Governed by Data: Entangled Encounters with Infrastructural Power

Stefania Milan

This theoretical essay examines human-data interaction (HDI) through the lens of *governance by data infrastructure*—a concept that captures the growing use of data-centric technologies as regulatory instruments. As infrastructures like biometric systems, digital identity platforms, and AI-powered predictive analytics become embedded in everyday life, they reshape how citizens access welfare services, engage with the state, and experience accountability and surveillance. These infrastructures produce data that inform real-time monitoring and automated decision-making, increasingly performing functions once carried out by public institutions. In doing so, they redefine who counts as a citizen, what constitutes valid knowledge, and how social ordering is enacted—raising urgent questions about democratic legitimacy, state sovereignty, and inequality.

Framed within critical data studies and political sociology, this article expands the concept of HDI by grounding it in current practices of governance, where data infrastructures negotiate, reinforce, or subvert institutional logics through everyday encounters. In so doing, it reconceives HDI not simply as a matter of interface usability or legibility, but as a set of socio-technical entagnlements that envelop individuals and collectives in ongoing processes of subject formation, political agency, and statecraft. While aligning with the call to 'make the human explicit' in data systems (Mortier et al., 2015, p. 2), the article emphasizes how such interactions are shaped by asymmetric power relations—and how people navigate, appropriate, or resist them. Thereby the article contributes to the SI by setting HDI 'in motion': first, by anchoring it in governance practices that reveal shifts in institutional power in data-driven societies; and second, by situating it within the politics of infrastructure, seen as both agents of governance and arenas of democratic contestation.

Introduction: Data as Infrastructure of Governance

In July 2021, a prominent billboard at Rome Fiumicino Airport (Italy) advertised biometric boarding with the slogan: 'It is not rocket science. It is your new way of traveling' (fieldwork notes). Meanwhile, in Amsterdam (The Netherlands), as part of an expanded predictive policing strategy, the Top400 algorithmic scoring programme targets minors labeled as potential future offenders—so-called 'high potentials'—not based on serious past crimes but on behaviors deemed disruptive (Public Interest Litigation Project, 2022). These examples illustrate how data-grabbing infrastructure—such as biometric identity verification systems, algorithmic scoring mechanisms, but also smart city dashboards and much of today's education technology, which I categorize under the rubric of *regulatory data infrastructure*—are no longer peripheral tools of governance; they are increasingly constitutive of it. Yet these infrastructures are not neutral enablers of efficiency or innovation—they embed new forms of rule that entrench power asymmetries and redraw the boundaries of civic life. Their implementation often sidesteps democratic oversight, operates in legal grey zones, and relies on for-profit contractors to manage sensitive personal data. For those subjected to them, opting out is rarely a meaningful or viable option.

These emergings forms of *human-data interaction* (HDI)—understood as the ways individuals and collectives are enrolled into, and shaped by, and respond to data-driven systems (Mortier et al., 2015)—are fast becoming a staple of public life. But how can such interactions be theoretized in ways that account for multiple levels of analysis, diverse actors, and the sociomaterial structures in which they are embedded? Originating within the tradition of human-computer interaction as an effort to 'make the human explicit' in the data relation (2015, p. 2), the HDI framework offers a valuable entry point for critically examining how data systems mediate power and accountability, and for exploring possibilities for more transparent, accountable, and user-aware forms of design.

Yet its value lies less in offering a comprehensive theory than in foregrounding the frictions and asymmetries at the interface between people and the infrastructures that govern them. Even so, the framework falls short in several ways. First, HDI is structured around three pillars—legibility, agency, and negotiability—presented as conceptual categories for organizing the human experience of data. While each is meaningful, this structure risks reducing HDI to a design checklist rather than articulating a dynamic, evolving process. Second, the framework centers individual interactions with data systems, while overlooking the socio-technical infrastructures that shape, constrain, or enable those interactions. Third, it assumes a user-centric control model which, although potentially empowering, fails to adequalely address the distributed and systemic nature of data production and governance. Finally, HDI rests on normative assumptions that individual empowerment, transparency, and ethical design are both desirable and achievable within data ecosystems. While important, this perspective tends to reify normative ideals—like legibility and agency—without adequately grappling with the *structural conditions*—such as regulatory ambiguity, commercial logics, and platform lock-in—that often undermine their realization.

To address these shortcomings, this essay argues that understanding HDI today requires a conceptual shift: away from a narrow focus on interface design, usability, or the 'ethics of' data systems, and toward a broader recognition of the infrastructural and socio-political entanglements that shape everyday life. This shift makes visible the (infra)structural conditions that define the boundaries of human-data interaction.

Realizing the full potential of the HDI concept, then, means *setting it in motion*—moving beyond a static, interface-bound understanding toward the messy, situated realities of how people live with, navigate, and contest data infrastructures. Framing HDI through the lens of *governance by data infrastructure* foregrounds these dynamics. It recasts HDI not merely as a matter of from usability, but as deeply intertwined with processes of subject formation, political agency, and the everyday exercise of statecraft and market dynamics. This theoretical paper explores this argument, grounding it in empirical illustrations that help surface the contingent, situated forms that HDI takes within specific socio-political contexts.

The concept of 'governance *by* data infrastructure' captures how data-centric systems are increasingly deployed as regulatory instruments that shape the contours of political and social life (Milan, 2024). These regulatory data infrastructures generate real-time data to automate decision-making and monitor populations. They operate not only by producing knowledge but also by governing behavior, access, identity, and legitimacy. In other words, they not just perform data governance but to the ontological and political ordering of society (Amoore, 2022). As a result, they contribute to restructure the social contract—quietly yet profoundly transforming what it means to be a citizen, how the state performs its functions, and who holds power and exercises control.

Framed within the tradition of critical data studies, with excursions into science and technology studies (STS) and democratic theory, this perspective foregrounds the asymmetrical power relations embedded in data infrastructures and how they mediate subject formation, agency, and resistance. In doing so, it builds on and expands the concept of HDI by locating it within two intersecting frames: first, the practices of governance in data-driven societies; and second, the politics of infrastructure as both a site of domination and a space for democratic contestation.

The paper is organized as follows. First, it provides a definition of regulatory data infrastructure as the core mechanism subtending to the advance of governance *by* data infrastructure in society. Second, it zooms in on the politics of technology design as a gateway to think about the loss of sovereignty and agency that this emerging mode of governance entails. Third, it exposines the tension between (political) agency and negotiability in relation to broader questions of governance by data infrastructure. Forth, it makes a modest proposal to reposition HDI away from interface usability and into infrastructural entanglement.

Regulatory Data Infrastructures: Delegating Governance to Machines

Regulatory data infrastructures are sociotechnical systems designed not only to collect and process data, but to act upon it in ways that directly shape civic life and the state machinery, including public administration. These infrastructures produce data in near-real time and feed it into algorithmic systems

Regulatory data infrastructures are sociotechnical systems designed not only to collect and process data, but to act upon it in ways that directly shape civic life and the state machinery, including public administration. These infrastructures produce data in near-real time and feed it into algorithmic systems that support—or substitute for—functions traditionally associated with human decision-makers within the state. Their defining feature lies in a dual movement: they *inform regulation* by generating data that guide policy and resource allocation, and they *perform regulation* by structuring access, eligibility, and rights through automated processes.

A striking example is the now-defunct Dutch System Risk Indication (SyRI). Designed to detect welfare fraud, SyRI integrated sensitive personal data from 17 public databases to generate individual 'risk scores'. These scores were produced through opaque algorithmic procedures and used to flag citizens—often those with dual nationality or residing in low-income areas—as potential fraudsters (Appelman et al., 2021). As noted by the UN Special Rapporteur on extreme poverty, the system operated without public knowledge or accountability, and represented a broader global trend toward 'surveillance of the poor' under the guise of efficiency and predictive governance (UN Office of the High Commissioner, 2019).

In Colombia, the System of Identification of Potential Beneficiaries of Social Programs (*Sisbén* in Spanish) was introduced to classify the poor and allocate limited social benefits to 'deserving' recipients. It scores households from 0 to 100 based on prosperity levels, determining eligibility for state-run programs. Citizens are enlisted as data providers through standardized surveys, turning Sisbén into a technopolitical experiment where poverty is rendered *legible* through quantification and policy is continually adjusted via data feedback. The system also reflects Colombia's reliance on foreign tech and consultancy firms, raising concerns about sovereignty and democratic oversight (López, 2020).

Vaccination certificates, widely adopted during the pandemic, are another example (Milan et al., 2021). These systems turned health status into a condition for mobility, employment, and access to public space—transforming public health data into a regulatory tool. They embedded assumptions about risk and responsibility, while outsourcing enforcement to actors like airlines and employers, and contributed to a broader data-centric scaffolding of governance—one that, once in place, could be readily repurposed for control beyond its original public health mandate. Beyond crisis response, they exemply how regulatory data infrastructures extend automated governance into everyday life. Like SyRI and *Sisbén*, they redistributed authority across hybrid public-private assemblages, blurred lines of accountability, and left little room for contesting decisions or opting out.

Similarly, digital identity systems illustrate how regulatory infrastructures formalize and expand state functions while introducing new dependencies on commercial and technical actors. These systems increasingly function as gateways to essential services such as healthcare, banking, or education. Thereby they restructure citizenship itself: who is recognized, what constitutes a legitimate identity, and which rights are granted or withheld. Like vaccination certs, such systems act as 'foot-in-the-door devices', laying the groundwork for future expansions in scope and control—often with limited or no public deliberation.

Together, these cases reveal how data infrastructures are not merely instruments of regulation but sites where regulatory logics are enacted, negotiated, and imposed in real time. Far from passive repositories, they are dynamic instruments that mediate the relationship between citizens and the state, configuring who is seen, how they are classified, and what treatment they receive. In turn, they reconfigure fundamental processes of statecraft and civic belonging.

Crucially, these infrastructures do more than execute policy—they help constitute a mode of governance of its own. By embedding decisions into technical architectures and enabling continuous feedback between data production, algorithmic assessment, and administrative response, they pave the way for governance by data infrastructure: an emerging logic of rule iun which institutional power is exercised through systems that automate, abstract, and often obscure their own operations. Rather than governing through deliberation and law alone, states increasingly govern through design—by shaping the conditions under which decisions are made, risks are assessed, and populations are managed.

As others have noted, the transition to algorithmic governance marks 'a shift toward a special form of design-based governance, with power exercised ex ante via choice architectures defined through protocols' (Gritsenko and Wood 2020: 45)—with profound consequences for democratic agency, accountability, and ultimately sovereignty as well.

In sum, regulatory data infrastructures are more than background systems—they are active agents in the remaking of political order. By automating decision-making, shaping social visibility, and embedding normative judgments into technical systems, they redefine what it means to govern and be governed in a datafied society. This transformation, however, invites closer scrutiny of the design processes through which such infrastructures are conceived and operationalized—processes that are far from neutral, and which embed political decisions into technical architectures from the outset.

The Politics of Infrastructure Design and the Opacity of Power

From an STS perspective, digital infrastructures are not passive tools but active sites where political decisions are encoded, enacted, and contested (e.g., Winner, 1999). Algorithms, protocols, and dashboards do not merely reflect governance priorities—they perform them. Design choices in sociotechnical systems enact governance *ex ante*: they shape how problems are framed, what solutions are deemed actionable, and which populations are rendered visible or rendered invisible (see Pelizza, 2020 for a compelling example in the realm of migration management). This anticipatory logic allows infrastructures to govern *in lieu* of policies, or before policies are formally debated or publicly legitimated.

This dynamic is vividly illustrated by SyRI, discussed earlier: as STS scholars would note, while framed as a neutral tool for efficiency, SyRI functioned as an inscription device—embedding political assumptions about deviance and risk into code, thereby precluding public debate over its normative underpinnings. As Huyskes (2025) documents, the system was not only opaque but also highly resistant to democratic scrutiny, until legal challenges and civil society interventions forced its suspension. SyRI's design effectively obfuscated accountability, shifting discretion away from public officials and into the computational logics of the infrastructure itself.

This shift poses profound challenges for how we understand and practice democracy—and to democratic theory itself. The health of democracy is widely seen as rooted in a set of formal and informal norms: from legal frameworks and institutional checks to the unwritten conventions that guide political behavior. The *normative foundations of democracy* refer to the core values and ethical principles that define how democratic systems ought to function—equality, justice, civil liberties, human rights, political participation, public deliberation, and the rule of law. These standards not only structure expectations about how power should be exercised, and also offer benchmarks for evaluating whether political decisions are fair and democratic (see, e.g., Dahl, 1998; Rawls, 1999; Diamond & Morlino, 2004).

Yet these frameworks are poorly equipped to grapple with governance processes that are technically complex, legally fragmented, and institutionally disaggregated. As technologies of governance increasingly 'black box' key policy choices and decisions about eligibility, risk, and resource allocation, citizens find themselves subject to forms of automated rule that lack transparency of recourse. What appears as a merely technical process is in fact a deeply political one—executed beyond the reach of democratic deliberation.

Moreover, access to the design and oversight of these infrastructures is highly asymmetrical. While state agencies and private contractors collaborate in the design and deployment of regulatory systems, those most affected—often already marginalized—are systematically excluded from shaping them. As Eubanks (2018) describes, this has given rise to a 'digital poorhouse', where the poor are intensively surveilled and categorized by algorithmic meanss, without meaningful channels for redress or participation.

Rather than dismissing these developments as technical glitches or policy missteps, they should be understood as indicative of a deeper transformation in governance: *from rule through institutions to regulation through infrastructure*. This shift compels us to rethink the nature of democracy itself, to account for how power is now exercised through data flows, interfaces, and design protocols. It also demands that we

politicize technology design: not as a neutral exercise in optimization, but as a contested arena where inclusion, exclusion, and control and continougly negotiated.

Contesting Systems: Citizen Agency in the Shadow of Infrastructure

As we have seen, governance *by* data infrastructure does not merely administer populations—it actively participates in the making of subjects. The classificatory and predictive logics embedded in algorithmic systems of, e.g., SyRI or *Sisbén*, encode particular visions of who counts, what constitutes risk, and how social order should be organized. These systems materialize policy goals, historical data patterns, and normative assumptions, which become sedimented in technical design. In turn, they categorize individuals and groups in ways that carry tangible, often unequal, consequences (see Masiero, 2020 for the case of biometric identification in the food distribution system in India).

But infrastructural power is not monolithic. Even though it often operates in ways and sites that are often opaque—intentionally or not—it is not immune to fracture and challenge. While regulatory data infrastructures constrain individual and collective maneuverability, they can also open spaces for contestation, negotiation, improvisation, and appropriation. Citizens, civil society actors, and frontline bureaucrats engage with these systems in often unanticipated ways—resisting imposed categories, subverting procedural logics, or creatively reinterpreting outputs. For instance, the SyRI system was ultimately struck down by a Dutch court after sustained legal action and public campaigning by civil society organizations, which exposed the system's discriminatory targeting of low-income neighborhoods and ethnic minorities (Vervloesem, 2020). In Italy, the unlawful adoption of facial recognition cameras in the city of Como was halted when journalists and digital rights activists drew public attention to the issue (Carrer et al., 2020). In Mexico, information activists countered the state's resistance to releasing open data by flloding the institution with freedom of information (FOI) requests—not only to gather evidence for strategic litigation, but to assert citizens' right to shape decision making processes (Torres, 2019). These varied everyday practices—ranging from legal mobilization to tactical adaptation—remind us that subjectivity is not simply imposed from above but can be actively negotiated within, and sometimes against, the constraints of data infrastructure.

Two of the three pillars proposed by Mortier and colleagues (2015)—agency and negotiability—offer useful entry points for thinking through the politics of subject formation and citizen navigation in such enviroments. Agency is defined as 'giving people the capacity to act within these data systems, to opt-in or to opt-out, to control, inform and correct data and inferences, and so on' (2025, p. 4). Negotiability, in turn, 'is concerned with the many dynamic relationships that arise around data and data processing', including the interplay between evolving social norms, legal frameworks, and individual attitudes.

To conceptualize this space of contestation, we must revisit the notion of agency through a sociological lens. Rather than something given or granted—either by the state or by the infratructure—agency is continuously constructed and negotiated. It refers to an intentional, reflexive practice oriented toward (political) action; in other words, the dynamic process of 'making sense of the world so as to act within it' (Couldry, 2014, p. 891). Agency is routed in the interpretive work through which individuals and social groups engage with their sociopolitical environment—shaped by values, desires, grievances, emotions, and identitarian elements, including collective identities (Milan, 2018). As Mouffe (1992) reminds us, this process unfolds not only through juridical claims on the state, but also through the quotidian politics embedded in everyday social practices.

In the context of governance by data infrastructure, agency manifests in acts of resistance, appropriation, and reinvention. Resistance, then, takes many forms. Some engage tactically—opting out of tracking systems, obfuscating their data traces, or finding ways to bypass constraints. Others adopt appropriative practices, repurposing infrastructures for new ends. Citizen science initiatives, for example, reframe data collection as a participatory process (Berti Suman, 2018); data activism projects expose algorithmic bias and demand accountability (Milan & van der Velden, 2016); participatory design efforts involving researchers, communities, and designers experiment with building infrastructures rooted in justice and inclusion (De Filippi & Treguer, 2014). Importantly, these forms of engagement often become acts of citizenship (Isin & Nielsen, 2008): interventions through which people challenge dominant scripts of

visibility and recognition. Campaigns like the European-wide *Reclaim Your Face* (2020) illustrate how citizens contest datafied governance not just by making rights claims, but by asserting new political subjectivities and demanding policy and structural change.

The third pillar identified by Mortier and colleagues—negotiability—refers toetent data systems are then open to feedback, contestation, or transformation, acting as a necessary counterpart to agency. This does not imply ease of reconfiguration, but rather recognizes infrastructure as a socially shaped and contested terrain. For example, in the UK, an algorithm used to calculate student grades during the COVID-19 pandemic was withdrawn after widespread protests, social media backlash, and civil society pressure exposed its disproportionate impact on students from under-resourced schools (Satariano, 2020). This case illustrates that even seemingly rigid infrastructures can be challenged and reshaped, revealing the political malleability and social embeddedness of regulatory data infrastructures.

In sum, the politics of human–data interaction cannot be separated from the question of who defines the terms of visibility, agency, and accountability. Regulatory data infrastructures are powerful instruments of classification and control—but they are also lived, interpreted, and contested. Attending to this dual nature is crucial for understanding how infrastructures not only govern subjects but also become arenas of subjectivation, resistance, and democratic imagination. What this duality means for how we understand HDI is the focus of the following section.

Rethinking Human–Data Interaction: From Interface Usability to Infrastructural Entanglement

Mortier and colleagues have usefully foregroundee the importance of usability, legibility, and transparency of interfaces and systems. However, this approach appears to reflect an implicit assumption: that human-data relations are primarily cognitive and functional—something to be optimized for comprehension or control. As data infrastructures increasingly underpine regulatory processes, this framing fails to capture the deeper socio-political structures and dynamics at play in human engagements with data.

This paper reframes HDI as a socio-technical entanglement shaped by asymmetric power relations and manifest in processes of subject formation, political agency, and contestation. Rather than reducing HDI to interface design, I foreground its unfolding through (infra)structural mechanisms that configure legibility, constrain or enable action, and vary in their opennes to negotion. This reconceptualization extends HDI in two key directions: by grounding it in governance practices, and by situating it within the politics of infrastructure design.

Positioning HDI within the operational logic of the state—and the public-private arrangements enable it—draws attention to how everyday interactions with data systems—e.g., checking eligibility, managing digital identities, or disputing automated decisions) have become integral to the exercise of authority. Data infrastructures do not merely support administrative functions; they perform statehood. At the same time, because they are lived and contested, they are shaped by improvisation, reinterpretation, and resistance. From resisting imposed classifications and tactically misusing identity systems to demanding data justice or repurposing open data, these practices illustrate the negotiability of HDI—not in terms of user control, but as the capacity to navigate, challenge, and reshape the normative, technical, and institutional framework that govern interaction.

To reflect this expanded understanding, I propose reinterpreting Mortier et al.'s (2015) three pillars of HDI as follows:

- Vibility, whereby data systems should be undertandable and transparent, should be reframed as *political visibility*: who is made legible to whom, under what conditions, and with what consequences?
- Instead of focusing exclusively on control over data and data access, agency becomes *situated agency*: how do users, civil society actors, or frontline bureaucrats navigate, subvert or repurpose data systems beyond the narrow issue of data control?

- Rather than only restricting the exercise of agency to the negotiation of terms of use, negotiability is expanded to include *infrastructural politics*: where are the frictions, levers, or choke points that allows systems to be contested, reconfigured, or dismantled?

Finally, the focus on user-system interfaces and design logics should be broadened to include the socio-technical and political fields in which HDI emerge and operate—in other words, the structural conditions outlined above. Moreover, the framework's implicit normative orientation should be expanded through critical and empirical ethics, to interrogate which values are encoded in (or excluded from) data systems, and whose interests they ultimately serve.

Figure 1 summarizes the conteptual shifts proposed in this paper.

Figure 1. Rethinking Human–Data Interaction: From Interface Design to Infrastructural Governance

Original HDI Pillars *(Mortier et al., 2015)*	Assumptions & Emphases	Governance-by-Infrastructure Lens *(this paper)*	Reframed Focus
Legibility	Data systems should be understandable and transparent.	Visibility is always partial, contested, and shaped by power.	*Political visibility*: Who is made legible to whom, under what conditions, and with what consequences?
Agency	Users should control their data and how it's used.	Data infrastructures shape subjects and constrain or enable action.	*Situated agency*: How do citizens, bureaucrats, or collectives navigate, subvert, or appropriate systems?
Negotiability	Systems should allow negotiation over terms of use.	Infrastructures embed path dependency and resist challenge.	*Infrastructural politics*: What are the frictions, levers, or choke points for contesting and reconfiguring systems?
(Implicit) Interface-level interaction	Centers the user-system interface and design choices.	Interaction occurs within broader sociotechnical and political fields.	*Governance field*: How is power distributed across actors, layers, and protocols?
(Implicit) Normative orientation: usability, empowerment	Envisions better design as the route to ethical systems.	Interrogates systemic conditions: outsourcing, opacity, regulation.	*Critical ethics*: What values are encoded, and whose interests do they serve?

In Conclusion

This paper has argued for a rethinking of Human–Data Interaction as a deeply political and infrastructural process. Moving beyond a narrow focus on interface usability or system legibility, it has reframed HDI as a socio-technical entanglement shaped by asymmetric power relations and materialized in acts of subject formation, political agency, and resistance. Rather than treating data systems as neutral mediators, the analysis foregrounds how regulatory data infrastructures—such as biometric ID schemes, algorithmic scoring systems, and digital welfare platforms—not only administer but actively construct the subjects they govern.

By introducing the concept of governance by data infrastructure, the paper situates HDI within broader transformations in statecraft and institutional power. These infrastructures define who is visible to the state, who qualifies for support, and who is marked as risky or deviant—often without transparency or democratic oversight. Yet, as shown through empirical illustrations, these systems are not immutable. Individuals, civil society actors, and frontline bureaucrats engage with them in situated, often unexpected ways: resisting imposed classifications, subverting procedural logics, and appropriating data infrastructures for alternative ends.

In expanding the conceptual and empirical scope of HDI, this paper contributes two key shifts. First, it grounds HDI in the operational logics of governance, highlighting how everyday data interactions are increasingly sites where state authority is enacted and contested. Second, it calls for a critical engagement with the politics of infrastructure, recognizing these systems not only as technologies of control but also as terrains of struggle, improvisation, and democratic possibility.

Ultimately, reimagining HDI in this way allows us to better account for the lived realities of data-driven governance. It invites further inquiry into how power, accountability, and agency are configured—and potentially reconfigured—through the infrastructures that increasingly shape the conditions of civic life.

Cited works

Amoore, L. (2022). Machine learning political orders. *Review of International Studies*, 1–17. Cambridge Core. https://doi.org/10.1017/S0260210522000031

Appelman, N., Ó Fathaigh, R., & van Hoboken, J. (2021). Social Welfare, Risk Profiling and Fundamental Rights: The Case of SyRI in the Netherlands. *Journal of Intellectual Property, Information Technology and Electronic Commerce Law*, *12*(4). https://www.jipitec.eu/issues/jipitec-12-4-2021/5407

Berti Suman, A. (2018). The smart transition: An opportunity for a sensor-based public-health risk governance? *International Review of Law, Computers & Technology*, *32*(2–3), 257–274. https://doi.org/10.1080/13600869.2018.1463961

Carrer, L., Coluccini, R., & Di Salvo, P. (2020, June 9). Perché Como è diventata una delle prime città in Italia a usare il riconoscimento facciale. *Wired*. https://www.wired.it/internet/regole/2020/06/09/riconoscimento-facciale-como/

Couldry, N. (2014). A necessary disenchantment: Myth, agency and injustice in a digital world. *The Sociological Review*, *62*(4), 880–897.

Dahl, R. A. (1998). *On democracy*. Yale University Press.

De Filippi, P., & Treguer, F. (2014). Expanding the Internet commons: The subversive potential of wireless community networks. *Journal of Peer Production*, *6*. http://peerproduction.net/wp-content/uploads/2015/01/De-Filippi-Tréguer-Expanding-the-Internet-Commons-with-Community-Networks.pdf

Diamond, L., & Morlino, L. (2004). The Quality of Democracy: An Overview. *Journal of Democracy*, *15*(4), 20–31. https://doi.org/10.1353/jod.2004.0060

Eubanks, V. (2018). *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*. St. Martin's Press.

Gritsenko, D., & Wood, M. (2020). Algorithmic governance: A modes of governance approach. *Regulation & Governance*, *16*(1), 45–62. https://doi.org/10.1111/rego.12367

Huyskes, D. (2025). *Constructing Automated Societies. Socio-cultural Determinants and Impacts of Automated Decision-making in Public Services* [Università degli Studi di Milano]. https://air.unimi.it/handle/2434/1163995

Isin, E., & Nielsen, G. M. (2008). *Acts of Citizenship*. Zed Books.

López, J. (2020). *Experimentando con la pobreza: El Sisbén y los proyectos de analítica de datos*. Fundación Karisma. https://web.karisma.org.co/wp-content/uploads/download-manager-files/Experimentando%20con%20la%20pobreza.pdf

Masiero, S. (2020). Biometric Infrastructures and the Indian Public Distribution System. *South Asia Multidisciplinary Academic Journal*. https://doi.org/10.4000/samaj.6459

Milan, S. (2018). Political agency, digital traces and bottom-up data practices. *International Journal of Communication*, *12*, 507–527.

Milan, S. (2024). Talking to Machines: Knowledge Production and Social Relations in the Age of Governance by Data Infrastructure. In J. Jarke, B. Prietl, S. Egbert, Y. Boeva, H. Heuer, & M. Arnold (Eds.), *Algorithmis Regimes: Methods, Interactions, and Politics* (pp. 229–238). Amsterdam University Press. 10.5117/9789463728485_ch11

Milan, S., Taylor, L., Gürses, S., & Veale, M. (2021). Promises made to be broken: Digital vaccine certification as hyperrealistic immunity theatre. *European Journal of Risk Regulation*, *12*, 382–392. https://doi.org/10.1017/err.2021.26

Milan, S., & van der Velden, L. (2016). The alternative epistemologies of data activism. *Digital Culture & Society*, *2*, 57–74. https://doi.org/10.14361/dcs-2016-0205

Mortier, R., Haddadi, H., Henderson, T., Mcauley, D., & Crowcroft, J. (2015). *Human-Data Interaction: The Human Face of the Data-Driven Society*. https://arxiv.org/pdf/1412.6159v2

Mouffe, C. (Ed.). (1992). *Dimensions of Radical Democracy*. Verso.

Pelizza, A. (2020). Processing Alterity, Enacting Europe: Migrant Registration and Identification as Co-construction of Individuals and Polities. *Science, Technology & Human Values*, *45*(2), 262–288. https://doi.org/10.1177/0162243919827927

Public Interest Litigation Project. (2022). *Top400. A top-down crime prevention strategy in Amsterdam*. https://racismandtechnology.center/wp-content/uploads/20221101-data-justice-lab-top400-report.pdf

Rawls, J. (1999). *A Theory of Justice. Revised Edition*. Harvard University Press.

ReclaimYourFace. (2020). *The problem. Secretive. Unlawful. Inhumane*. https://reclaimyourface.eu/the-problem/

Satariano, A. (2020, August 20). British Grading Debacle Shows Pitfalls of Automating Government. *The New York Times*. https://www.nytimes.com/2020/08/20/world/europe/uk-england-grading-algorithm.html

Torres, G. (2019). Institutional resistance to transparency: The quest for Public Sector Information in Mexico. *Journal of Resistance Studies*, *5*(2), 68–96.

UN Office of the High Commissioner. (2019, October 16). *The Netherlands is building a surveillance state for the poor, says UN rights expert*. https://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=25152&LangID=E

Vervloesem, K. (2020, April 6). How Dutch activists got an invasive fraud detection algorithm banned. *Algorithm Watch*. https://algorithmwatch.org/en/syri-netherlands-algorithm/

Winner, L. (1999). Do Artefacts Have Politics? In D. MacKenzie & J. Wajcman (Eds.), *The Social Shaping of Technology* (pp. 28–40). Open University Press.