The Machinery of Government: Bureaucracy, Automation and Institutional Black-Boxing

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1. Introduction

In recent years, the automation of public services through algorithms and mathematical models has emerged as a significant and controversial issue in governance globally and has become a defining feature of contemporary bureaucratic institutions. While it promises efficiency, cost-effectiveness, and enhanced decision-making, its increasing opacity raises critical questions about transparency, accountability, and democratic oversight (Pasquale 2015; Burrell 2016; Meijer et al. 2021). Analysis on the implications of the changes brought by GovTech (government technology) (Tangi et al. 2022; Misuraca & van Noordt 2022) for governance, democracy, public administration and society at large are urgent and particularly needed. However, most of these explore the general implications of automation and the use of technologies in these settings, rarely linking these reflections to the specific cultural context in which they are situated to highlight different approaches. Looking at the European context, the scenario appears very varied: some countries are far ahead on the automation of public services while others seem to have not yet chased this trend (Sun & Medaglia 2019; Tangi et al. 2022). Moreover, how this digital transformation is governed also varies from country to country.

This article takes Italy as a case study and seeks to explore the deeper institutional and cultural reasons behind its approach to the automation of public administration. The country provides a striking case to study these dynamics as it was designated as one of the top adopters of automated systems in public services (AI Watch 2022) while its approach in integrating these technologies into bureaucratic workflows remains shrouded in opacity. This is perfectly represented in the controversial Buona Scuola case, where an algorithm designed to allocate teachers to schools resulted in widespread errors, causing significant disruptions in the education system. Yet, this event has not triggered a significant precedent for future public debate or transparency on the wider use of algorithms in Italian governance. Through a constructivist methodological lens, which aims to follow actors and institutions rather than focusing only on technology (Bijker and Pinch 1987; Latour 1987; 1999) this article draws on a range of different qualitative sources to navigate the challenges of accessing information from Italian institutions. Far from being a purely technological issue, this paper argues that cultural resistance and other relevant factors within these organizations play a significant role in the black-boxing of these processes and posits that the true locus of black-boxing in the Italian case study lies in the opaque, human-driven processes that manage and obscure the use of technology within the public sector.

The article analyzes the idea of bureaucratic automation in the first section, starting from Weber's theories on bureaucracy and contemporary research on algorithmic governance and discussing the concept of black-boxing in different domains. This provides the foundation for understanding how bureaucratic processes have long been fertile ground for automation due to their focus on standardization and efficiency. The findings are discussed delving into the different institutional and legal challenges about the automation of Italian public services. The section also examines the Buona Scuola case in order to demonstrate these challenges empirically, particularly how algorithmic errors can have far-reaching

consequences when embedded in opaque systems. Finally, the paper emphasizes the cultural and institutional factors characterizing the Italian opacity around algorithms, contributing to research on algorithmic governance and the uses of digital technologies by public administrations.

2. Theoretical Background

2.1. The Machinery of Government

Public bureaucracies have long been fertile ground for technological automation. Even before today's wave of algorithmic systems and AI-driven decision-making, bureaucratic institutions were shaped by values of standardization, efficiency, impersonality, and objectivity – qualities that naturally aligned with technological tools aimed at control and optimization (Fountain 2001; Weber 1904). From early mechanization and record-keeping to the integration of decision support systems in the 1970s and e-government platforms in the 2000s, digital technologies have continually promised to make public services more accessible, efficient, and transparent.

However, this ideal has always been shadowed by tensions. While automation can enable fairer treatment by reducing discretion, it also risks amplifying opacity, disempowering citizens, and obscuring responsibility. As governments embraced New Public Management (Hood 1991), influenced by private-sector practices, the citizen became increasingly framed as a "customer", with performance indicators and data analytics driving reforms. This shift has brought about new tensions between accountability, fairness, and transparency. Today, the integration of AI and machine learning in public services further intensifies these dynamics. Scholars highlight the double-edged nature of algorithmic governance: while these systems can enhance efficiency and consistency, they can also obscure how decisions are

made and who is accountable for them (Veale & Brass 2019; Yeung 2018). As recent mappings by EU institutions show, countries like the Netherlands and Italy are at the forefront of AI experimentation in the public sector (Tangi et al. 2022), yet their approaches – and the resulting levels of transparency – differ significantly, as this paper will further explore.

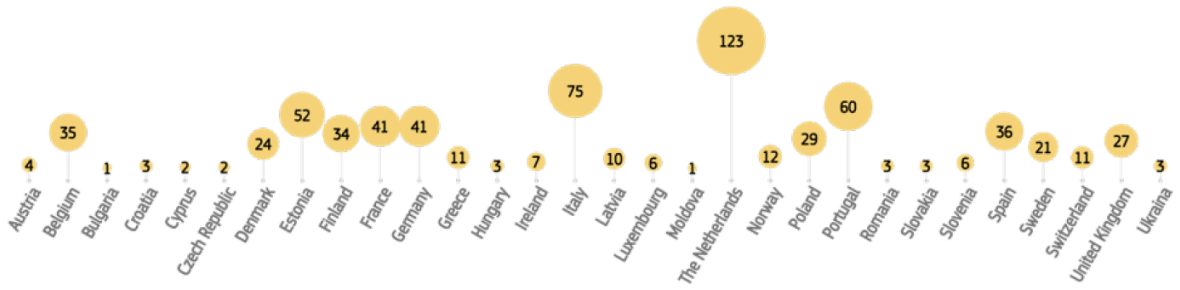

Figure 3: Mapping the use of AI in public sector in Europe (Tangi, L. et al. 2022).

Van Noordt & Misuraca analyzed several cases in order to map what are the major implications and changes in public administrations as a result of machine learning (2022).

Michael Milakovich analyzed the premises of the alleged e-government revolution in various U.S. contexts and explored the impact of new digital technologies on public service delivery and citizen participation (2011). According to the author, change in the public sector was already "limited by internal and external factors, including, among others: bureaucratic protectiveness, existing laws and regulations, political interference, privacy concerns, obsolete technologies and infrastructures unsuited for the adoption of high-level technologies. In addition, accountability, transparency and lack of trust are major problems facing nearly all governments" (Ibid.). But, if looking at the characteristics discussed in this paragraph looks like traditional bureaucracy was already so mechanized before the arrival of early forms of advanced digitization, is there anything that more recent automation trends would change? While this paper does not aim to reconstruct the

full historical trajectory of public administration, recognizing the long-standing interplay between bureaucratic rationality and technological mediation is essential. It reveals that concerns about opacity and transparency are not new, but they are reshaped by each technological turn, and today with AI. But how does this relate to the external and internal factors – identified, for example, by Milakovich (2011) – that make technological advancement in the public sector difficult?

2.2. Blackboxing as a Practice

The availability of big data and increased computing power over the years have caused the models underlying AI and the analysis that rely on them to become increasingly complex (Mayer-Schönberger & Cukier 2013). An exponentially greater amount of information, sophistication of analysis and thus in the identification of patterns and correlations have led to these systems being defined as progressively inscrutable and difficult to interpret even for those who create them (Faraj et al. 2018; Stone et al. 2016). For this reason, the black-box metaphor has returned to use in recent years to refer to the AI patterns underlying many operations (Pasquale 2015; Burrell 2016). From this backdrop, an entire field of research on explainability and interpretability has emerged to seek mostly technical solutions that would make these models more interpretable and explainable (e.g., Rosenfeld & Richardson 2016). Famously, in the years of the promised revolution in big data analytics, Frank Pasquale wrote a book that critically examined the increasing role that opaque algorithms and data-driven processes were playing in societies (2015). Almost ten years ago, Pasquale brought the metaphor of the "black box" back to describe systems whose inner workings are not visible or understandable to the public, leading to different concerns related to fundamental rights and surveillance. In various industries, algorithms were already central to decision-making processes despite the fact that they were inaccessible to public scrutiny and their incorporation into many procedures, especially in the case of government and public administrations, was not politically and publicly debated

(Pasquale 2015; Burrell 2016). One of Pasquale's and many other scholars' main concern was towards the lack of transparency and accountability of these processes, that prevent the inspection for bias, discrimination and social exclusion.

Among the first scholars to use the black box concept, back in 1987, was Bruno Latour, to describe how scientific and technological processes become accepted and stabilized in society, to the point where their internal complexities and the controversies surrounding their development are no longer visible or questioned. According to Latour, "when a machine runs efficiently, when a matter of fact is settled, one needs focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become" (1999, 304). According to him and many other sociologists working within the STS, the key to the success of technological and scientific progress lay there, and they very often made explicit their goal of "opening the black box" (Pinch & Bijker 1987). For social constructivism, the phenomenon of blackboxing – which more than a phenomenon is the way in which almost all technological development has always been conceived and treated – has been a central element of both theoretical and empirical inquiry. In fact, the black box represents not so much the technical workings, the hidden "gears" of any technology, but more the social, political, and economic factors that influenced their development and that go unseen (Ibid.). These include the networks of actors who work in different ways for that technology to be feasible, whose actions, relationships, goals, ideas, negotiations and intentions normally remain obscured (Ibid.; Latour 1987; 1999).

Less frequently, bureaucracy itself has been called a black box, although the metaphor is also perfect for referring to processes or decision-making systems that operate opaquely, that is, without the people involved (citizens, officials or even other bureaucrats) having a clear understanding of how decisions are made. This happens when the procedures, rules and internal mechanisms are so complex that

they are inaccessible or incomprehensible to those outside the system. As Latour (1999) wrote, the black box emerges when a technological process stabilizes, we begin to take it for granted, for inevitable, and we stop questioning it. Today, that instance of progress is identified with the digital transition of the bureaucratic apparatus. But what we see in many cases is that rather than progressing with technology, public administrations that become digitized risk becoming more opaque and less accountable. In the automation of government, public services, and bureaucratic practices, blackboxing is sublimated. Various opaque practices are layered until they create a dense and complex network that mixes human and nonhuman actors (Latour 1987). Algorithmic practices in the public sector are complex socio-technical systems that, in the words of Karen Yeung, "comprise computational networks, people (data scientists, software engineers, interface designers, operators, reviewers, users), organizations, norms, and practices, all connected to a broader social effort oriented toward knowledge production" (2018, 506). This structure is reminiscent of what Karen Yeung calls New Public Analytics (NPA), structures that are so complex and so oriented towards optimizing their internal processes instead of citizens' experiences, that they worsen the public good. As public analytics often involve complex algorithms and vast datasets, the decision-making process can become opaque, leading to challenges in ensuring accountability. At the same time, originally, the digitization of government always promised greater transparency as online platforms, social media, and other digital tools can facilitate greater public involvement in policy-making, leading to more informed and responsive governance (Milakovich 2011). Bovens and Zouridis documented the transition in large executive public agencies from street-level bureaucracies, to screen-level bureaucracies, to system-level bureaucracies (2002). The computer has played a symbolically important and more profound role than it may appear as it has significantly shifted the discretion that previously occurred at the street level, by one person and directed at other people, to the computer.

As different authors argued, computers can be interpreted as actors in the network (Latour 1999; Yeung 2018) or as something that rather influence the network and reframe the relationship among its members, responsibilities and competences (Wihlborg et al. 2016). As Christin (2020) notes, ethnographic methods in the study of algorithms are useful in overcoming algorithmic opacity by decentralizing the analysis: instead of focusing on the "black boxes" of algorithms, ethnographers can study how collectives of human and nonhuman actors emerge, solidify and evolve over time. The research design for this paper was inspired by this perspective. In the context of public sector automation, transparency is not solely a function of explainable code or open data; it is also deeply embedded in institutional cultures, professional practices, and shifting accountability structures. Ethnographic engagement allows to trace how transparency is performed – and at times resisted – by different actors across the lifecycle of algorithmic tools by shifting attention to the sociotechnical contexts in which these systems are designed, implemented, and contested. However, this proposal, which qualifies the active and more or less intentional role of human actors, can be complex to apply, as the next section discussing the data analyzed will illustrate.

3. Methodology

This paper adopts a qualitative case study approach to examine how the automation of public services is implemented, governed, and rendered (in)visible in the Italian public administration. The study of technology embedded in a culture, as put forward by this paper, relies on a case study approach. This will not leave aside considerations of continuity and certain cross-cutting factors common to the adoption of automated decision-making processes by public bodies, but rather it will be of greater interest to note even these similarities in the presence of very different dynamics present within single settings (Eisenhardt 1989). As reconstructed by Eisenhardt (1989), case study research has been common both in

the study of specific technological settings, innovation projects and decision-making situations. This type of research is not necessarily aimed at comparison, but rather at the possibility of gaining access to the specifics of different cases and situations within their real-life context, providing detailed insights. Italy was selected as a critical case based on theoretical sampling (Glaser & Strauss 1967) to explore the challenges of algorithmic transparency in a context where digital public service automation remains limited and opaque. Despite being one of the top adopters of algorithmic tools in public administration (Tangi et al. 2022), Italy ranks low in European digitalization indexes, including DESI, particularly in transparency and citizen-facing digital services (DESI Italy 2022). This paradox – between high uptake and low visibility – makes Italy a valuable setting to investigate how sociotechnical and institutional factors shape the governance and opacity of automation in the public sector. Lastly – to contextualize the fieldwork – it is necessary to clarify my positioning as a researcher in this field, which was shaped by prior involvement in digital rights advocacy. From 2019 to 2024, I was actively engaged with the Italian non-profit Privacy Network, where I led the Advocacy & Policy team and co-founded the Automated Administration Observatory (OAA). This role gave me access to national and European policy networks on AI, digital governance, and public sector automation, which informed both the selection of the case and my ability to identify and engage relevant actors. For instance, thanks to the work on the OAA, I was able to analyze several documents obtained through access requests under the Freedom of Information legislation (FOI) (for a detailed proposal on how to use these requests to facilitate social research, see Savage & Hyde 2012) sent to central public administrations suspected of using algorithms in the provision of public services. The purpose of the FOI procedure for the OAA was to map the use of algorithms used by Italian central public administrations in order to ensure transparency for citizens. Starting from these documents and responses received before and during the past three years of research, I was able to collect some data

on the attitude, awareness, competence and general sentiment of public administrations.

Drawing on a constructivist and ethnographic tradition in science and technology studies (Pinch & Bijker, 1987; Latour, 1987), the analysis focuses on the sociotechnical assemblages surrounding algorithmic systems rather than the algorithms alone. For example, Orlikowski's theory of technology-in-practice is particularly useful to this research approach, as it focuses the attention not primarily on the technology itself, but rather on what people – or in this case, public organizations – decide to do with it (2000). Similarly, as Christin points out, there is a lack of analysis in actual practices, while much of the debate focuses on the instruments and not their use (2017). This allows for an analysis of transparency as a situated and contested practice, embedded in organizational routines, professional norms, and institutional cultures. Fieldwork was conducted in Italy between 2022 and 2024 and relied on three main qualitative techniques: semi-structured interviews, participant observation, and document analysis. A total of 14 interviews were conducted with key informants including civil servants, public-sector technologists, legal experts, and private actors involved in public digital infrastructure. Access to interviewees was built through an initial set of privileged informants (N = 3) from Italian public bodies who had participated in or overseen automation projects across different political moments. Following a snowball sampling strategy (Noy 2008), further interviewees were identified through referrals, allowing for trust-based access to otherwise closed institutional settings.

	DESCRIPTION	CATEGORY
1	Person working at the Data Protection Authority (DPA)	Independent
2	Lawyer	Independent; Expert
3	Person who worked in a central public agency in charge of digital innovation	Public agency or institution
4	In-house company operating in the ICT sector	Public agency or institution
5	National Social Security Agency	Public agency or institution
6	Office of the Prime Minister	Public agency or institution
7	Teacher who was affected by an algorithm	Independent
8	Teacher who supported many affected colleagues and coordinated a response as a director for a trade union	Independent; Civil society
9	Journalist	Media
10	Secretary for a teachers' trade union	Civil society
11	Staff member working on the digital agenda of a political group in the Senate of the Republic	Public agency or institution
12	Research staff member at the European Commission	Public agency or institution
13	Member of a governmental commission of experts on AI	Independent
14	Person working at the Data Protection Authority (DPA)	Public agency or institution
15	Professor at a University	Academia

Table 1: A detailed list of the people interviewed for this research in Italy

In addition to interviews and document analysis, I conducted participant observation at seven relevant events, including conferences, workshops, and policy roundtables. These moments offered insight into how key actors interact around algorithmic technologies in real time (Callon 1986; Pinch and Bijker 1984; Latour 1987) – revealing not only technical framings but also negotiations, language, and power dynamics. Attending as both a researcher and, at times, a stakeholder allowed me to observe institutional attitudes and practices in context, contributing to a richer understanding of how algorithmization is embedded in socio-cultural routines.

The data collection was complemented by document analysis (including FOI responses, technical reports, and policy documents). All data were analyzed through thematic coding, identifying patterns of meaning around transparency, responsibility, and resistance to algorithmic reform in the public sector. Ethnographic access in public institutions is often constrained by organizational opacity, political sensitivity, and limited technical traceability. These limitations were

partially mitigated through triangulation of data sources and by treating restricted access itself as an indicator of broader systemic opacity. As Christin (2020) notes, barriers to understanding algorithmic governance are often cultural and institutional, not merely technical.

4. Transparency Barriers in Italian Algorithmic Governance

The primary objective of this chapter is to comprehensively understand how Italy is approaching the automation of public services, with a particular focus on how social and cultural values influence the adoption and governance of these technologies. However, despite a structured methodological approach that included interviews and ethnographic participant observation with a representative sample of informants, I encountered significant obstacles. A considerable barrier emerged when attempting to engage with certain key figures, particularly those within ministerial teams and public agencies known to be involved in algorithmic governance. Despite prior knowledge of their involvement in such practices, gained through my work within the Automated Administration Observatory project, many potential informants were unresponsive. Out of the 35 individuals initially identified for semi-structured interviews, in fact, only 14 agreed to engage. Hence, the research presented here can be viewed as a partial failure, albeit one that is revealing in its own right. It is not uncommon to encounter a situation like this when investigating algorithms, platforms, or other technological components. For example, Gandini and Bonini experienced these difficulties when they wanted to study music curators working in major online music streaming platforms (2020). The authors pointed out that much of the knowledge we have about the workings of the cultural industry comes from the work carried out by social scientists who were able to access and investigate it with ethnographic methods in the past (Ibid.). This is what ethnographic methods are intended for: to analyze certain social and cultural practices "from within", and it is also what social constructivism –

particularly in its feminist expression of gender and technology studies – recommended doing with artifacts (Bijker & Pinch 1989; MacKenzie & Wajcman 1999). For example, one study that guides this research is Cockburn and Ormrod's famous work on the microwave oven (1990). The authors, interested in investigating the social construction and in particular the influence of gender relations behind this domestic technology, compiled their ethnography through a study that "followed the actors" with a constant inside look that started from the factories and went all the way to the stores. They talked to the designers, engineers, and workers who worked to build those technologies, discovering what their intentions and values were; the legislators who regulated their production and sale; and the salespeople who had to convince customers to buy them. Today it seems that this practice, so fundamental to unveiling the values with which technologies are constructed, is increasingly difficult. Similar to Bonini and Gandini (2020), the hypothesis of this research was that by extracting information directly from the (bureaucratic) organizations that decide to employ algorithms (and then, therefore, at least theoretically, govern them) – in this case in Italy – it would be possible to motivate the use of these technologies and its methods as related to the culture they belong to. Although the kind of access to this information went differently than I expected, I cannot say that I failed to test my initial hypothesis. As Seaver already documented, "A great deal of information about algorithmic systems is available to the critic who does not define her object of interest as that which is off limits or intentionally hidden" and that "challenges to access hidden meetings, reluctant interlocutors, non-disclosure agreements are part of the field, not simply barriers around it" (2017, 7), and it is precisely in the obstacles that I found my answers.

When looking closely enough – even if "circling around" the topic from different vantage points and not from within – and accessing various sources of information regarding the governance of the algorithmization of public services in Italy, one can see that the reasons for the lack of transparency are many and varied.

Based on what I gathered in the field and from the analysis of various other sources, I propose some of these reasons, namely (i) legal barriers; (ii) lack of awareness and competences; (iii) private interests; (iv) lack of governance and strategy; (v) accountability; and (vi) bureaucratic resistance, to which I will devote individual sections in the next pages.

4.1. Legal barriers

First, it should be noted that public agencies and governments, compared to private companies, are more unlikely to be able to entrench themselves behind secrecy, if only industrial secrecy. Moreover, as one key informant working at an independent supervisory authority reported, public organizations should have different aims than private companies:

> *«When we talk about this issue (the automation of public services or bureaucratic activities) we should never forget that the public good should always be a fundamental variable of the project. Because the public is the public, it should not guarantee profits or protect products: it should act for the benefit of citizens.»*
>
> *(Informant 1, person working at the Data Protection Authority (DPA))*

Acting in the interest of citizens also means protecting them. This is the idea that justifies some of the exceptions of public transparency. One of these is the article contained in the Legislative Decree of 14/03/2013 No. 33, which regulates the right of civic access and the obligations of publicity, transparency and dissemination of information by public administrations. Within it, it is stipulated that requests for information may be refused if sharing them would jeopardize any of the public interests inherent to: a) public security and public order; b) national security; c) defense and military matters; d) international relations; e) state policy and financial and economic stability; f) the conduct of investigations into crimes and their prosecution; and g) the orderly conduct of inspection activities. After reading this list, it is quite immediate to recognize that given its breadth and comprehensiveness many requests for information can be rejected by appealing to

these interests, especially considering that the person submitting the request generally does not know the contents of the documentation and, therefore, the administration can call this article into question without any possible verification of whether there is actually a risk to the public interest. Another possible response by government offices to avoid answering this question concerns citizens' personal data. Several of the responses the no-profit organization Privacy Network received in recent years when submitting requests for the Automated Administration Observatory's mapping cited the inability to share, in particular, the Data Protection Impact Assessment (DPIA). The DPIA is required under the General Data Protection Regulation (GDPR) for every new project that is likely to involve a "high risk" to other people's personal information. Given the amount of personal data that a public administration normally holds and uses for automation projects, many public digitization projects require these assessments.

Name of the project	Owner	Documentation received
Redditometro	Agenzia delle Entrate	No
SARI	Ministero dell'Interno	No
Graduatorie GPS	Ministero dell'Istruzione	Yes
VeRA	Agenzia delle Entrate; Ministero dell'Economia	No
Frozen	INPS	No

Table 5: main active algorithmic processes in Italian public administrations and central agencies mapped by the Automated Administration Observatory up to September 3, 2024[1]

Apparently, however, these exceptions are used by administrations even when unnecessary:

«Many times, when administrations are unwilling to share the DPIA, it is because they do not have it. They therefore hide behind the excuse of not sharing personal data - when they could just obscure it from the document - because they haven't done it. It should be noted that the impact assessment under the GDPR is not always mandatory, quite the contrary. Certainly,

[1] The Observatory is accessible at: https://privacy-network.it/osservatorio/sistemi-automatizzati/

however, having it done and shared would be an important step toward transparency and accountability.»

(Informant 1, person working at the Data Protection Authority (DPA))

4.2. Awareness and competence

Thus, there exists an active intention and deliberate choice to avoid scrutiny regarding the presence of algorithms and/or automated processes. However, a second relevant aspect that emerged from the analysis of qualitative data is an unintentional, or unconscious, component related to non disclosure:

«There is a gap in awareness within public administrations about the algorithms being used, especially in the context of purchasing software solutions from vendors. Many administrations may not even realize that an algorithm is part of the solution they are using.»

(Informant 1)

This is one of the most striking pieces of evidence that emerged from the interviews and the participant observation sessions. Several people, in fact, on these occasions reiterated how widespread unawareness of the presence of these technologies is for a large number of public personnel at different levels. Many of the interviewees who were willing to speak expressed either a limited understanding of the algorithms in use within their institutions or a hesitance to discuss the specifics of these systems, often citing bureaucratic or legal constraints.

«Only a small portion of administrations are consciously using algorithms, with many relying heavily on vendors without fully understanding the technological implications.»

(Informant 1)

One of the key issues highlighted in relation to unconscious non-transparency is the lack of digital literacy within Italian public administrations:

«We are a country in which digital competence is not there...if we do not have the basic digital competencies, how can I expect that these are all systems they can govern?»

(Informant 3, person who worked in a central public agency in charge of digital innovation)

The lack of specialized technical expertise is a significant issue within the public administration, another informant stressed:

«There is an a priori adverse selection: the administration does not hire computer scientists but lawyers and economists in the best case. People like me are the exception, and we are here because in fact we came through agreements with private companies.»

(Informant 5, person who worked for the National Social Security Agency)

Without the necessary skills, administrations are unable to critically assess the solutions they are implementing, leading to a high probability of misuse of technology. Analyzing the collected data, lack of expertise emerges as the first reason for distrust and skepticism about the implementation of algorithms and other IT infrastructure useful for policy-making and important decision-making processes in public services. In all the opportunities for open discussion and participant observation, conferences and meetings with various officials from public agencies and ministries and external experts that I have been able to attend, the issue of competencies has always emerged. Even in the National Strategy it is recognized as a problem, and in fact it is proposed "a training system that aims at excellence, on the growth of talent possessing skills consistent with the emerging scenario and the efficiency of Public Administration services through the introduction of AI solutions" as cross-cutting priorities (AgiD 2024, 5). Despite

this, speaking with some of the stakeholders, no structural solution appears to be planned to modernize the professional figures involved in the digitization of public agencies and significantly increase their skills, except with one-off courses that delve into the topic of AI.

4.3. Private interests

To analyze the adoption and use in Italy's central public administrations of artificial intelligence (AI) algorithms and systems, I realized almost immediately that it was not enough to simply engage with public actors. It was crucial to also talk to private actors, the real executors and controllers of public algorithms in Italy. This, in terms of personal data, requires special attention:

> *«It's hugely important keeping data within the control of public institutions rather than outsourcing to private companies, which may pose risks related to data privacy and sovereignty. All our data is stored by Google, Microsoft etc.»*
>
> *(Informant 5, person who worked for the National Social Security Agency)*

Moreover, in Italy, there are several large service provider companies that are juridically private but are controlled by the State, in some cases even completely. This is also the case with technology service providers. The fact that these are always external companies, even if they are state-controlled, leads to a risk of over-reliance:

> *«I would say that, first of all, my suspicion is that the public administration does not always know how to use an algorithm because most of the public administrations are in the hands of service providers from this point of view. So they buy a solution, and the dynamic of operation, the technology behind that solution, they know nothing about.»*
>
> *(Informant 1)*

Public administrations rely and depend extensively on these providers. That of external providers is a significant role. They often drive the process more than the public administrations themselves, as one person working for one of these companies told me:

«Dependence on outside vendors highlights a potential weakness in the public administration's approach to technology. Without a strong internal capacity to manage and understand these technologies, the government becomes dependent on external contractors, who do not always prioritize the public interest or fully meet the administration's needs.»

(Informant 4, person working for a state-controlled company operating in the ICT sector)

Furthermore, agencies normally adopt technologies because companies propose it to them, convincing them commercially of its usefulness. It is rarer for the need to arise within the administration. This leads to a lack of decision-making sovereignty on the part of the administrations themselves and further reinforces over-reliance on external partners:

«The relationship between public administrations and private companies is characterized by an imbalance of power, with private companies often taking the initiative to provide solutions without adequate oversight or understanding on the part of the public sector.»

(Informant 6, person working at the technical office of the Prime Minister (Presidenza del Consiglio dei Ministri)

So a vicious cycle is set in motion: by outsourcing, public agencies do not invest in in-house expertise, all of which results in not only the development, but also the monitoring and governance of these tools remaining outside the public administration:

«A loop starts because the automated or algorithmic process is often driven by immediate needs, such as simplifying bureaucratic tasks or adhering to new regulations. However, these solutions are sometimes adopted without a deep understanding of their impact or even an awareness that an algorithm is involved, because everything happens really fast and they rely on companies' promises.»

(Informant 2, lawyer)

And so, the vicious cycle ends exactly as it began: with general unawareness.

«The administration, in good faith, does not know that it is using an algorithm...the user, the administration, may not even perceive it, in many cases, they do not perceive it.»

(Informant 1)

4.4. Governance and strategy

The implementation of algorithmic processes in Italian public administration is often reactive rather than proactive. In particular, from the data, and especially from the analysis of official documents released by the Agency for Digital Italy (AGiD) in recent years, such as the last National Strategy on Artificial Intelligence, two aspects emerge that are particularly relevant for the purposes of this article: (a) the absence of a strategic plan, because there is much mention of investments and a national industrial plan but no detail of how - beyond development and economics - the adoption and governance of these processes are to be managed; (b) a thorough understanding of its implications, because there is no explicit mention in the documents of strategies for managing or observing the societal implications of introducing AI into public services (Agid 2024). Moreover, there is a notable gap between the policies and their implementation on the ground:

«Execution often falls short due to outdated systems and resistance from those responsible for implementing these policies. This is not a country where you can innovate. At some point, everything comes to a standstill. As with the creation of 3-i, which is also promised in a government act, which is still not there and has become a mere bureaucratic exercise of funds allocated and people moved around.»

(Informant 5, National Social Security Agency)

3-i S.p.a is the first Company with wholly public capital and participation that brings together the IT skills and services of Public Administrations and in particular three national institutes: for social security (INPS), for accidents at work (INAIL) and for statistics (ISTAT) to "develop technological innovation, interoperability, optimizing investments and ensuring increasingly high levels of security and cybersecurity in the delivery of digital public services". Promised in 2021, three years later it is still not operational, although there is a specific website announcing it.[2] Automation is perceived as a tool for efficiency, but there is a mismatch between its adoption and the understanding of its broader impact. The consequence for the absence of sufficient foresight or planning is a substantial lack of transparency and accountability, which increases the risk of inefficiencies and potential problems related precisely to social impacts.

4.5. Accountability

The reluctance to disclose the use of algorithms reflects a deeper issue with transparency in public administration. The Italian Data Protection Authority (DPA) noted that algorithms are not always managed or disclosed in ways that meet privacy regulations. In case these processes are found to violate citizens' rights or if they result in discriminatory outcomes, this could lead to significant legal repercussions. All of this suggests that these matters are not talked about within administrations, and that technological innovation is a goal in its own right and not something integrated or to be integrated into pre-existing processes:

«There is a certain reluctance to declare it...what might seem like a human error, obviously, it's hidden behind the system.»

(Informant 2, lawyer)

[2] https://www.3-i.gov.it/

The informant speaks with this certainty that a human error is attributed to the system because indeed in recent years, in Italy, in cases where a public algorithm jumps to the headlines, it is made responsible and, in a sense, humanized by attributing blame or credit to the software or calculation itself. The tendency to "blame the algorithm" is certainly not a typically Italian attitude. As shown, for example, by Maasland and Weißmüller, in various contexts algorithms are given the most "unpleasant" tasks so that they can then be blamed for errors, unethical or discriminatory choices (2022). In this way, rational calculation justifies unethical conduct that no longer passes for human beings. Doing so, however, contravenes one of the most important principles of modern algorithmic governance, namely that of leaving the ultimate decision - and thus responsibility - to the human, also mentioned in the latest National Strategy (Agid 2024) and in an important court ruling, as will be detailed below.

4.6. Bureaucratic resistance

Automation is not necessarily seen as a solution by Italian public administrations. Although we can certainly say that there is a general interest with respect to its use and that it is growing (the Automated Administration Observatory, for example, has intensified its work over the years due to a growing attention to the topic but also in the number of technologies adopted), the rate of interest and adoption found in Italy is not comparable to that of other European countries in public administrations, such as the Netherlands. Going back to the mapping done by Tangi et al. for AI Watch (2022), there appears to be a large gap between the cases detected and the awareness of the Italian public sector with respect to automated processes:

«In general, automation seems more of a challenge than a solution within public administration.»

(Informant 5)

While it offers an opportunity to streamline processes and reduce manual labor, there is skepticism about its impact on jobs and what it might cause on the overall functioning of the administration. This is probably related to the lack of expertise within organizations to "lead" these projects from a strategic perspective as well. Another piece of evidence relates to the type of automation most prevalent in the processes of Italian public bodies, which has so far been limited to very simple techniques. Mostly, in fact, these are basic algorithms, simple mathematical formulas and rules that are coded. The last AI Watch report decided to include these in a broader definition of AI, while today they would not fall into the scope of the definition provided by the European Artificial Intelligence Act (AI Act). Despite this, transparency regarding their existence and use remains unsecured. Quite remarkably, last year we received a response to a FOI request that adds an interesting element to this scenario. As is our practice, we were asking one of Italy's most important government agencies for information with respect to the active or inactive status of an algorithm that had been reported to us, and the administration replied that they "did not use algorithms, only computer systems" and therefore would not share the information. Despite the terminological confusion, a computer system is something even more complex than an algorithm, in that it encompasses software and hardware elements and, as an infrastructure, could also accommodate multiple algorithms.

All these shortcomings contribute to the difficulty of implementing and managing automated processes effectively. As a result, public administrations are afraid to fail. A key actor who witnessed these sentiments from the inside highlights the role of bureaucracy as a significant barrier to the effective implementation of technology:

«We currently experience a public administration that is basically schizophrenic, hovering between maintaining traditional processes and trying to incorporate new technologies.»

(Informant 4, person working for a state-controlled company operating in the ICT sector)

This creates a situation where technology is introduced but not fully integrated into decision-making and operational processes, leading to increased complexity rather than simplification, as he/she stressed:

«Bureaucracy is a stopping force that puts the brakes on any kind of activity.»

(Informant 4)

The persistence of traditional bureaucratic structures and mindsets seems to be one of the main notable obstacles to the adoption of new technology. This is particularly evident when, for example, automation occurs on already problematic bureaucratic bases, or on procedures on which critical issues have already been found:

«Even when technology is adopted, it often adds layers of complexity rather than streamlining processes, as seen in the example of SPID (Public Digital Identity System), which is overly complex and not easy to use.»

(Informant 4)

Thus, on the one hand, there is a resistance to changing pre-existing procedures, and on the other hand, there is a belief that forms of digitization can be introduced without adapting processes:

«There is strong resistance to digitization within the public administration, often rooted in cultural and bureaucratic inertia. Many decision makers prefer to maintain the status quo, in part because of a lack of technical understanding and fear of losing control over processes.»

(Informant 6, person working at the technical office of the Prime Minister (Presidenza del Consiglio dei Ministri)

Importantly, this was also emphasized by a key actor working for the European Commission who contributed to the mapping of European administrations and their relationship with automation for the AI Watch:

«The Italian public administration tends to be more resistant to the adoption of new technologies compared to other European countries.»

(Informant 12, research staff member at the European Commission)

This resistance is deeply rooted in bureaucratic culture and reluctance to innovate, which contrasts with the more forward-looking and innovative administrations of countries such as the Netherlands. Looking at a specific case of algorithmization in the Italian context can help to better understand the scenario that has been built so far around these technologies. In particular, in the next section, I will describe and summarize the setting related to the facts that marked the first case of algorithmization of public procedures and led to several problems. Among them, several of those discussed in this section emerge.

4.7. A Lesson from the Algorithm: the Buona Scuola Case

In 2015, the Italian government introduced the "Buona Scuola" reform, which included the mass recruitment of approximately 100,000 precarious teachers via an algorithm meant to assign tenured positions based on teacher preferences, scores, and curricula. However, the system produced significant mismatches, with many teachers assigned to schools far from their preferences – often across the country – triggering what was described as a teacher "exodus" from South to North (Zunino, 2019). The opacity of the process and lack of clarity on how scores were calculated led to widespread dissatisfaction and legal appeals. For example, one of the concrete impacts of this procedure was to favor teachers with less experience and

lower scores (but perhaps younger) rather than those with higher scores and experience.

In 2019, Italian administrative courts ruled on the case, criticizing the Ministry for delegating decisions to an algorithm that lacked human oversight. The algorithm was described as technically flawed and incompatible with constitutional guarantees, establishing for the first time judicial principles requiring human review in automated decision-making. According to the Regional Administrative Tribunal (TAR) of Lazio, in the case of Buona Scuola, it was a "serious administrative flaw" to leave decision-making power to an algorithm that was not checked and validated by humans in its outputs and that a technical report from the Court described as "confusing, lacunose, ampullary, redundant, elaborated in two different programming languages, one of which dates back to the prehistory of computer science, built on input data managed in the wrong way" (Zunino 2019). The case became a cautionary example in Europe and remains a cultural reference point in Italy's debate on automation in public administration. According to one interviewee from the public sector:

«In my opinion, the Buona Scuola and everything that happened afterwards - the rulings, the courts, the media attention and resonance even outside of Italy - has set a strong precedent in Italy. It showed how translating administrative and bureaucratic practices into mathematical language is nothing obvious and simple, and it created fear in administrations.»

(Informant 4, person working for a state-controlled company operating in the ICT sector)

Interviews conducted for this research indicate that the Buona Scuola significantly shaped institutional attitudes toward automation. Some officials described it as a precedent that instilled fear and hesitation within administrations, highlighting the risks of encoding flawed procedures without adequate human deliberation. Despite this, the Ministry of Education has continued to use algorithms to manage teacher recruitment through national rankings (GAE, GPS), though reports indicate persistent errors and perceptions of unfairness (Bizzini,

2023). As one affected teacher noted, even those with top scores were sometimes allocated part-time roles over lower-ranked peers, undermining trust in the system's fairness:

> *«The algorithmic system that allocates teachers is often perceived as unfair and arbitrary. Despite having higher scores and ranking in the first tier, I was assigned a part-time role, while lower-scoring teachers received full-time positions. This points to a lack of transparency in how the algorithm functions, frustrating those who rely on it for fair treatment.»*
>
> *(Informant 7)*

In 2022, the Privacy Network team submitted two FOIA requests to the Ministry of Education regarding the algorithm's functioning. In a surprising move – unprecedented in Italy – the Ministry provided full documentation, including the algorithm's code. This act of transparency echoes similar developments in the Netherlands following public pressure after the Toeslagenaffaire (Casimir-Braun et al. 2023), and suggests that direct public scrutiny and institutional memory of controversy may encourage openness.

5. Behind Closed Doors: Measuring Technological and Institutional Black-Boxing

As Wieringa (2023) points out, public accountability is severely challenged by algorithmization, especially when these systems are opaque and difficult to scrutinize. Having closely observed the contexts in which public decision makers work around major central agencies, their intentions, and having followed some of the cases involved, it emerges that generally these processes are opaque and difficult to access. This is so regardless of the level of technology, algorithmic and technical sophistication. As reported in the theoretical background, Max Weber and many others already recognized bureaucracy as a technology of control. Processes are optimized, the relationship with the public becomes more

client-based, and the citizen is rarely seen in its specificities but more as a number. The bureaucratic apparatus, the machinery of government originates to serve for efficiency and rationalization, and because of this, algorithmization resides in its very purpose, and automation is nothing more than its sublimation. In this genealogy, as many previously identified (Milakovich 2011; Kolkman 2020; Vydra and Klievink 2019), there are several limitations and barriers to an enabling use of digital technologies.

Bureaucratic processes are much similar to statistical ones as they operate with structured objectives but are inherently opaque, often resulting in a system that neither the public nor administrators fully understand. One interviewee captured this perfectly:

«(Technological) processes are 90% undocumented, 100 percent unshared, and least of all explained.»

(Informant 4)

All of this, focused on the Italian case, demonstrates the various phases of a single loop that shows back the inextricable nature of technological and institutional black-boxing, which together amplify the complexity of these systems and reinforce one another. If bureaucratic structures can cause harm and negative impacts in subtle and intangible ways, the automation of these procedures - when they already start as problematic - through mathematical models could result in unprecedented levels of injustice (Eubanks 2018).

Probably the most problematic consequence is what another informant, thinking more generally about the automation of bureaucratic processes, reported to me:

«If you don't know what's wrong, you can never put it right.»

(Informant 28)

There are concerns about the legal and political responsibility for errors or issues arising from the use of automated systems. Since Frank Pasquale's (2015) *The Black Box Society*, where he warned about the growing opacity of automated systems, and the discourse around black-box algorithms, we have become very accustomed to taking almost for granted the impenetrable nature of the technical features that underlie them. My sense is that by doing so we are supporting those who should be in control and doing the most to ensure transparency, understanding and governance of the processes and instead have the excuse to hide behind the complex nature of these systems. The Italian case, in its entirety, shows this well: despite the technical simplicity, damage can be done and continues to be done if the skills and governance structures are not adequate. However, one cannot simply blame an algorithm for the problems that have arisen, for which instead several actors bear responsibility. The reluctance of ministerial teams and public agencies to engage in this research underscores an institutional opacity that mirrors the technological black-boxing of automated systems. The difficulty in accessing these informants, therefore, represents a crucial finding in itself. It suggests that the processes governing the use of algorithms in Italian public services are not only technologically opaque but are also institutionally, and at least partially intentionally, black-boxed. Furthermore, it suggests a broader cultural resistance within Italian institutions to scrutinize and critically assess the role of automation in governance. The question which arises is: what if it is the lack of institutional transparency that makes these technological processes opaque, and not the other way around? At the expense of the more recent and mainstream narrative of algorithms as black boxes, this evidence is more akin to what Latour originally noted, namely that the black box does not so much represent technical functioning but rather the social, political and economic factors that surround it, the actors that govern it and the actions, goals and ideas that drive it (1987; 1999). Along these lines, this research

shows that even in the face of a partial failure related to accessing direct data on technologies and their governance, it is still possible to obtain important information - by adapting the methodology, inspired by constructivist ethnography, to the practice of "scavenging" information (Wieringa 2023) - and reconstruct the human opacity that intersects on different levels with the algorithmic one. In most cases, instead of studying institutions as black boxes, there is a tendency to shift the focus to technology and blame it for its lack of transparency, justifying the inability to access insights and knowledge about the underlying processes. Notably, this narrative deflects responsibility away from institutions, reducing public accountability. Focusing on the institutional barriers to technological transparency also allows us to unveil the cultural factors that perpetuate this lack of openness in the face of increasing automation.

6. Conclusion

This paper has examined how bureaucratic automation in Italy is shaped not only by technical systems but, crucially, by institutional cultures and governance practices. Bureaucracies have long aimed for standardization and efficiency, and with the advent of algorithmic tools, these tendencies have intensified—often at the expense of transparency and accountability. While much of the literature on algorithmic opacity focuses on the technical complexity of models, this research shows that opacity is equally a product of institutional choices and organizational resistance to scrutiny.

Through the Italian case – particularly the Buona Scuola incident – it becomes evident that black-boxing is not only technological but deeply institutional. Errors in algorithmic teacher placement revealed how public administrations can obscure responsibility by attributing failures to machines, while resisting deeper reflection on governance practices. Interviews and fieldwork further illustrate a widespread

reluctance within institutions to engage openly with automation, driven by factors such as political risk aversion, lack of digital literacy, and entrenched bureaucratic norms.

This study argues that improving transparency in algorithmic governance requires more than technical fixes – it demands a cultural and institutional shift. Rather than viewing the algorithms themselves as inherently inscrutable, the lack of transparency is equally, if not more, a product of institutional practices that obscure decision-making processes related to the use of such technology and thus need more specific attention for research. The significance of these findings lies in the profound impact that institutional black-boxing can have on governance, public trust and future technologies. The black-boxing of these processes allows institutions to deflect responsibility, framing failures as purely technological rather than acknowledging the institutional failures that contribute to these errors. Italy's experience offers a cautionary example for other countries: without structural accountability and a willingness to open institutional black boxes, the promise of fair and responsible automation remains elusive.

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