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Dis/Trust and data-driven technologies

David Duenas-Cid *Gdańsk University of Technology* David.duenas.cid@pg.edu.pl
Stefano Calzati *Delft University of Technology*

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Abstract: This concept paper contextualises, defines, and systematises the concepts of trust and distrust (and their interrelations), providing a critical review of existing literature so as to identify gaps, disjuncture, and continuities in the use of these concepts across the social sciences and in the context of the consolidation of the digital society. Firstly, the development of the concept of trust is explored by looking at its use in different disciplines —e.g. sociology, psychology, law, and management— and then confronted with that of distrust, often regarded—somewhat simplistically—as its opposite. Secondly, the review invites a reflection on the suitability of current definitions of trust and distrust when applied to the implementation of current data-driven technologies (dis/trust in technology) and their workings (dis/trust through technology). The discussion is relevant and timely, not only given the renewed interest in finding the touchpoints between dis/trust and digital-related issues but also to provide a benchmarking overview on this topic, which is still lacking in current literature.

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Introduction

As per Cambridge Dictionary definition, trust is the "belief that someone is good and honest and will not harm you, or that something is safe and reliable;" while distrust is, simply put, its reverse, or "the feeling of not trusting someone or something." Everybody has a sense of what trust and distrust mean and what they imply in terms of human relations. Although (or maybe because) they are commonly used in everyday life, these concepts have been the focus of wide attention in the social sciences—e.g. how can trust and distrust be fostered? To what extent are they mutually exclusive?—spanning fields as diverse as sociology (Giddens, 1991; Luhmann, 1979; Sztompka, 2003), psychology (Anderson, 2010; Evans & Krueger, 2009; Thielmann & Hilbig, 2015), law (Cross, 2005; Hall, 2002; Tyler, 2001) and management (Hurley, 2011; Kramer & Tyler, 1996; Stern & Baird, 2015), amongst others. For one thing, such diversity attests to the resistance of these concepts to be systematised and analytically enquired as social constructs, warranting interdisciplinary approaches that also account for the interplay of trust and distrust with neighbouring attitudes and values such as "confidence" and "trustworthiness." This is even more the case when trust and distrust are applied to new scenarios, notably the consolidation of today's digital society through data-driven technologies, which demands new forms of trust and impacts on how trust and distrust are being fostered.

This paper stems precisely from the need to bring some clarity to the concepts of trust and distrust in the context of today's digital society (Pietrzak & Takala, 2021). To do so, we conduct a critical literature review (Grant & Booth, 2009) on how these concepts have been tackled across the social sciences. A critical literature review is a method that delivers analysis and conceptual innovation without aiming for exhaustiveness in scope but rather for the identification of analytical trends, which then establish, de facto, further research and practice.

The goal of the review is double-sided: on the one hand (Section 2), we highlight findings from different perspectives on the factors that affect the fostering of trust and distrust as social constructs, discussing also the extent to which trust and distrust can be regarded as mutually exclusive and/or if they shall be approached as self-standing constructs. On the other hand (Section 3), we map recent research on

trust and distrust in connection with the digital society alongside two axes: 1) the fostering of trust and distrust concerning the development, implementation, and use of data-driven technologies and services (dis/trust *in* technology); 2) how data-driven technologies remould trust and distrust as socio-*technical* constructs (dis/trust *through* technology). In Section 4 we provide a synthesis of the preceding discussion by proposing an interdisciplinary agenda focused on dis/trust in/through data-driven technologies.

An overview on trust and distrust

In common parlance, trust and distrust tend to be regarded as zero-sum opposites, meaning that someone either has trust *or* distrust in someone else or a given situation. While this position is often sufficient as a compass to navigate everyday life, on closer inspection, trust and distrust (and their relation) are ticker concepts that need critical unpacking if we want to understand better how to control their genesis and effects.

2.1 Trust

We identify two traits shared by definitions of trust which cut across disciplines and approaches: 1) in the act of trusting, the trustors put themselves voluntarily in an asymmetric relation with the trustee, and 2) this asymmetry implies some form of risk that is context-based. For example, traditional approaches to trust define the concept as a psychological construct that entails the willingness to take risks in a given situation with a well-defined trustee (Murnighan et al., 2004) or assume positive expectations with regard to a person's behaviour within a situation that implies some degrees of risk (Marsh & Dibben, 2003). As such, trust is regarded as an immaterial bond, including both subjective evaluations and social projections. It has also been suggested, although not unanimously, that without trust, the capacity to enhance human cooperation tends to reduce (Luhmann, 1979), impacting social capital (Putnam, 2000) and slowing down economic development (Fukuyama, 1996). Other approaches, such as Simmel's (Simmel, 1964, p. 308), describe trust as an antecedent or subsequent form of knowledge, a bridge connecting ignorance and knowledge and having a strong relational binding and cohesive component. In this respect, trust relies both on inductive knowledge and faith (Möllering, 2001), being somewhere *in-between* rational and non-rational certitudes (Zinn, 2008, 2016).

Trust has commonly been understood according to who the recipient of trust is—either an individual or an institution—and it has been described as a mecha-

nism with certain properties influencing and describing the functioning of social life. First, trust allows for reducing the complexity of modern life. Luhmann (1979) connects trust creation to familiarity. Since being "familiar" with all surrounding people and institutions is getting harder and harder to achieve as society complexifies, adopting trusting measures allows cutting through the complexity of daily life and reducing the uncertainty that the lack of mutual familiarity entails. Trust, then, appears as an element that enables us to reduce the uncertainty of social life, especially due to its ever-increasing complexity, by translating this uncertainty into specific risks. Paradoxically, trust eases human life and brings cohesion to society by helping identify the risks that the trustor is keen to face in the process of trusting (e.g. failure of the expert knowledge of the trustee), being easier to deal with a limited number of identified risks than with a general situation of uncertainty (Zinn, 2006).

Second, trust relates to the existence of a knowledge asymmetry and to the need to rely on those who hold the necessary expertise to overcome such gaps (Giddens, 1991). In this case, experts and knowledge-holders may appear as mediators helping to bind individuals and/or institutions, supplying a third-party basis that finds its own legitimation in being trusted by both other parties. In other words, in situations of clearly unbalanced distribution of knowledge, trust might be mediated by expert opinions (Ehin & Solvak, 2021). The definition of what an expert is and the validity of their expertise in creating trust is also an object of debate (Whyte & Crease, 2010). Science is a traditional trust repository, but the scientific language is not necessarily easy for non-experts and, therefore, it is necessary to seek other agents who translate the scientific expertise into common language, creating a chain of trust mediation that might eventually distort the message (Hendriks et al., 2016). This intermediate step influences the recipient's perspective on the information received and, by extension, on the original source (Reif & Guenther, 2022). Trusting others (regardless of whether they are individuals or institutions) allows transferring the responsibility to deal with uncertainty to the trustee and concretises the number of potential harms to those risks affecting the interaction between trustor and trustee. Signing a contract, e.g., reduces complexity by passing on the responsibility to the trustee (lawyer), who should use expert knowledge to identify the risks that the contract entails. In case of failure, the overall harm might be the same as if the lawyer would not be involved, but its presence allows trusting that the sources of harm will be manageable.

2.2 Distrust and other concepts related to trust

Trust cannot be understood in isolation without considering some neighbouring

concepts that help enlarge the scope and get a more comprehensive picture. As Sztompka (2003) puts it, trust requires a certain degree of "institutionalized distrust" in order to keep a healthy balance in social functioning and prevent risks. Paradoxically, trust and distrust can be mutually necessary to ensure oversight over a system or interaction and, hence, to reinforce its trustworthiness (see below). Absolute trust might be blinding and become dangerous if the trustee abuses it, metamorphosing the situation into forms of exploitation or domination (Calnan & Rowe, 2007).

As a matter of fact, research on trust cannot be detached from other neighbouring concepts: not only, quite evidently, distrust, but also confidence and trustworthiness. Let's start from the latter. Following Levi and Stoker (2000), trustworthiness refers to the attributes of a trusted party (whatever their nature, individual, institutional, or technological), which assures potential trustors, say Actor 1, that it will not betray their trust. As such, trustworthiness appears as an information-based (Alarcon et al., 2018) antecedent to trust (Tomlinson et al., 2020), or an envelopment of the trusting relation referring to a property of the trustee, in this case, Actor 2. The impact of trustworthiness in the creation of trust, although stemming from the trustee, depends on how the trustor perceives it and how keen on trust he/she is (Kiyonari et al., 2006). Although some approaches have distinguished between trust as referred to people and confidence as linked to institutions (Sapsford & Abbot, 2006), Giddens' (1991) understanding of confidence as the certainty (or expectation, for Bauer, 2013) that something will occur as expected, based on previous knowledge and experience, allows maintaining the two—people and institutions—on the same level. Opposite to trustworthiness, confidence relates to the trustor's interpretation of whether the trustee should or not be trusted. Also, a difference between certainty and expectation when understanding confidence has been identified by Luhmann and Giddens. While for Luhmann confidence relies on expectations in situations where no risks are considered (Luhmann, 1988; Meyer et al., 2008), for Giddens (1991), confidence relates to a certainty based on knowledge, being trust a link between faith (lack of knowledge) and certainty (mastery of the circumstances).

Finally, aligning with Luhmann's approach (1979), trust and distrust can be regarded as closely related but not symmetrically opposed concepts (Lewicki et al., 1998). Distrust, interpreting McKnight and Chervany (2001), is the belief or expectation that someone/something will harm us, and, therefore, we take an active role/vigilant attitude towards it. Overall, research either overlooks a proper focus on distrust or maintains it at the opposite end of the trust-distrust continuum (e.g.

Hopland Nestås & Hole, 2012; Li & Singhal, 2007) being distrust defined as the absence of trust (van de Walle & Six, 2014). In fact, little research has been conducted on distrust as an independent, although complementary, construct. However, as soon as one looks at the foundations of these two concepts, it is possible to see that their inputs differ. As Kühne (2015) describes, trust is not necessarily rooted in proofs of trustworthiness but the lack of counter-evidence of the opposite, while distrust can be raised by a well-targeted narrow number of pieces of information undermining the trustee's trustworthiness. Also, distrust has been defined as a disposition based on reason, routines, and reflexivity, and leading to negative expectations towards the actions and intentions of others (van de Walle & Six, 2014), being somewhat detached from the possible efforts of the trustee to prove its trustworthiness. For Sztompka (2003), distrust can be understood as a practice of active verification, oversight, control of, and engagement with the trustee, becoming a method to establish trust where there was not, or where it was breached. Lewicki et al. (1998), although assuming the obvious interrelatedness of trust and distrust, propose to regard them as separate constructs having their own antecedents and consequences.

From here, it is possible to advance that a cognisant understanding of trust cannot do without a proper mapping of neighbouring concepts whose genesis is different from, yet imbricated with, that of trust. This also means the links between trust and distrust, confidence or trustworthiness are neither given nor symmetrically opposed. In fact, when it comes specifically to distrust, it might be useful to conceive of *dis/trust* as a whole socio-institutional value in which trust and distrust are regarded as independent yet complementary facets.

Trust and distrust in/through data-driven technologies

With the evolution of the digital society through the widespread diffusion of data-driven technologies and services, discussions on and inquiries into trust and distrust have also revamped. This is because the digital transformation has had an impact not only on a vast array of disciplines, sectors, and processes but also on attitudes and values. Globalisation and digitalisation have unleashed a crisis of trust, as traditional institutional and interpersonal logics are not attuned to deal with the risks introduced by the prevalence of digital technologies (Bodó, 2021, p. 2668). The arrival of new forms of digitally mediated interaction has challenged face-to-face elements (e.g. proxemics) we traditionally use for building trust and distrust (Botsman, 2017). The technological transformation is renewing digitally-based risks, and aspects related to security and privacy are constantly named as

sources of trustworthiness (Wong et al., 2019; Belanger et al., 2002) even when increasing the security of digital systems has been proven not to be sufficient alone in securing trust (Nissenbaum, 2004).

Similarly, trust has been described as a precondition for adopting new technologies (Bahmanziari et al., 2003; Schaupp & Carter, 2005) and as a consequence of its adoption (Janssen et al., 2018). At the same time, some digital innovations (such as blockchain) pretend to eliminate the need for trust (Werbach, 2023) by transferring trust from the individual to the process itself (Jemielniak & Przegalinska, 2020) and creating new forms of tech-based institutionalized trust that have not yet been socially legitimated due to their lack of trustworthiness (Bodó, 2021).

As a consequence, it is relevant and timely to address how trust and distrust have been approached in connection to the digital society. This, in turn, will allow identifying conceptual continuities and, especially, discontinuities and research gaps in comparison with what we have discussed in the previous section.

It is worth advancing a preliminary distinction between, on the one hand, trust and distrust *in* technology and, on the other hand, trust and distrust *through* technology. The former axis explores the fostering of trust and distrust in connection to the development, implementation, and use of data-driven technologies and services; the latter axis is concerned with how data-driven technologies remould trust and distrust as socio-*technical* constructs.

In interactions among people and/or between people and institutions, trust can be related to the potential willingness of the trustee to do good or harm to the trustor. Differently, when the trusting relation connects people to technology, trust relates to the ability of the latter to deliver the expected results due to the impossibility to infer intentionally from technology (McKnight et al., 2011). This standpoint lies on the assumption that technology lacks moral agency, urging to shift the focus on the features of the technology itself as well as to transfer the moral concerns to those (people or institutions) who are producing or using it (Sharma, 2020). For example, trust and distrust were found to have different trajectories (i.e. types of impact and moments of impact) when influencing decision confidence in IT automation (Lyons et al., 2011). Differently, trust through technology approaches focus on “human-like trust constructs” (Lankton et al. 2015), assuming that the design and development of technological artefacts is a social construction and, therefore, the resulting technologies are representing a set of social interests (Mackay & Gillespie, 1992). For instance, it was found that different website features, such as perceived honesty, competence, and benevolence, influence in differ-

ent manners the creation of trust and distrust. Overall, this shows that distinguishing between trust "in" and "through" technology is valuable, as well as to couple "dis/trust" as a whole double-faced construct.

Overall, the transversal nature of trust research provides a wide range of approaches to the topic, allowing segmenting them by distinguishing a double axis depending on 1) how trust and distrust are conceptually understood and 2) whether at stake is trust and distrust in the technology or through technology. This creates a four-quadrant matrix (Figure 1, below), which will guide our discussion in the remnant of the article.

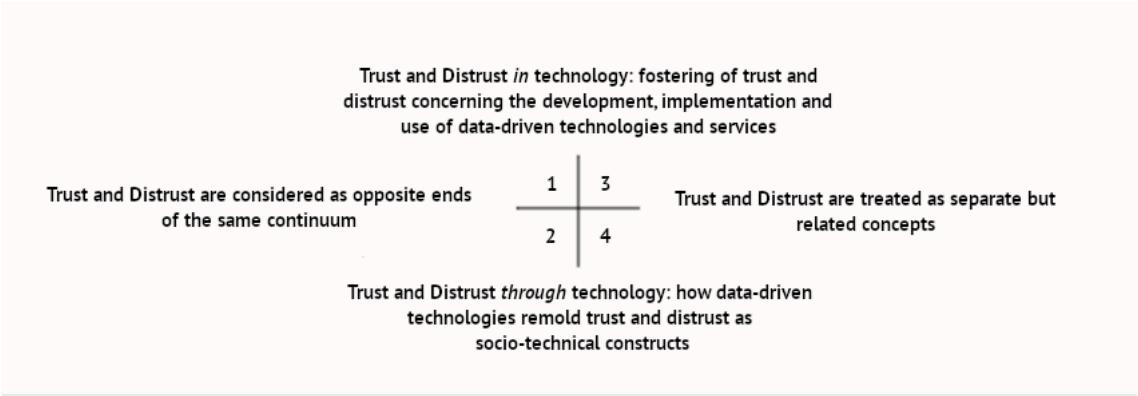

Figure 1: Approaches to the research on trust, distrust, and data-driven technologies.

3.1. Quadrant 1: Trust and distrust *in* technology as opposite ends of the same continuum

Considering trust and distrust as opposite ends of the same continuum and focusing on the development, implementation, and use of data-driven technologies and services has been a popular scholarly approach. In the organisational and business literature, the digital interaction is preceded by the fact that users generally have information about who the trustee is in the offline world (e.g. international companies or organisations) and bear already-formed ideas regarding its trustworthiness. Technologies, then, are treated as mediators between producers and users, and the focus on trust research is placed on the offline-online information exchange and management (Granados et al., 2010), the security of the digital mediation process (Srinivasan, 2004) or the perception regarding the trustworthiness of the organisation (Blöbaum, 2016). For example, successful trust creation strategies allow the use of technology but also foster parallel/alternative relations between the stakeholders involved in the process (Stouthuysen, 2020). This can also provoke, in turn,

a platform disintermediation effect in the case of the online freelance marketplace, in which providers and consumers in matching platforms circumvent the digital platform and build their own relations (Gu & Zhu, 2021).

Similar research foundations apply to public management and administration, where more and more digital technologies are deployed and need to generate trust as a precondition for citizens' use (Carter & Bélanger, 2005). Also here, trust not only relies on the technology but also includes previously existing public perception regarding the trustworthiness of the institution or government (Lee et al., 2011) or the potential impact of the technology in, e.g., democratic life (Duenas-Cid, 2022). The political dimension of public administration enriches the scope of the discussion by bringing new elements to be considered when referring to trust-related research (Möllering, 2021) as can be misinformation (Dubois et al., 2020) or political communication strategies (Ehin & Solvak, 2021). Yet those approaches are generally related to how data-driven technologies affect trust in institutions but not necessarily considering neither distrust nor how previous levels of trust affect the use or adoption of technologies. Similarly, abundant research took this stream aiming to determine how the implementation of e-government measures helps increase trust in institutions (Janssen et al., 2018) by facilitating the interaction with citizens (Tolbert & Mossberger, 2006), accessibility (Schmidthuber at al., 2023), co-production (Scupola & Mergel, 2022) or reducing corruption (Zhao & Xu, 2015), amongst others.

Trust, hence, appears as an element collectively created by the different stakeholders involved in the process, with the digital component just one of many and not necessarily the central one.

An important part of trust *in* data-driven technologies relies on preexisting offline mechanisms that are partially transposed into the digital realm, expecting that it will provide security and trustworthiness. Trust, hence, is approached as a pragmatic component, allowing understanding parallel processes resulting from the digital transformation. Still, it does not represent the core of the research: trust is often seen as an element that precedes or results from others, with the approach focusing on how the preceding elements affect trust or how trust impacts the stemming outcomes. This use of trust does not elaborate complex conceptual frameworks defining what trust is but relies on previously built definitions existing in literature, bringing, occasionally, to a conceptual simplification of trust and the methods used for tackling it. For example, trust has been presented as the outcome of using e-government tools (Janssen et al., 2018) and as an enabler for technology adoption (Lippert & Davis, 2006). Finding trust at the foundation and

as a logical outcome of a given process is conceptually possible but can bring confusion if the complexity of the concept and its distribution throughout the process is not clearly established. The same can be seen in the literature on technology adoption, where the use of trust in the Technology Acceptance Model (TAM) (Kim, 2012; Wang et al., 2021; Gefen & Karahanna, 2003; Zhao et al., 2018) or the United Theory of Acceptance and Use of Technology (UTAUT) (Arfi et al., 2021; Cody-Allen & Kishore, 2006; Alharbi, 2014; Slade et al., 2015) is sometimes confusing, being possible to find references to trust in different parts of the previous models, either as a source or intermediary precedent of behavioural intention. Although understanding trust as a precondition for the intention of using data-driven technologies seems obvious, the way the construct of trust is presented in the model is too simplistic (Shachak et al., 2019) to achieve a full comprehension of the potential impact of trust—under the assumption that the black-boxed construct of trust is *de facto* used and not simply referred to (Williams et al. 2011). A similar flaw also affects research in cryptography, where trust is often presented as stemming from a set of objective technical elements (Walton, 2006; Barthe, 2015) that could be reproduced following a simple roadmap and reducing other sources of complexity in its comprehension, and where trust and trustworthiness or security are often used in an indistinguishable manner.

3.2. Quadrant 2: Trust and distrust *through* technology as opposite ends of the same continuum

A second stream of research focuses on the processes in the digital realm that are transforming the understanding of trust as such and, eventually, creating new forms of trust that are typical of the digital. Stemming from the idea that data-driven technologies transformed the nature (boyd & Ellison, 2007; boyd, 2007) and the way in which human interaction occurs (Hine, 2015), it seems reasonable to question if previous trust approaches can still be applied in digital contexts. For example, how are "trust hangers" (i.e. those elements we rely upon to decide whether to trust) affected in the digital world? According to Botsman's distributed trust model (Botsman, 2017), the structure of digital exchanges enables a collective and distributed rating of subjective values that, thanks to that, emerges as (more) trustable to internet users. According to Botsman, trust hangers shifted from individual interaction or institutional mediation to the hands of many internet users, who rate the service provided and help back certain users' opinions over others. Still, Botsman's approach fails to provide a clear link between her distributed form of trust creation and the centralised pattern of functioning of the platforms she refers to: It seems counterintuitive that centralisation would bring about decentralisation.

A similar distributed structure lies behind the logic of blockchain, where a distributed ledger system of verification provides stamped proofs that serve as trust hangers without requiring intermediaries: stamped proofs can be used as an oversight validation of the transaction. However, following De Filippi and colleagues, the promises of blockchain technology as a trustless system have been heavily questioned (De Filippi et al., 2020). Blockchain does not overcome the technical problems that decentralisation entails, such as data protection (De Filippi, 2016), scalability (Johnson, 2019), or additional managerial complexity (Park et al., 2021). Yet, especially, Blockchain does not manage to circumvent the need for trust since it ignores the sociotechnical dimension of algorithms and the need for legal and cultural embeddedness as a matter of accountability (Bodó, 2021).

Different perspectives downgrade the impact of distributed trust by considering that it is not substituting institutional trust but transferring some forms of trust from the individual to the process as a whole (Jemielniak & Przegalinska, 2020), as can be seen in the functioning of Wikipedia, where the process of knowledge production can be described as a community building trust-creator which, finally, allows validating the produced outcomes (Jemielniak, 2014). Yet, other elements escape this conception of distributed trust and invalidate its adoption in some aspects of human-technology interaction. For example, ChatGPT is also relying on distributed knowledge, but the recentralisation of such knowledge via the opaque synthetic workings of its algorithm negatively affects the trustworthiness of the service, especially when it comes to contents that are subjected to personal interpretation (Dwivedi et al., 2023). In such a context (and other similar ones), digital interactionist approaches are highlighting the need for real (although mediated) interactions to create interpersonal trust (Jamieson, 2013).

Bodó (2021) follows this thread by proposing a wider frame for comprehending trust in the digital sphere, approaching the role that digital intermediaries play in creating trust relations. The author coined the term “mediated trust” to describe how digital technologies mediate in traditional trust-related interactions, transforming its creation process, embedded in the institutional and power-distribution context. As the author describes, many digital technologies escape from the control of institutional regulations (Yeung, 2019), colliding with the traditional legal, political, economic, social, and cultural frames of offline institutional trust production. In the offline realm, familiarity allows absorbing complexity via trust, and institutions help depersonalise that need for trust by taking that role (Jalava, 2006; Luhmann, 1979). By contrast, digital technologies propose renovating institutional trust production forms that settle on technical-organisational solutions (Bodó,

2021), that is, disenfranchising trust from affect. This list encompasses very different solutions that can be divided into 1) security-related properties (cybersecurity), 2) societal (online reputation [Botsman, 2017], external certification [Grandison & Sloman, 2000]), and 3) architectural properties (open source [Alarcon et al., 2020], decentralisation [Werbach, 2018], p2p [Viriyasitavat & Martin, 2011]). For Bodó (2021), platforms and digital services, also blockchain, are just another set of institutions trying to produce societal trust. Yet, unlike traditional ones (regulated and/or well-known ones), they are not trustworthy (because they are disruptive or unregulated or rely on untested, black-box technologies).

Mediated forms of trust (such as verification mechanisms) aim to reduce the need for human mediators, replacing them with other types of mediators that leave open the question of who is designing them and with which purpose and, once more, blurring the line with institutional or interpersonal trust. The digital interface of a system is the visible part aiming to build confidence, but, at the same time, the interface hides most of the information necessary to understand it (not only technically but also at the most basic level of comprehension). Trust is deployed on the mediator for aspects related to its design, convenience, or capacity to solve problems, more than as a result of a conscious decision based on factual knowledge of how the mediator works: e.g. Syrian refugees were found to be more wary of institutional than commercial algorithmic targeting, because the former, differently from the latter, is felt as not enough accurate in responding to their needs (Kasapoglu et al., 2021). Digital mediated trust might create wrong feelings of trust towards well-designed non-trustworthy systems, while it might also be that trust is negatively impacted by badly designed tools coming nonetheless from a trustworthy source (Oostveen & van den Besselaar, 2004), thus opening a dialogue between trust and distrust in the offline and online realms, e.g. how offline distrust in individuals can be a trigger for trusting digital technologies (Molina & Sundar, 2022).

3.3 Quadrant 3: Trust and distrust *in* technology as separate but related concepts

Research on trust and distrust *in* data-driven technologies is getting some traction in the fields where the construct of trust is treated more instrumentally. In management research, trust and distrust have been analysed to understand their differential impacts on the development of open-source software (Ho & Richardson, 2013) or virtual teams (Lowry et al. 2015). But where they made a fortune is in the area of technology adoption, where publications on the differential impacts of trust and distrust have been flourishing (Benamati et al. 2006; McKnight & Choud-

hury, 2006; Yao et al. 2013). This research is often characterised by a lack of theoretical complexity in the definition of distrust, leading to the reproduction of the limitations expressed in the use of trust constructs: distrust is often reduced to a behavioural precedent (Simon & Cagle, 2016) or an outcome stemming from technical settings (Ou & Sia, 2010). Even there, some efforts have been made in order to include societal variables in the analysis of distrust; for instance, the work of Simon and Cagle (2017) compares reactions to data theft in different cultural backgrounds; Kühne (2015) approaches the adoption of digital fingerprinting qualitatively challenging the general understanding of security perceptions; to theses, the proposals to rethink the research methods for approaching the trust/distrust distinction can be added (Dwyer et al.; 2013; Duenas-Cid, 2022).

3.4 Quadrant 4: Trust and distrust *through* technology as separate but related concepts

Diving into the literature, it emerges that a general theoretical effort to explore trust and distrust through data-driven technologies systematically is still missing. On the one hand, we have an important corpus of literature approaching dis/trust from a pragmatic perspective. On the other, we can find relevant contributions to trust through technologies, but they are not distrust-inclusive. Bodó's approach—as far as we know the most complete theory for describing trust through technologies—recognises the different natures of trust and distrust. Still, the latter remains something to be managed by creating "better analytical tools to assess the known and unknown risks associated with digital technologies, (…) design them to be more trustworthy and rely on the trust they produce" (Bodó, 2021, p. 2685), rather than an object of parallel analysis to construct a common picture. Others, like Botsman, do not provide a definition of distrust, although referring to it on several occasions and considering it "common to distrust people outside your own personal network" (Botsman, 2017, p. 33). Although not explicitly mentioned, from her approach, it can be inferred that distributed trust relates to the need to find solutions to the "normal distrust" that stems from the fact that we are dealing with large communities of unknown people in our digital lives. Still, approaching theoretical distrust in the digital seems urgent and necessary to equip researchers with new theoretical tools for analysing and understanding the new challenges that current societies face, such as the use of artificial intelligence or the Internet of Things. Some seminal efforts are noteworthy, such as the approach by Tang, Hu, and Liu to the "systematical understanding of distrust in social media" (Tang et al., 2014), as well as the references to the growing distrust within digital societies (boyd, 2017; Benkler et al. 2018) which, even if not providing frameworks for understanding the transformation of distrust, help create awareness on the need to

further investigate it.

Concluding remarks: an interdisciplinary agenda for researching dis/trust in/through data-driven technologies

This piece aimed to bring some clarity to the comprehension of the concepts of trust and distrust in the context of today's digital society. Through a critical literature review, we first mapped how these concepts have been tackled within the social sciences, identifying challenges and current gaps, especially in the ways trust and distrust are traditionally treated as either concepts part of the same continuum or as independent social constructs. Secondly, we explored analytical continuities and discontinuities in the understanding of trust and distrust in connection with data-driven technologies and services, highlighting the need to disentangle between trust and distrust in and through technology. From here, in this final section, we close the circle by enriching the discussion conducted so far with an integrative approach to the research on dis/trust in/through data-driven technologies.

We claim, on the one hand, that trust is a social construct whose dynamics of creation cannot be fully grasped without also taking into account the dynamics of distrust; on the other hand, when it comes to the mapping of these dynamics onto the digital realm, trust and distrust cannot be solely regarded as social constructs (involving people and/or institutions), but rather as sociotechnical constructs in which technology plays a pivotal, and not merely an auxiliary, role. From here, we outline the contours of an integrated sociotechnical approach to *dis/trust in/through data-driven technologies* based on the following tenets (Figure 2):

1) *Dis/trust* is one single concept composed of two independent yet complementary sides. As such, the concept must be tackled as a whole, disentangling how trust and distrust contribute together to their coming into being in different contexts. This might imply, for instance, moving past traditional understandings of trust and distrust as part of the same continuum and rather exploring scenarios and/or the extent to which they might coexist, mutually reinforcing or diminishing each other beyond linear subject-object cause-effect links in favour of a context-dependent analysis.

2) The "digital" is a dimension with specific features—e.g. de/centralisation, tech-based intermediation, algorithmic opacity, disenfranchising of human-to-human, human-to-institution relations—fostering new forms of trust and distrust in and through data-driven technologies. This, in turn, demands new ways to explore dig-

ital-based forms of dis/trust, departing from traditional approaches either in or through data-driven technologies, which maintain a substantial divide between people and technology, thus failing to acknowledge the consolidation of a proper sociotechnical dimension. For example, when the axes “in and through” technology are considered conjointly, strategies to foster trust might lead to exploring people’s adversity to engage with technology or institutions' resistance to innovation under a new light, taking into account at once technical and non-technical aspects, notably collective techno-cultural instantiations of dis/trust.

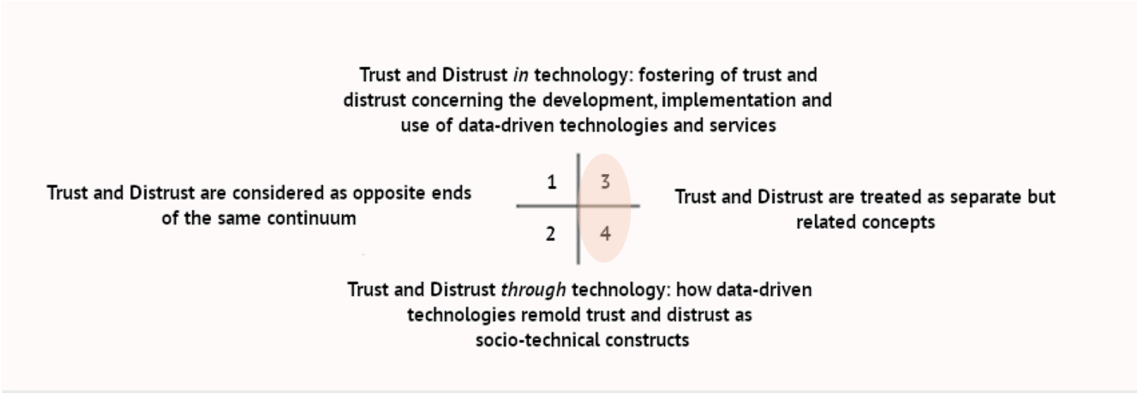

Figure 2: Dis/trust in/through data-driven technologies.

Refining and adopting such a comprehensive approach will help overcome the limitations found through this critical literature review, notably the use of loosely defined concepts, the unclear interrelation between trust-related concepts, or the missing link between offline and online dynamics of dis/trust creation. Hence, a door opens onto both the sophistication of research methods to acknowledge the nuances of the dis/trust sociotechnical construct, as well as the provision of solid conceptual definitions when trust and distrust are approached instrumentally. Moreover, the detailed approach will help foster the dialogue across disciplines: *trust in* approaches have been prolific in supplying practical cases on which to conduct research, *trust through* approaches have been useful in delivering reflection and conceptual clarity. Intersecting these two in the exploration of dis/trust naturally demands interdisciplinary cross-fertilization. We hope this paper will serve as a stepping stone in this direction, contributing to finding responses to the challenges the digital society poses.

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