data

A salient theme underpinning the opening statements and ensuing discussions revolved on the way the field of IS conceives data as an object of study which is broadly intended still as a servant of empirical research or data analytics. There will likely be tensions between existing and emerging conceptualizations of data, partly driven by the empirical phenomena researchers investigate in, for example, market, business, or scientific settings. Yet, updating the existing conceptual toolkits on data appears as a necessity as very little of the definitions that are currently in use has the explanatory power to frame emerging data-driven phenomena and related practices. During the workshop, some participants focused on data as economic entities and resources, highlighting the economic role data play in the creation and evolution of markets especially in platform ecosystems or through the process of tokenization. Such a view usefully foregrounds value creation from data and how a more granular control of data may allow data creators, producers, and owners to capture a fairer share of value from platform exchanges. At the same time, the conceptualizations of data qua economic entities cannot account for the ways in which data travel and undergo transformations in their production and use (or not use) (Jarvenpaa & Markus, 2020), therefore they cannot fully explain how value is generated through such processes of production, circulation, and re-use. As the speakers suggested, to this end other perspectives are relevant, such as the cognitive, semiotic, and epistemic perspectives that variously account for the work of data as digital objects fostering perception patterns and knowledge practices (Alaimo & Kallinikos 2021, 2022), and study how people engage with data as infrastructures embedded in wider technological and organizational assemblages (Monteiro & Parmiggiani, 2019).

Overall, it transpired that IS research needs to be open to accommodating different perspectives in conceptualizing data as no single definition will be able to account for the complex entanglements of data with economic and social life. A diversity of perspectives may be further enriched by drawing from adjacent fields such as science and technology studies, connecting their insights with questions that are relevant for IS research, for example, regarding information infrastructures, digital innovation, value creation or any other topics recognized to be central to our field. In line with a phenomenon-oriented perspective, the IS field would benefit from cross-pollination and influences from fields that have developed the demand-side oriented pursuit of datafication further than the IS community. Scholars within media and communication, digital humanities, anthropology, computer-supported cooperative work, and science and technology studies, to name a few, all offer methods, empirical insights, and theoretical resources that are relevant to IS – and vice versa. Engaging in a discussion on the conceptualization of data is not only an intellectual exercise. It has direct implications for how we regulate data and the data economy and how we govern data. Future research may discuss, for instance, how does the cognitive dimension of data impact value creation in different contexts (healthcare vs. social media) and the consequences that adopting different definitions may have for governance arrangements (distributed or concentrated systems).

## 4.2 Theme 2: The Need to Investigate the Relationship Between Data and Meaning

Participants by and large agreed that most of IS research thus far has assumed that data have a relatively unproblematic relationship with what they stand for. Data are assumed to represent ‘facts’ or events out there and those representations are assumed to stay unchanged as they travel databases and systems within and between infrastructures and organizations. Yet, research influenced by fields that have been historically concerned with cultural cognition and semiotics reveal the multifaceted nature of meaning which may be linked to contexts, cultural systems, and technologies in different and complex ways. To this end, current technological developments challenge assumptions on the nature of data and call for a reassessment of the role of design, production, transfer, and use of data in re-producing meaning. The necessity of unpacking the relationship between data and meaning is especially made relevant by the current big data industry where data journeys happen mostly across organizations. Apart from few exceptions, we still miss empirical research on the role played by technologies in producing meaning as data cross contexts and uses or on the role played by context in shaping the practices surrounding the production of meaning (Aaltonen et al., 2021; Alaimo, 2022; Alaimo et al., 2020; Alaimo & Kallinikos, 2021; Jones, 2019; Leonelli & Tempini, 2020). While the multivalent nature of data has been acknowledged in the conceptual modeling literature, the semantics of data must also be understood by applying a broader social, economic, and organizational lens and linked to the modalities by which data are designed, produced, transferred, and used. These issues seem particularly relevant today as we see the emergence of AI tools such as chatbots concerned with the computational production of meaning.

A connected yet different issue regards the relationship between data and knowledge. All the workshop’s speakers agreed on the need to overcome the limits of current conceptualizations (such as the data-information-knowledge-wisdom pyramid) and proposed several ways to move forward. One way is to look at data with an epistemological lens and recognize that data represent knowledge that is, in turn, contingent on the digital means of their production and use (Monteiro & Parmiggiani, 2019). For instance, a performative perspective could help in overcoming the temporal myopia that affects most economics-centric accounts of data assuming that data are stable resources available forever. To this end, IS research could investigate the practices that make data instruments of knowledge, how knowledge is linked to cultural predisposition or organizational predilection, and how it is shaped by the digital makeup of underlying technologies. More research is needed along the temporal and spatial dimension of data – IS scholars and practitioners alike rarely consider the time aspect – echoing Star and Ruhleder’s call for investigating ‘When is infrastructure?’, instead we should ask, when are data? Extant research has remarked how ephemerality is a distinctive trait of (big) data and the updatability of certain types of data is key for their subsequent usability (Kallinikos, 2009a, 2009b), yet more work is required to understand how temporality enters the design and use of data, and the production of meaning out of them.

These observations remind us that data are not inevitable but could have been otherwise. Such a stance rather invites IS scholars to imagine how data are carriers of meaning and knowledge in ways other than what is commonly assumed in our field. This strand of research invites IS scholars to engage with both the supply and demand sides of data. Some of these fundamental issues cannot be solved but with an in-depth knowledge of different social fields and how do they change as data furnish the means to build meaning and knowledge. Future research may be directed toward making case study comparisons of data

journeys across different contexts or engage more closely with issues of meaning and knowledge production in AI-powered systems.

### 4.3 Theme 3: The Need to Study New Data Management and Governance Approaches

The third theme that emerged from the opening statements of our speakers and the discussion that followed is the issue of data management and governance. Data governance is a relatively new field, therefore is very relevant to account for the changes that decentralized governance beyond current digital platforms could bring to data and the new forms of organizing data enable (Alaimo & Kallinikos, 2022). This discussion can often benefit from taking established debates on centralization versus decentralization as a starting point (Hanseth et al., 1996; Yoo et al., 2010), while extending and building on them by highlighting that it is not only about whether data are centralized or decentralized but also about what data centralize and decentralize. Data change the ways in which experiences, opinions, and even people are becoming visible or manageable. For instance, through tokenization, data representing value can be stored and exchanged on decentralized digital infrastructure to afford greater immutability, provenance, security, and transparency compared to centralized platform ecosystems. Yet, the decentralization of data in non-fungible tokens has the paradoxical effect of centralizing personal preferences hence rendering them visible and controllable in ways that were not possible before.

Understanding how data should be governed and how governance changes with new kinds of data calls for investigations of the semiotic, communicative, and social predilections on the basis of which data are produced and put into practice both from the supply and demand side. Closely related to the issues of governance, participants raised the theme of the generativity of data: the production, access, use, and further processing of data produce more data as a by-product. At the same time, different types of data carry different levels of accuracy and precision in representing real-world entities, giving rise to questions about managing and combining data of varying quality and properties (Mikalsen & Monteiro, 2021). Such higher-order and potentially self-reinforcing processes have been seldom studied in IS (Kallinikos, 2007; Lyytinen, 2022; Swanson, 2022). Yet, it would be important to investigate how data produced for immediate use create additional opportunities or risks for (un)controlled data inference and control down the road. From this perspective, IS scholars could contribute to broader managerial and societal issues by carefully studying not only how and by whom data are governed but also how different domains of socio-economic life become governed by digital data. Further research may consider the institutional implications of a more distributed control of data and to what extent it applies to different domains for instance addressing issues of data security, privacy, or quality control. On the other hand, we still miss an assessment of the different institutional forms involved in data-based innovation and which of them is better suited to unleash sustainable innovation empowered by data.

## 5 Concluding Remarks

As data are seeping into our everyday lives in ways that ‘computers’ or ‘information technology’ never did, studying their role in shaping the reality that data increasingly mediate should be at the core of the IS discipline. There is a need to cultivate critical and innovative scholarship on data at the crossroads between IS and neighboring fields, such as management, innovation, strategy, policy, and other fields in social sciences. This requires acknowledging and theorizing the characteristics of data artifacts, data practices, and the broader organizational configurations that emerge around them (e.g., Alaimo & Kallinikos, 2022; Gregory et al., 2021; Jarvenpaa & Markus, 2020). The three themes that emerged from our workshop do not stand in isolation, but instead fuel and build on each other. Tackling questions in one of the themes is likely to reinforce and make more prominent the questions in other themes, contributing to the development of a body of research on data in IS. We conclude with three ‘meta’ observations about the workshop discussions and this report.

1. The field of IS must develop multiple approaches to study data. While this does not have to entail an ‘everything goes’ attitude, it is unlikely that any single perspective is able to answer all relevant questions IS scholars should study. We have identified a few promising directions from the workshop discussions in this regard but there may be others.
2. An implicit assumption about data is that data are representations of ‘facts’ or what is out there. To this end, an established tradition of conceptual modeling in IS provides formal or cognitive tools, so to speak, to design data. Yet, recent research on data, adopting infrastructural

approaches and practice-based views, have revealed whole new categories of questions regarding how and why data become and stay meaningful. IS is very well positioned due to its interdisciplinary nature to expand its remit among social sciences and lay grounds for the social study of data.

3. Proliferating data resources need to be carefully governed to produce value, but also governance changes with data and cascades on several domains of socioeconomic life that are increasingly governed through data. Understanding the interplay between how data are governed and governing through data will again require engagement with adjacent fields such as management and social sciences more broadly.

## Postscript

Our long-term aim is to support the creation of a community of scholars interested in the study of digital data driven by intellectual innovation and interest in tackling relevant research questions. We hope to be joined by those who find issues raised in this report interesting and those inspired by research in IS and nearby academic fields such as science and technology studies, computer-supported cooperative work, media and organization studies. We believe in the importance of diversity of perspectives and accommodating different research interests, yet it is also important to build on common grounds, acknowledging, in one way or the other, that data are not given but actively designed, produced, transferred, and interpreted, often across organizational settings, systems and industries (Aaltonen et al., 2021; Alaimo & Kallinikos, 2021, 2022; Jones, 2019; Mikalsen & Monteiro, 2021; Monteiro & Parmiggiani, 2019). We hope this summary will provide a useful reference point for the evolving discussions on these topic.

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## References

- Aaltonen, A., Alaimo, C., & Kallinikos, J. (2021). The making of data commodities: Data analytics as an embedded process. *Journal of Management Information Systems*, 38(2), 401–429.
- Aaltonen, A., & Penttinen, E. (2021). What makes data possible? A sociotechnical view on structured data innovations. In *Proceedings of the 54<sup>th</sup> Hawaii International Conference on System Sciences (HICSS)*.
- Ackoff, R. L. (1989). From data to wisdom. *Journal of Applied Systems Analysis*, 16(1), 3–9.
- Alaimo, C. (2022). From people to objects: The digital transformation of fields. *Organization Studies*, 43(7), 1091–1114.
- Alaimo, C., Kallinikos, J., & Aaltonen, A. (2020). Data and value. In S. Nambisan, K. Lyytinen, & Y. Yoo (Eds.), *Handbook of digital innovation* (pp. 162–178). Edward Elgar Publishing.
- Alaimo, C., & Kallinikos, J. (2017). Computing the everyday: Social media as data platforms. *The Information Society*, 33(4), 175–191.
- Alaimo, C., & Kallinikos, J. (2021). Managing by data: Algorithmic categories and organizing. *Organization Studies*, 42(9), 1385–1407.
- Alaimo, C., & Kallinikos, J. (2022). Organizations decentered: Data objects, technology and knowledge. *Organization Science*, 33(1), 19–37.
- Beer, D. (2016). *Metric Power*. Palgrave Macmillan.
- boyd, D., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information Communication and Society*, 15(5), 662–679.
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. WW Norton & Company.
- D'Ignazio, C., & Klein, L. F. (2020). *Data Feminism*. The MIT Press.
- Dalton, C. M., Taylor, L., & Thatcher, J. (2016). Critical data studies: A dialog on data and space. *Big Data & Society*, 3(1).
- Dencik, L., Hintz, A., Redden, J., & Treré, E. (2019). Exploring data justice: Conceptions, applications and directions. *Information Communication and Society*, 22(7), 873–881.
- Desrosières, A. (2002). *The politics of large numbers: A history of statistical reasoning*. Harvard University Press.
- Diesner, J. (2015). Small decisions with big impact on data analytics. *Big Data & Society*, 2(2).
- Frické, M. (2015). Big data and its epistemology. *Journal of the Association for Information Science and Technology*, 66(4), 651–661.
- Gehl, R. (2013). A history of like. *The New Inquiry*. Retrieved from <https://thenewinquiry.com/a-history-of-like/>
- Gerlitz, C., & Helmond, A. (2013). The like economy: Social buttons and the data-intensive web. *New Media and Society*, 15(8), 1348–1365.
- Gregory, R. W., Henfridsson, O., Kaganer, E., & Kyriakou, H. (2021). The role of artificial intelligence and data network effects for creating user value. *Academy of Management Review*, 46(3), 534–551.
- Guyan, K. (2022). *Queer data*. Bloomsbury Publishing.
- Hacking, I. (1990). *The taming of chance*. Cambridge University Press.
- Hanseth, O., Monteiro, E., & Hatling, M. (1996). Developing information infrastructure: The tension between standardization and flexibility. *Science Technology and Human Values*, 21(4), 407–426.
- Hirschheim, R., Klein, H. K., & Lyytinen, K. (1995). *Information systems development and data modeling: Conceptual and philosophical foundations*. Cambridge University Press.

- Jarvenpaa, S. L., & Markus, M. L. (2020). Data sourcing and data partnerships: Opportunities for IS sourcing research. In R. Kirschheim, A. Heinzl, & J. Dibbern (Eds.), *Information systems outsourcing* (5<sup>th</sup> ed., pp. 61–79). Springer.
- Jones, M. (2019). What we talk about when we talk about (big) data. *Journal of Strategic Information Systems*, 28(1), 3–16.
- Kallinikos, J. (2007). *The consequences of information: Institutional implications of technological change*. Edward Elgar Publishing.
- Kallinikos, J. (2009a). On the computational rendition of reality: Artefacts and human agency. *Organization*, 16(2), 183–202.
- Kallinikos, J. (2009b). The making of ephemeria: On the shortening life spans of information. *International Journal of Interdisciplinary Social Sciences*, 4(3), 227–236.
- Kitchin, R. (2014). *The data revolution: Big data, open data, data infrastructures and their consequences*. SAGE.
- Kitchin, R., & Lauriault, T. (2014). Towards critical data studies: Charting and unpacking data assemblages and their work. In J. Eckert, J., Shears, A., & Thatcher (Eds.), *Geoweb and big data*. University of Nebraska Press.
- Knorr Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Harvard University Press.
- Kornberger, M., Pflueger, D., & Mouritsen, J. (2017). Evaluative infrastructures: Accounting for platform organization. *Accounting, Organizations and Society*, 60, 79–95.
- Lamont, M. (2012). Toward a comparative sociology of valuation and evaluation. *Annual Review of Sociology*, 38(1), 201–221.
- Leonelli, S., & Tempini, N. (2020). *Data journeys in the sciences*. Springer Nature.
- Leszczynski, A. (2016). Speculative futures: Cities, data, and governance beyond smart urbanism. *Environment and Planning A*, 48(9), 1691–1708.
- Lyytinen, K. (2022) Innovation logics in the digital era: A systemic review of the emerging digital innovation regime. *Innovation*, 24(1), 13–34.
- Mackenzie, L. Z. (2017). The afterlife of data. *TSQ: Transgender Studies Quarterly*, 4(1), 45–60.
- Mikalsen, M., & Monteiro, E. (2021). Acting with inherently uncertain data: Practices of data-centric knowing. *Journal of the Association for Information Systems*, 22(6), 1715–1735.
- Monteiro, E., & Parmiggiani, E. (2019). Synthetic knowing: The politics of the Internet of Things. *MIS Quarterly*, 43(1), 167–184.
- Østerlie, T., & Monteiro, E. (2020). Digital sand: The becoming of digital representations. *Information and Organization*, 30(1).
- Pachidi, S., Berends, H., Faraj, S., & Huysman, M. (2021). Make way for the algorithms: Symbolic actions and change in a regime of knowing. *Organization Science*, 32(1), 18–41.
- Parmiggiani, E., Østerlie, T., & Almklov, P. G. (2022). In the backrooms of data science. *Journal of the Association for Information Systems*, 23(1), 139–164.
- Passi, S., & Jackson, S. J. (2018). Trust in data science: Collaboration, translation, and accountability in corporate data science projects. In *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), article 136.
- Plantin, J. C. (2021). The data archive as factory: Alienation and resistance of data processors. *Big Data & Society*, 8(1).
- Shapiro, C. S., & Varian, H. R. (1998). *Information rules: A strategic guide to the network economy*. Harvard Business Press.
- Swanson, E. B. (2022). *How information systems came to rule the world and other essays*. Routledge.
- Taylor, L. (2017). What is data justice? The case for connecting digital rights and freedoms globally. *Big Data & Society*, 4(2).



- Tuomi, I. (1999). Data is more than knowledge: Implications of the reversed knowledge hierarchy for knowledge management and organizational memory. *Journal of Management Information Systems*, 16(3), 103–117.
- Varian, H. R. (2010). Computer mediated transactions. *American Economic Review*, 100(2), 1–10.
- Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research*, 21(4), 724–735.

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