

Fascicolo ad uso esclusivo di Paola Coppola (v.pareto@economia.uniroma2.it)



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EDITORE**

Dynamic capabilities as paths to organizational readiness for digital transformation: an analysis of the NRRP horizontal reform “public administration digitalization”

Le capacità dinamiche come percorsi abilitanti alla trasformazione digitale: un’analisi della riforma orizzontale del PNRR “digitalizzazione della pubblica amministrazione”

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Summary: 1. Introduction – 2. Dynamic capabilities of public sector organizations: a theoretical underpinning to organizational readiness for digital transformation – 3. Measuring organizational readiness for digital transformation – 4. Research design – 5. Assessing the NRRP horizontal reform “public administration digitalization” through the organizational readiness framework – 6. Conclusions

Negli ultimi due decenni, l’adozione delle tecnologie dell’informazione e della comunicazione si è dimostrata vantaggiosa per le organizzazioni erogatrici di servizi pubblici, abilitandole alla trasformazione di molti servizi tradizionali in servizi automatizzati o di tipo “smart”. Esempi di tali utilizzi includono la didattica a distanza per gli studenti, le relazioni a distanza tra pazienti, famiglie e medici, e il c.d. “smart working” per i dipendenti pubblici. Il perseguimento di tali obiettivi ha portato diversi Governi a dare priorità alla trasformazione digitale nei loro programmi di riforma. Tuttavia, l’attuazione della trasformazione digitale nelle organizzazioni del settore pubblico richiede di “essere digitali” che non equivale a digitalizzare, ossia alla semplice conversione di dati analogici in formato digitale. Una tale trasformazione richiede lo sviluppo di capacità dinamiche specifiche che rendano un’organizzazione pronta a attuare la trasformazione digitale. Per indagare questo processo di trasformazione, questo scritto adotta il concetto di “organizational readiness” al fine di valutare la riforma orizzontale del PNRR “digitalizzazione della pubblica amministrazione” con l’obiettivo di comprendere quale logiche organizzative e manageriali, risorse e processi portino alla creazione di valore pubblico attraverso la digitalizzazione. La nostra analisi illustra come l’integrazione delle capacità dinamiche di tipo tecnologico con le competenze digitali delle risorse umane fornisca percorsi per le organizzazioni del settore pubblico per passare da una mera “digitalizzazione” a una diffusa “digitalizzazione”, consentendo una migliore appropriazione del valore pubblico da parte dell’utente finale, della comunità e dei professionisti che operano nell’ambito dei servizi pubblici.

Parole chiave: capacità dinamiche, trasformazione digitale, organizational readiness, PNRR

Keywords: Dynamic capabilities, Digital transformation, organizational readiness, Public value creation, National Recovery and Resilience Plan

Mots clés: capacités dynamiques; transformation digitale; digitalisation, PNRR

Over the last two decades, the adoption of information and communication technologies has proven beneficial to public deliveries allowing organizations to transform many traditional encounters into automated or smart services. Examples of such usages include online student classes, remote patient-family physician relationships, and from-home work for civil servants. Pursuing such goals has led several governments to prioritize digital transformation for their reform agenda. However, implementing digital transformation in public sector organizations does not equate to digitizing, i.e., the simple conversion of analog inputs into digits but “being digital”. Such a metamorphosis demands the development of specific dynamic capabilities which make an organization ready to implement digital transformation. To investigate such a transformation process, the paper adopts the organizational readiness framework to assess the NRRP horizontal reform “public administration digitalization” with the intent to reveal which organizational and managerial logic, resources, and routines lead to public value creation through digitalization. Our analysis illustrates how integrating technological-driven dynamic capabilities with human resources digital skills provides paths for public sector organizations to move from a mere “digitization” to a pervasive “digitalization”, enabling superior public value appropriation by the user, community, and service professionals.

Au cours des deux dernières décennies, l’adoption des technologies de l’information et de la communication a été bénéfique pour les prestations publiques, permettant aux organisations de transformer de nombreuses rencontres traditionnelles en services automatisés ou intelligents. Des exemples de tels utilisations incluent des cours universitaires en ligne, des relations à distance entre les médecins de famille et leurs patients ainsi que le travail à domicile (home office) pour les fonctionnaires. La poursuite de tels objectifs a conduit plusieurs gouvernements à prioriser la transformation digitale dans leur programme de réforme. Cependant, la mise en œuvre de cette transformation au sein des organisations du secteur public ne se résume pas à la numérisation, ex., à la simple conversion d’entrées analogiques en chiffres, mais à «être numérique». Une telle métamorphose exige le développement des capacités dynamiques spécifiques qui rendent une organisation prête à exécuter la transformation digitale. Pour analyser un tel processus, l’article adopte le cadre de préparation organisationnelle pour évaluer la réforme horizontale du PNRR “digitalisation de l’administration publique” dans le but de révéler les logiques organisationnelles et managériales, les ressources et les routines qui portent à la création de valeur publique à travers la digitalisation. Notre analyse illustre comment l’intégration des capacités dynamiques en technologie avec les compétences digitales des ressources humaines offre des chemins aux organisations publiques pour passer d’une simple “numérisation” à une “digitalisation” généralisée, permettant une appropriation supérieure de la valeur publique par l’utilisateur, la communauté et les professionnels du service.

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1. Introduction

Over the last two decades, the adoption of information and communication technologies has been beneficial to the functions of public sector organizations (Matheus et al., 2020; OECD, 2003, 2017; West, 2004). More recently, the contribution of digital technology became remarkably evident to the public when the COVID-19 pandemic outbreak (Crahay et al., 2021). In such an emergency condition, the public has found the availability of digital assets and the managerial capacity to prompt them crucial factors in preventing public service disruption (Mazzucato & Kattel, 2020). What we all experienced during the lockdown provides a vivid example of how digital means are vital for ensuring fruitful interactions among public service users and providers (Russo et al., 2022).

In fact, the intensive use of digital technologies (Lindgren et al., 2019) may allow public sector organizations to transform many traditional “public encounters” (Goodsell, 1981, p. 3) into automated (Kattel et al., 2020) or “smart” (Timeus et al., 2020) services. Examples of such usages include online classes for students, remote patient-family physician relationships, and from-home work for civil servants. Through digitalization, public sector organizations may improve public value in terms of efficiency (e.g., information gathering, control, and distribution), effectiveness (e.g., service accessibility), and impacts (e.g., service time) on the final user. The pursuit of public value has led several governments to make digital transformation a priority for their reform agenda (Mergel et al., 2019) so as to transform their “internal processes and [...] the relationships between governments and other social and political actors” (Luna-Reyes & Gil-Garcia, 2014, p. 545).

However, implementing digital transformation in public sector organizations does not equate to digitizing, i.e., the simple conversion of analogue inputs into digits. Digitalization refers to “the manifold sociotechnical phenomena and processes of adopting and using these technologies in broader individual, organizational, and societal contexts” (Legner et al., 2017, p. 301). This means that the challenge for public administration digital transformation is not decoupling information from physical records by streamlining production, storage, transmission, and distribution systems (Tilson et al., 2010) but “being digital” (Bhimani, 2021). Such profound metamorphosis cannot be achieved as a discrete process; instead, it demands the development of an organizational “ability to build, integrate, and reconfigure internal and external competencies to address rapidly changing environments” (Teece et al., 1997). In this sense, public administration is greatly challenged as several forces impact its traditional ethos (Ongaro & Ferlie, 2020), creating the risk of fragmentation and discontinuity, which jeopardize public value creation. To limit fragmented and inconsistent policy responses to wicked societal problems (Head & Alford, 2015; Levin et al., 2012), digital technologies may support pub-

lic administration in the governance of complex programs (Bache & Flinders, 2004; Christensen & Lægreid, 2010; Osborne, 2010).

This entails rethinking the civil service activities, roles, and functions so as to develop innovative capabilities to adapt, learn, manage, and govern technological advancements as they occur (Cordella & Paletti, 2019; Margetts & Dunleavy, 2013a; Mazzucato & Kattel, 2020). Such capabilities are essential for two main reasons. First, digital transformation is becoming a priority for managers and policy-makers as it greatly innovates many professional traits of people working in organizations. In fact, the availability of disruptive digital technologies (e.g., robotics, automation, and cloud) is simplifying – if not replacing – highly repetitive working tasks (Mintrom et al., 2022). Second, digital transformation interfaces with accounting, shaping its practices and language (Bhimani, 2020, 2021; Quattrone, 2016), and with public service delivery (OECD, 2017), demanding new spaces, techniques, and logic of provision (Lember et al., 2019; Trischler & Westman Trischler, 2022). In the current technological landscape, big data repositories provide insights into public issues affecting socio-ecological systems, but their use requires specific knowledge to be harnessed by decision-makers (Funk et al., 2022; Giest, 2017; Young, 2020). Also, the rise of artificial intelligence has brought ethical and behavioral problems to public administration, requiring competencies to disentangle value-laden translation of desired outcomes into lines of code (Bracci, 2022).

These arguments have motivated our interest in understanding two issues. What managerial and organizational capabilities should the public administration develop to be ready to implement digital transformation? To what extent the reform “public administration digitalization” of the National Recovery and Resilience Plan is developing such capabilities? We posit what follows to make these questions the thrust of this article.

From a conceptual perspective, organizational readiness for digital transformation is regarded in this paper “as an organization’s assessment of its state of being prepared for effective production or adoption, assimilation, and exploitation of digital technologies” (Lokuge et al., 2019). To elaborate on this view, we make organizational readiness for digital transformation contingent on specific dynamic capabilities, i.e., a set of organizational and managerial logic, resources, and routines (Eisenhardt & Martin, 2000; Mazzucato & Kattel, 2020; Teece et al., 1997; Zollo & Winter, 2002).

Such a concept is an established understanding in the management literature, with most of the scholarly investigation focusing on the role of dynamic capabilities in sustaining performance (Amit & Schoemaker, 1993; Lin & Wu, 2014; Teece et al., 1997) and digital transformation (Ellström et al., 2022; Kindermann et al., 2022; Warner & Wäger, 2019) in the business context. Though such a relationship has proven valid in the private sector, there is a paucity of parallel studies in public sector organi-

zations (Kattel, 2022; Mazzucato & Kattel, 2020; Piening, 2013). Such a gap sets the context for our empirical investigation. As digitalization is an overarching goal for public sector organizations, the concept of dynamic capabilities holds an explanatory potential to reveal how internal resources may be built up and deployed. Through them, public sector organizations set out for a diffuse and pervasive digitalization, enabling value creation for individuals, the community (Osborne, 2020), and the service ecosystem (Laitinen et al., 2018; Ng & Vargo, 2018). Understanding how digitalization reform may support public value creation is relevant for our field of analysis since the success or failure of public sector organizations does not relate to market or competition.

To investigate the specific horizontal reform “public administration digitalization¹” of the National Recovery and Resilience Plan² (NRRP), we adopt the “digital readiness framework”, which provides methodological guidance to assess the digital transformation of public sector organizations (Agostino & Costantini, 2022, p. 1141). More specifically, the framework dimensions target specific organizational and managerial capabilities deemed critical for implementing digital transformation in the machinery of government. As a result, our analysis sheds light on the paths that make an organization ready to harness digital transformation. Along this way, we provide insights into how digitalization enables public value creation.

After the introduction, section 2 discusses the role of dynamic capabilities as drivers of organizational readiness for digital transformation in the public sector. It illustrates why dynamic capabilities enable digital transformation and a systemic introduction (i.e., scope and intensiveness) of technological advancements in the public domain. To measure such capabilities, we adopted the “digital readiness framework”, as illustrated in section 3. Then, section 4 explains the research design, while section 5 covers the analysis and the discussion to provide insights into how digitalization enables public value creation. In section 6, we respond to our research questions with findings and implications. Also, limitations and future research avenues conclude the paper.

2. Dynamic capabilities of public sector organizations: a theoretical underpinning to organizational readiness for digital transformation

The spread of digital technologies into the contemporary reality of public administration has brought remarkable changes, whose effects have been

¹ Such reform aims to consolidate new digital skills of civil servants, accelerate investments in digitalization and begin using new infrastructure and applications to achieve further public NRRP goals, such as improving recruitment procedures, managerial capacity, reducing red tape, and the weight of bureaucracy in public service delivery.

² The NRRP is a complex policy program recently adopted by the Italian Government within the Next-generation EU funding framework in order to cope with the current socio-economic distress caused by the COVID-19 pandemic.

– not infrequently – misunderstood by practitioners as a mere shift from an analog-based to a digitally rooted service (Newman, 2017). Such a modernizing approach to digitalization is “accompanied by a sense of techno-optimism” (Trischler & Westman Trischler, 2022, p. 1251), implying the risks of overlooking the implications for public value creation processes (Lindgren et al., 2019).

As the complexity of the policy issues affecting contemporary societies increases, public sector organizations and the decision-makers therein struggle to learn and experiment (Vignieri, 2019) with new policy initiatives capable of generating public value (Moynihan et al., 2011; Vignieri, 2022). Effective management narrows a series of gaps influencing the sharing of information, skills, and resources and implies the development of “patterned organizational behavior of learning and change” (Kattel, 2022, p. 6). In management studies, value generation has been associated with the development of distinctive organizational and managerial capabilities (Coda, 2010; Ruggiero, 2011) whose endowments are built up and deployed over time through several layers of flows hierarchically ordered (Bianchi, 2016). Such a change process affects all the tangible and intangible organizational assets, including those committed to exploiting them within the scope of particular “organizational functions” (Catturi, 2003, p. 335). The idea that resource endowments change over time, even inertially, is embodied in the dynamic capability theory.

As outlined in the introduction of the paper, dynamic capabilities constitute precursors for public sector organizations aiming to be digital as they “help organizations change their resource configurations” (Klievink & Janssen, 2009, p. 276), in order to pursue their desired transformation gradually. In fact, as a novel contribution to the resource-based view (Barney, 1991), dynamic capability theorists proved that resources are not static, but they are “dynamic” alike the environments in which they are being deployed (Bianchi, 2016; Bianchi & Vignieri, 2020; Panagiotopoulos et al., 2019). Such innovative understanding has given new light to the strategies leading to the flows that change the organizational assets (Coda & Mollona, 2010). In particular such policies configure “a set of specific and identifiable processes” (Eisenhardt & Martin, 2000, p. 1105) of learning and experimentation (Pablo et al., 2007, p. 687) through which organizations “achieve new resource configurations” (Eisenhardt & Martin, 2000, p. 1106). Examples of dynamic capabilities in the public sector include the ability to learn new practices, networking, boundary-spanning activities, and analytical skills, such as information-gathering and assessment. Also, intellectual capital, leadership, information-sharing systems, and performance management routines may be regarded as a comprehensive set of dynamic capabilities (Barney & Clark, 2007; Boyatzis, 1991; Ruggiero, 2011; Spencer & Spencer, 1993).

The literature on public sector dynamic capabilities (Piening, 2013) mostly takes a descriptive account, with Gullmark (2021) differentiating

managerial and organizational capabilities and Pablo (2007) framing them as a strategic approach for learning and experimenting. Building on empirical work, other scholars have recognized the role of dynamic capabilities in public value generation processes (Kattel & Mazzucato, 2018) with a specific emphasis on stakeholder management relationships (Cabral et al., 2019) or inclusive governance practices (Crosby et al., 2017). Such a discussion dates back to the seminal work of Moore (1995) that frames available dynamic capabilities as enablers of public value (Moore, 2013). Such an idea has been expanded by public service management scholarship (Lusch & Vargo, 2013; Osborne, 2018; Osborne et al., 2012, 2015), which led Osborne (2020, p. 80) to localize public value at the “user, community, and professional service system level”.

For instance, at the user level, a comprehensive digitalization process may help reducing the authorization time for a construction permit. Similarly, a route planning mobile app may improve local transportation service accessibility from the community perspective. Also, the introduction of cloud infrastructure for sharing documents may support civil servants to handle bureaucratic procedures with high standards of security, privacy, and transparency. A systemic implementation of digital technologies in a plurality of domains may further strengthen such value appropriation streams synergistically.

In line with this idea, Panagiotopoulos et al. (2019, p. 1018) illustrated how “capabilities can contribute to public value creation by permeating the boundaries between the various digital government implementations that may exist in relative isolation from each other”. This parallels what we posited in the introduction of this paper: innovating dynamic capabilities is a vehicle to make an organization ready for digitalization to sustain public value creation.

Mainly at the governmental level – studies in such a direction have commenced exploring digitalization approaches in the public sector, including open innovation initiatives (Mergel, 2018; Mergel & Desouza, 2013), agile project management (Mergel et al., 2018), and digital service teams (Mergel, 2019), to identify managerial, organizational, and technological challenges (Kattel & Mazzucato, 2018; Mazzucato & Kattel, 2020; OECD, 2017).

Methodological efforts in such a direction are even more needed “in the increasingly complex digital government landscape” (Panagiotopoulos et al., 2019, p. 1017). In fact, as Piening (2013, p. 210) remarked, if public sector organizations disregard innovating dynamic capabilities, “they will find it difficult to respond effectively to changes in their environments”. In line with this idea, several authors remarked that digital transformation configures a significant challenge for public sector organizations (Dunleavy, 2005, 2006; Margetts & Dunleavy, 2013b; Mazzucato & Kattel, 2020; Trischler & Westman Trischler, 2022) since the new technologies are bringing about an unprecedented transformation of our societies and the logic of institutions operating in them.

In front of the challenges posited by digital transformation, public sector organizations have shown a limited attitude (Borins, 2001; Jones, 2005; Lombardi & Secundo, 2020; Matt et al., 2015; McNulty & Ferlie, 2004; Ridder et al., 2005) to convey “distinctive competencies to organizational aspirations and goals” (Bryson et al., 2007, p. 702). Without a proper alignment of specific dynamic capabilities with the intended digital transformation policy ambitions, no systemic implementation will be successful due to the lack of “organizational readiness” (Lokuge et al., 2019). Such conceptualization renders dynamic capabilities a path to organizational readiness for digital transformation. This means that if dynamic capabilities underpin organizational readiness for digital transformation, the way in which digitalization initiatives impact the current resource configurations is instrumental to public value creation. To lead an organization going through such a transformative challenge, specific dimensions could help managers “to understand the current practices and to guide future actions and objectives” (Agostino & Costantini, 2022, p. 1144). A measurement framework to account for organizational readiness for digital transformation is illustrated in the next section.

3. Measuring organizational readiness for digital transformation

The “digital readiness framework” (Agostino & Costantini, 2022, p. 1150) comprises five dimensions, i.e., people, digital resources, process, users, strategy, and investment, each having one or more sub-dimensions, as shown in Table 1. Such attributes regard critical organizational aspects which are at stake in the digital transformation process. The framework identifies key areas of concern by targeting such dimensions to the specific complexity of the investigated context³. In turn, it allows one to understand the relevant dynamic capabilities to make an organization ready to implement digital transformation.

³ The authors clearly state that “while dimensions and sub-dimensions are applicable at organizational level, operational metrics and weights are industry specific” (Agostino & Costantini, 2022, p. 17)

Table 1 – The digital readiness framework dimensions (Agostino & Costantini, 2021: 9)

Dimension	Definition	Sub-dimensions	Definition
People	<i>People</i> refers to the presence of the appropriate digital skills and capabilities of the staff	Digital skills	<i>Digital skills</i> identifies the way digital capabilities are managed internally and the existence of digital roles
Technology	<i>Technology</i> refers to the availability, adoption, and use of technological infrastructures, method, and tools to gather, analyze, and employ data and information to support decision-making processes	Technology adoption	<i>Technology adoption</i> refers to the acquisition of a certain technology within the organization
		Data analytics	<i>Data analytics</i> considers the systematic usage of online data to support decision-making processes
		Technological infrastructure	<i>Technological infrastructure</i> indicates the facilities needed for delivering digital services
Process	<i>Process</i> reveals how digitalization contributes to delivering intermediate and final outputs to internal and external users, respectively.	Front-office	<i>Front-office</i> refers to the interactions with external users
		Back-office	<i>Back-office</i> refers to the interactions with internal users
Customer	<i>Customer</i> reflects the organizational capacity to meet internal and external users' expectations by using digital services	Customer awareness	<i>Customer awareness</i> means the front-and-back-office users' consciousness about digital service availability
Strategy and investment	<i>Strategy and investment</i> intend to measure organizational intentions to pursue a long-term digital transformation strategy	Digital strategy	<i>Digital strategy</i> measures the level of integration and consistency among the different initiatives undertaken by the several actors who are responsible for implementing digitalization initiatives.
		Investment	<i>Investment</i> gauges the perceived gap between the desired digitalization level and the current condition.

As Table 1 shows, the dimension “people” refers to the presence of the appropriate skills and capabilities of human resources as measured by the subdimension “digital skills”, which identifies the way digital capabilities are managed internally and the existence of digital roles. The role of people in organizations is central to implementing digitalization initiatives (Pirola et al., 2019). The dimension “technology” refers to the available technological infrastructures to empower people to adopt methods and tools to gather, analyze, and use data to support decision-making processes. In fact, such dimension contains three subdimensions: “technology adoption” indicates the acquisition of specific technology by the organization; “data analytics” considers the systematic usage of online data to support decision-making processes (Canetta et al., 2018); and “technolog-

ical infrastructure” regards the facilities needed to enable digital services both inside and outside the organization (European Commission, 2018).

The third dimension of the digital readiness framework is “process”, which reveals how digitalization contributes to delivering intermediate and final outputs. In the investigated context, the process dimension covers those activities using digital technologies (e.g., software, websites, portals, and mobile apps) to deliver services to external and internal users, which are gathered by the “front-office” and “back-office” subdimensions, respectively.

The “customer” dimension reflects the organizational capacity to meet internal and external users’ expectations using digital services. It embodies the concept of awareness to indicate internal and external users’ consciousness about digital service features (e.g., security, privacy, reliability, and accessibility) and availability (Khando et al., 2021).

The last dimension is “digital strategy and investment”, with each of them being a subdimension. In turn, “digital strategy” measures the level of integration and consistency among the initiatives undertaken by the several institutional actors responsible for implementing digitalization initiatives. “Investment” gauges the perceived gap between the desired digitalization level and its current condition.

The illustrated framework dimensions refer to a wide area of managerial and organizational domains: human and technological resources, internal and external deliveries and relationships, and the overall strategic approach to digitalization. Such “empirical properties” (Pfanzagl, 1971, p. 15) provide methodological guidance to assess the level of readiness to implement the digital transformation (Lokuge et al., 2019). As reported in the next section, we adopted such framework dimensions to measure the extent to which the NRRP horizontal reform “public administration digitalization” innovates the dynamic capabilities underpinning organizational readiness for digital transformation.

4. Research design

This paper adopts a qualitative methodology to develop a deductive-inductive approach to research in two subsequent phases, as illustrated in Figure 1. In the first phase, we reviewed the existing literature on dynamic capabilities in the public domain to discuss their role in civil service digitalization. Given the extent of the body of knowledge in this specific field, we selected top journal articles and well-known referenced works for the literature review – as discussed in section 2. Such a choice was motivated by the fact that the theory from which we are drawing (i.e., dynamic capabilities) is a well-established understanding in the management literature (Eisenhardt & Martin, 2000).

Such conceptual work enabled us to illustrate why specific dynamic capabilities set out for a diffuse and pervasive implementation of digital transformation initiatives. This idea positions dynamic capabilities at the

core of organizational readiness, implying that an organization is ready for digital transformation when the dynamic capabilities provide consistent means for public value creation.

In line with this idea, in step 2 of phase 1, we studied the dimensions contained in the “organizational readiness framework” (Agostino & Costantini, 2022, p. 9) so as to focus digitalization as a process innovating resources, practices, routines, and procedures (i.e., dynamic capabilities) in public sector organizations.

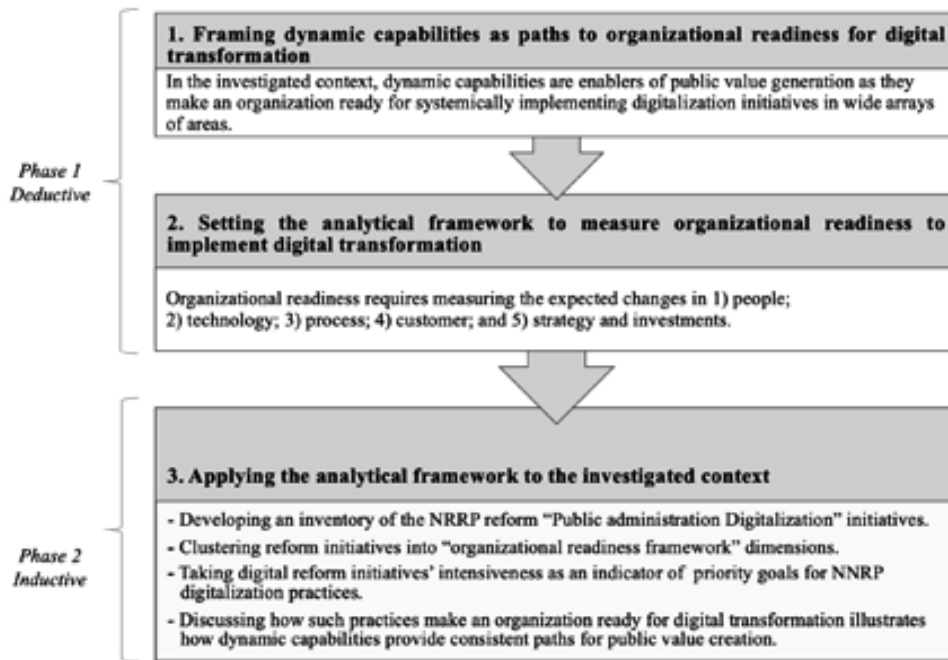


Figure 1 – A pictorial representation of the overall research design process as composed of two phases

In the second phase, we applied the analytical framework to the investigated context with the intent to assess the extent to which current initiatives are developing the dynamic capabilities underpinning organizational readiness for digital transformation. In particular, document analysis (i.e., governmental dossiers on NRRP implementation, European commission reports on digitalization in the context of Next Gen EU plan, journal articles, and official NRRP webpages) was used to frame the content of the NRRP reform “public administration digitalization”, which was then clustered with the framework dimensions. To this end, by surveying the NRRP Mission 1 “Digitalization, innovation, competitiveness, culture, and tourism”, with a specific reference to component 1 “Digitalization, innovation, and safety in public administration” (M1C1 hereafter), we limited our analysis to the investments planned under the domain 1 “Public Administration digitalization” (i.e., M1C1-I1) and 2 “Public Administration innovation” (i.e., M1C1-I2). In doing this, we left out the third domain “in-

novation of the judiciary system” (i.e., M1C1-I3) included in the M1C1 of the NRRP because its primary focus – as per the investment description – does not fit with the scope of our investigation. We applied the same rule for the reforms comprised in the domain M1C1-I3.

To retrieve the required information on the investments comprised by the M1C1-I1 and M1C1-I2, we used the search tool available on the NRRP website (i.e., <https://www.italiadomani.gov.it/>), as portrayed in Figure 2. The dotted line boxes highlight the filters we used to generate the list of initiatives under the label M1C1. In contrast, the solid boxes refer to the two investments under the label M1C1-I3 excluded from the analysis.

Figure 2 – Two screenshots of the search tool available on NRRP official website from which the information about the investments has been retrieved



Also, we integrated such a list with the three specific reform initiatives included in the M1C1. In doing this, we excluded the reform pertaining to the M1C1-I2, since they are not explicitly associated with digital transformation. In fact, as per the NRRP description, they aim to make human resources selection procedures more efficient (i.e., M1C1-R2.1), simplify administrative practices (i.e., M1C1-R2.2), and renovate managerial carriers in the public domains (i.e., M1C1-R2.3). To achieve these goals, no digitalization processes are at stake.

Hence, 13 initiatives (i.e., 7 investments and three reforms of the M1C1-I1 and 3 investments of the M1C1-I2) set the scope of our analysis. To identify the NRRP expected impact on the current resource configurations, we clustered targeted digitalization initiatives through the digital readiness framework dimensions based on the fit between the object and the definition of each measure. Two examples may clarify the selection logic. We associated the investment in “digital infrastructure” comprised by the M1C1-I1.1 with the framework dimension “technology” as it refers to the availability, adoption, and use of technological infrastruc-

tures. With the same logic, we clustered the investment in “skills and administrative capacity” comprised by the M1C1-I2.3 within the dimension “people” as it indicates a commitment to build appropriate digital skills and capabilities of public administration staff.

By using the digital readiness framework, we can address the research questions raised in the introduction of this work: 1) what managerial and organizational capabilities should the public administration develop to be ready to implement digital transformation? 2) To what extent the reform “public administration digitalization” of the National Recovery and Resilience Plan is developing such capabilities? As a result, our investigation illustrates what dynamic capabilities provide paths enabling public sector organizations to set out for diffuse and pervasive digitalization leading to public value appropriation by users, community, and service professionals. Such a discussion provides directions to “guide future actions and objectives” (Agostino & Costantini, 2022, p. 1144) associated with the digital transformation of public sector organizations.

5. Assessing the NRRP horizontal reform “public administration digitalization” through the organizational readiness framework

In this section, the organizational readiness framework outlined in section 3 is adopted as an analytical lens to assess the NRRP horizontal reform “public administration digitalization”.

The NRRP⁴ is a complex policy program adopted by the Italian Government in 2021 to overcome the adverse aftermaths of the Covid-19 pandemic so as to recover the Italian socio-economic context. Such an initiative joins a European choral effort.

With a total budget of 235 billion euros, the Italian Government has articulated the NRRP along six strategic missions: 1) digitalization, innovation, competitiveness, culture, and tourism; 2) green revolution and ecological transition; 3) infrastructure for sustainable mobility; 4) education and research; 5) inclusion and cohesion; and 6) health. As a strategy to pursue such missions, the plan includes three kinds of reforms⁵: 1) horizontal reforms that cut across all the missions of the plan; 2) enabling reforms that are designed to guarantee the implementation of the program; and 3) sectoral reforms that introduce a more efficient regulatory and procedural frameworks for each field covered by the plan.

The reform “Public administration digitalization” falls within the first category and it is four-fold: 1) developing the administrative capacity of central and local government; 2) strengthening the processes of selection, training, promotion, and mobility of public employees; 3) stream-

⁴ The NRRP is funded by the “Next-generation EU” plan (NGEU) through which the European Union has allocated a total budget of 806.9 billion euros for the 27 EU Member States to cope with the current socio-economic disruption.

⁵ <https://italiadomani.gov.it/en/Interventi/riforme.html> (accessed on 19/09/2022)

lining bureaucracy; and 4) promoting the digitalization of administrative procedures. From a policy design perspective, such a plan contemplates a two-tier approach as it conflates urgent initiatives to address organizational and structural deficiencies of the Italian public administration and tailored initiatives targeting specific policy goals.

As explained in section 4, to scope the content of the horizontal reform “public administration digitalization”, we selected the initiatives comprised in the M1C1. Table 2 (see the appendix) provides an inventory of the initiatives pertaining to the horizontal reform “public administration digitalization”. The investments and reforms included in our analysis target an array of public administration bottlenecks, which are addressed by the Italian Government through digitalization initiatives.

5.2 Framing the reform “public administration digitalization” through the organizational readiness framework

The five dimensions of the organizational readiness framework set the organizational and managerial context for our analysis on which the reform “public administration digitalization” is expected to impact. To this end, we weighted each initiative – as a fraction of the overall reform budget – to determine the intensiveness of each framework dimension. The result of such exercise is reported in Table 3 in the appendix.

As Table 3 (see appendix) illustrates, the first dimension is “people”, measuring human resources digital skills, and abilities to use digital resources (e.g., devices, tools, software, applications, and networks) to store, access, and manage information. Related to such dimension, the “reform public administration digitalization” intends to hire specialized human resources with technical profiles and train employees to reskill and upskill their human capital at the State and local level, including their abilities to audit the vulnerability of hardware and software solutions employed by public agencies. To implement such initiatives, the reform introduces training vouchers and encourages the institution of a community of practice. It is worth noticing that the “people” dimension, with regard to digital skills, takes 7.41% of the whole investment volume, including personnel employed by the State and regional administration.

The second dimension refers to “technology”, in terms of its “adoption”, use for “data analytics”, and associated “infrastructure” availability. As for the first, NRRP initiatives intend to digitalize urban planning services and one-stop-shops for business creation, introduce a national platform for public records consultation, improve communication with citizens by sustaining the spread of mobile phones applications (i.e., “PagoPa” and “IO”), and make the national digital identity system (i.e., SPID and CIE) the standard to get access to digital service. Regarding “data analytics”, a specific investment targets the introduction of the “Single Digital Gateway” to enable interoperability at the European level. Concerning “technological infrastructure”, the plan aims to endow public administration

with a national digital platform to store data, apps, and websites. It also fosters the release of application programming interface (i.e., API) to enable interoperability across public sector organizations at the central and local level and to develop a cloud and a cybersecurity infrastructure. The dimension "technology" takes 62.15% of the whole reform budget, with a fraction devoted to providing public administration with "technological infrastructure" (i.e., 36.5 %) and sustaining "technology adoption" (i.e., 29.15 %). The sub-dimension "data analytics" takes only a marginal budget quota (i.e., 0.57%).

The "process" dimension contains two sub-dimensions, i.e., "back-office" and "front-office", which reveal how digitalization contributes to delivering intermediate and final outputs to internal and external users, respectively. Concerning the "back-office" perspective, NRRP initiatives aim to recover process efficiency and speed-up bureaucratic procedures (e.g., acquisition of ICT services) through a comprehensive digitalization of large central administrations (i.e., national institute for social security, judicial system, minister of defense, minister of internal affairs, and fiscal police). Also, the reform intends to establish a national unit for digitalization and a "software development & operations management" organization to support digital transformation at the central and local administration levels. Regarding the "front-office" sub-dimension, user experience and service accessibility are particularly interesting for the MIC1 of the NRRP. In addition, the "process" dimension absorbs about a quarter, i.e., 26.53%, of the entire reform budget. As per our reconstruction, NRRP initiatives place slightly more emphasis on "back-office" (i.e., 15.52%) than "front-office" (i.e., 11.01%) activities.

The "customer" dimension reflects digital services capacity to meet internal and external users' expectations. In this perspective, the reform aims at improving the "awareness" of internal (i.e., back-office) and external (i.e., front-office) users about digital service availability and features through intergenerational support (i.e., civil service projects for digitalization) and local facilitation centers (i.e., schools, libraries, and community hubs). Such initiatives are meant to overcome the risk of digital exclusion of the elderly population and increase people's interactions with the new service delivery modes. Such dimension is guaranteed with a residual share of 2.01%.

Finally, the last dimension of the framework is "strategy and investment", gauging the overall intentions to pursue a long-term "digital strategy" through specific "investments". Related to that, by leveraging the innovative potential of a "digital strategy", the reform aims to reduce red tape within administrative processes and enable information exchange among several administrations to recover efficiency in public service organizations and improve the quality of deliveries. To this end, the MIC1 set "investments" into seven key areas: technological infrastructure, cloud platforms, interoperability, digital services, cybersecurity, and basic digi-

tal skills. Our analysis does not associate any fraction of the budget with “strategy and investments” because it cuts across the different initiatives previously commented. In fact, “digital strategy” gauges the whole logic underpinning the digital transformation plan, while “investment” considers the gap between a desired digitalization level and a current condition.

From our analysis, it emerges that the reform “public administration digitalization” sets out a digital transformation strategy that aims at reducing the gap in three critical dimensions of digitalization, i.e., technology, process, and people, which takes the 62.15%, 26.53%, and 7.41% of the reform budget, respectively. Building on this evidence, we discuss what dynamic capabilities enable public sector organizations to create public value through digitalization. This is the object of the next section.

5.3 What insights the organizational readiness framework provides us on the role of dynamic capabilities as paths for digital transformation in the public sector?

In the previous section, we have shown that the investigated reform primarily focuses on reducing the digitalization gap associated with technology, process, and people.

Technology clusters the initiatives that make digital infrastructures available for adoption by public sector organizations. Process focuses on digitalizing administrative procedures, routines, and services. People convey the development of employees’ digital skills through training and recruitment. In this way, each framework dimension points to specific dynamic capabilities providing paths to organizational readiness for digital transformation. Our discussion unfolds these paths to illustrate how pervasive digitalization leads to public value appropriation (Lindgren et al., 2019; Panagiotopoulos et al., 2019) by the user, context, and professional service system (Osborne, 2020).

Technology is instrumental to societal purposes (Heidegger & Lovitt, 1977). In fact, in the context of public administration, technology supports information-sharing and coordination as it helps the actors committed to delivering certain services or implementing specific policies to cooperate by leveraging digital assets within specific administrative processes. For example, the availability of digital infrastructure and web apps that support interoperability among different administrations may facilitate civil servants to get access to specific files concerning a policy domain (e.g., public works or education) or a use case (e.g., permits to build, residence permits, social benefits). This enables public sector organizations to enhance mutual adjustments by providing the involved actors with the means to address managerial challenges, such as reducing information asymmetries, aligning financial documents, and coping with porous administrative boundaries within and across departments and jurisdictions. This is because technology may help streamline the technical and legal assessment underlying the traditional public administration rationality, avoiding

funneling citizens throughout the public service realm to collect the several pieces of information required to get their paperwork done. As a result, introducing digital technologies in public service may improve organizational efficiency and effectiveness, including reducing service lead time, avoiding conflicting decisions, limiting paperwork overlaps and relocation, and improving transparency and quality of deliveries.

In line with its instrumental role, technological resource availability and adoption set the field for the digital transformation of public administration by conveying its transformative potential (Markus, 2004b) into administrative processes and service delivery modes. As shown in Figure 3, the path “setting the field” involves the development of arrays of dynamic capabilities associated with the use of technological resources, such as digital infrastructure (e.g., platforms for data storage), information sharing logic (e.g., APIs for expanding communicative functionalities), and innovative bureaucratic routines (e.g., service requests and notices sent by mobile apps), which create the preconditions for a service-oriented use of digital facilities in back-and-front-office activities (i.e., the process dimension).

However, “digital transformation is not (only) about technology” (Tabrizi et al., 2019). This idea reminds us of the distinction between digitization and digitalization (Legner et al., 2017). The latter requires a pervasive transformation of the societal system in which technologies are used (Lokuge et al., 2019). “Being digital” (Bhimani, 2021) also requires “non-technological aspects such as leadership, culture, and employee training” (Oliveri et al., 2023, p. 1067), so to enable an organization to unleash the potential of technology.

Developing human resources provides a “working in the field” path to digitalize the machinery of government. In this sense, digital skills (e.g., ability to use the software) and data analytics abilities (e.g., developing a toolkit to use big data) of the employee holding key positions in public sector organizations are crucial to deflect obstructive technologies (e.g., cyberattack) and absorb technological-driven disruptions (e.g., artificial intelligence) as they emerge (Bracci, 2022; Mergel et al., 2018). If human resources skills do not match what is entailed by the innovation brought about by the technology being introduced, the organization may find itself unprepared in front of the challenge of configuring, using, and understanding the output provided by digital artifacts (Maciejewski, 2017; Quattrone, 2016).

The introduction of technology should parallel human resource upskilling and reskill initiatives by taking into account the roles and responsibilities of using the tools being released for public deliveries. A granular development of both capabilities implies endowing public administration with technological infrastructures and ensuring that people develop the ability to understand how the system gathers, interprets, and employs digital data. This is relevant for public administration accountabili-

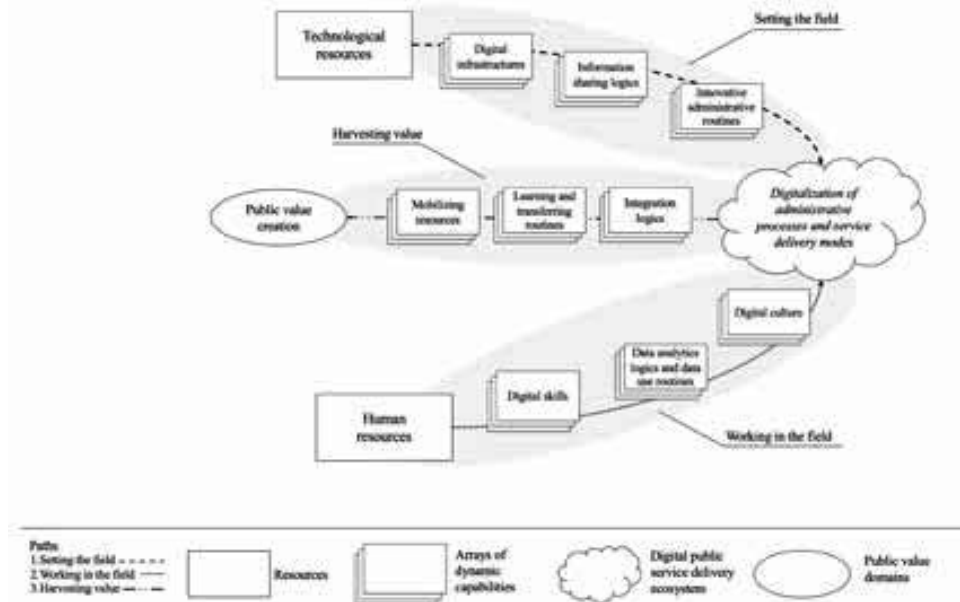
ty (Mussari & Steccolini, 2006) because “digitalization impacts the form, substance, and provenance of internal accounting information” (Bhimani, 2003, p. 1).

Digital culture is an “important organizational characteristics” (Markus, 2004a), whose development requires a conscious understanding of how digital tools and technologies shape the appearance of workplace routines and the substance of professional practices. In this case, hiring external consultants expecting that digital skills will flourish within the public domain does not suffice. Also, the training of human resources should be aimed at challenging conventional “techno-optimistic” beliefs that tend to consider technology and its application inherently open, accessible, and transparent than analogic working rationalities. Such an approach reveals a tendency to overrate the benefits of technology in the workplace, leading people to overlook the underlying logic according to which data are being produced, analyzed, and distributed along the service chain (Klijn & Koppenjan, 2015; Vydra & Klievink, 2019), with the implicit risk of diluting the public value generation (Bryson et al., 2007). Evidence can be found in the recursive use of algorithms in public service delivery, whose classical promise is to make complex procedures fast, reliable, and objective (Dourish, 2016) – often leaving humans out of the decision-making loop (Wieringa, 2020). Though algorithms have proven successful, scholars warned that this happens when they are “handled with care” (Kolkman, 2020, p. 101488) since the belief that the code is intrinsically neutral may herald unfair service outcomes (Martin, 2019).

As Figure 3 shows, developing dynamic capabilities associated with technological resources sets the field for digitalizing administrative processes and service delivery modes. In turn, digital skills, data analysis routines, and a robust digital culture can effectively create a digital public service ecosystem.

The consistency between the hard (i.e., technological resources) and the soft (i.e., human resources) component of digital transformation enables value harvesting from the public service delivery ecosystem (i.e., a systemic digitalization of administrative processes and service delivery modes), which is the third path. First-hand evidence of this path can be found in the contemporary reality of public administration. The Covid-19 pandemic is undeniably one of the most relevant issues of our recent past.

Figure 3 – Dynamic capabilities as paths to organizational readiness for digital transformation, leading to public value appropriation



As the reader may remember, with the surge of the disease, many governmental attempts to use “contact tracing” (ISS, 2020) to detect new infections have failed (Clark et al., 2021) while few of them “got it right” (Lewis, 2020, p. 384). The adoption of obsolete technology, including software that does not integrate traditional contact tracing with the data generated by smartphone apps, hindered the system attitude to alert people that they might have been exposed to the virus. In this context, also the ability to transfer technology from other countries and tailor them to the societal characteristics in which it is expected to operate would have made the difference. The failure to implement such technology in the Italian context provides a vivid example of how the success of a digitalization initiative requires a balance between technology and knowledge. The mutually supportive relationship between the two enables public service professionals to unleash the potential that technology holds for human progress. While technology helps mobilize needed resources to organize rapid responses, the “learning and transfer of capabilities” (Mazucato & Kattel, 2020, p. S265), even from other contexts, requires developing an attitude.

If “setting the field” and “working in the field” paths are associated with the impact of the initiatives under the “technology” and “people” dimensions of the organizational readiness framework, the path “harvesting value” concerns the “process” dimension. The dynamic capabilities associated with that dimension reveal how digitalization delivers intermediate and final outputs to internal and external users. Examples of such capabilities regard integration logic (e.g., sharing citizen data across

administrations), learning and transferring processes (e.g., tailoring and using open-source software), and mobilizing resources (e.g., allocating capacity where needed). Through a set of specific dynamic capabilities, an organization is ready to implement a systemic digital transformation, which makes public deliveries go beyond the sole value exchange (Moore, 1995; Thomas, 2014) to impact appropriation processes by user, community, and service professional (Osborne, 2020).

Examples of value creation at the user level are improving citizens-public administration interactions, including ubiquity in the use of a service, remote meetings via video call applications, and up-to-date notices through push notifications. Value creation at the community level concerns the capacity of the digital ecosystem to meet community needs and expectations, such as the provision of digital identity, including the possibility to share such data across different public administrations, as well as an improvement in cybersecurity and privacy standards. Also, business organizations operating in a region may welcome digital technology to speed up specific administrative procedures. Similarly, a systemic introduction of digital tools in education and the health care system may help reduce the distance between remote areas and central service hubs, allowing marginalized communities access to vital public services.

Value appropriation for the service system implies the need for public service professionals to learn how to adopt digital technology to innovate their deliveries substantially. For example, if a systemic introduction of robotics within health care for surgical treatment on the one side is likely to improve the accuracy of interventions, on the other side, it requires not only adequate individual expertise of the surgeon but also of its supporting team, and a set of specific pre-and-post surgical treatment routines. Another context in which digitalization may create value for service professionals is the educational system. In this context, the ever-increasing use of digital means for teaching purposes (e.g., slides, software, course management systems, and audience interaction tools) challenges traditional modes of content delivery. Such a trend pushes instructors to learn how to use these digital solutions within their disciplines to embrace their engaging and communicative potential.

As discussed in this section, the combined effects of “setting the field” and “working in the field” paths lead to creating a digital public service ecosystem by employing technology-driven dynamic capabilities and human resources skills and abilities to digitalize administrative processes and service delivery modes. This enables public value appropriation by users, community, and service professionals through digitalization.

6. Conclusion

This paper has shown what managerial and organizational capabilities enable public sector organizations to generate public value through digitalization. To this end, in the first part of this work, we have reviewed the

extant literature on public sector dynamic capabilities to discuss their role in digital transformation. As illustrated in section 2, our conceptual analysis has framed dynamic capabilities as paths to organizational readiness, discussing how digitalization may lead to public value creation.

The use of the “organizational readiness framework” (Agostino & Costantini, 2022, p. 9) has provided the analytical dimensions to assess to what extent the NRRP reform “public administration digitalization” is contributing to developing the dynamic capabilities underpinning digital transformation. As shown in section 5, our analysis of the NRRP reform is ingrained in the five dimensions of the framework with the intent to locate specific dynamic capabilities that make an organization ready to implement digital transformation. In particular, we have shown that “technology”, “process”, and “people” are the three major concern areas of the reform “public administration digitalization” in the context of the NRRP. Such emphasis has allowed us to identify three paths to pervasive digitalization that may ultimately lead to public value creation. In this sense, improving public value creation is subjected to the digitalization paths associated with technology-driven capabilities and human resources skills and abilities, allowing for a comprehensive digitalization of administrative processes and service delivery mode, i.e., what we have termed as a service digital ecosystem.

Our study contributes to the debate on the public sector digitalization (Agostino et al., 2022; Drechsler & Kattel, 2020; Mazzucato & Kattel, 2020) by focusing on the role of dynamic capabilities (Piening, 2013; Ruggiero, 2011). To this end, in response to the first research question (i.e., what managerial and organizational capabilities should the public administration develop to be ready to implement digital transformation?) we pointed out that human resource skills and abilities are as essential as technological resources for a system-level digital transformation of public sector organizations. In this sense, the consistent combination of technology with a digital culture makes public administration ready to render digitalization a social phenomenon involving the public service professionals, the user, and the society at large in a unique service delivery ecosystem.

As discussed in section 5, though technology sets the field, are the human resources that work in the field. This finding allowed us to provide an answer to the second research question (i.e., to what extent the reform “public administration digitalization” of the National Recovery and Resilience Plan is developing such capabilities?). This implies that putting the sole technological-driven dynamic capabilities at the forefront of digital transformation may bear the risk of losing control over the logic according to which data are produced, and information distributed along the value chain, mainly when puzzling digital artifacts are involved (e.g., algorithms). Related to that, as our analysis has illustrated, the reform “public administration digitalization” tends to frame digital transformation as mainly driven by technological means. The intensiveness of the dimension

“technology” and the specific content of the initiatives clustered under the “process” dimensions are evidence of that inclination.

Our discussion has suggested that an important path for making an organization ready to implement digital transformation is upscaling the dynamic capabilities associated with human resources. However, such a dimension takes a small share of the whole reform budget, with some of its substantial initiatives being concerned with temporary external technical support to civil servants. As we have illustrated in this work, developing a digital culture may create employees’ and users’ awareness about the potential of technology, which in turn can help public sector organizations overcome the risk of a techno-optimistic approach to digitalization. In this way, a digitalization reform may be an effective instrument to implement a transition from mere “digitization” to a pervasive “digitalization” driven by innovative teams’ attitudes “to build, integrate, and reconfigure internal and external competencies to address rapidly changing environments” (Teece et al., 1997, p. 516). In section 5, we have provided several examples illustrating how a digital service ecosystem that integrates technology and human resources capabilities enables public value appropriation by users, the community, and the professional service system.

We respond to our findings with implications to advance the study and practice of digital transformation in public service delivery, emphasizing the role of dynamic capabilities in creating a digital ecosystem that enables superior public value creation. The first implication is that investment in technology is not an alternative to advancing human resources, noting that pervasive digital transformation initiatives should consider a consistent balance among them. The introduction of technological infrastructure requires skills and capabilities to configure digital tools so that the public service system produces valuable outputs. This implies that technological resources employed in digitalized administrative processes require a certain degree of agility and adaptability since their reconfiguration might be needed as digital skills and abilities advance with training and practice.

We are conscious that our investigation is limited by the early development of the NRRP reform, particularly since most initiatives still need to be fully developed into specific projects. Our exploratory analysis may provide avenues for future research in at least two directions. A first potential avenue for developing this work is carrying out case studies targeting specific fields once digital transformation initiatives have been carried out (e.g., health care). A second possibility for future development is to take a comparative account among EU states, given the common framework and trajectories of public administration digitalization initiatives set by the European Commission.

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Appendix

Table 2 – An inventory of the initiatives pertaining to the horizontal reform “public administration digitalization” (source NRRP and <https://italiadomani.gov.it/en/>)

Mission	Domain	Initiative	Object	Main goals	Actions
M1C1	PA digitalization	Investments – I1.	Digital infrastructure for central and local administrations Enabling and facilitating Cloud migration	Guaranteeing the reliability, quality, security, and scalability of Public Administration systems, dataset, and applications. Migrating the datasets and applications of a large chunk of local public administration to a secure cloud infrastructure.	The investment involves: the creation of a cutting-edge national hybrid infrastructure based on cloud technology, i.e., the National Strategic Hub; the certification of alternative secure and scalable public clouds which will be followed by the migration of public administration datasets and applications. Through a support program, local public administrations will be able to transfer data and applications to the cloud, ensuring they are accessible anytime and anywhere. To complete these activities, the administrations will be guided by a team coordinated by the Ministry for technological innovation and the digital transition.
			Data and interoperability	Ensuring full interoperability of the main data sets and services between central and local governments. Implementing the EU “Single Digital Gateway”.	The measure envisages: the development of a “National Digital Data Platform” that guarantees the interoperability of datasets through a catalogue of APIs shared between central and local governments. the development of a “Single Digital Gateway” in compliance with EU Regulation 2018/1724, which will be managed to help central and public administrations to restructure priority procedures and processes, allowing the fulfilment of the “one-time” principle.

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Mission	Domain	Initiative	Object	Main goals	Actions
			Digital services and digital citizenship	Developing integrated, harmonized, state-of-the-art, citizen-oriented digital services and to ensure their wide-spread adoption among central and local administrations and improve the user experience.	<p>The measure: encourages the adoption of the digital application for payments between citizens and public administrations (PagoPa) and the adoption of the "IO" app as the main digital touchpoint between citizens and administration for a wide range of services; fosters the adoption of national digital identity platforms (Public Digital Identity System, SPID and Electronic Identity Card, CIE) and of the National Registry (National Registry of the Resident Population, ANPR) by "Scaling up the National Digital Identity Platforms (SPID, CIE) and the National Register (ANPR)"; digitalizes public notices; promote the adoption of Mobility as a Service (MaaS) paradigms in metropolitan cities to digitalize local transport and provide users with an integrated mobility experience.</p>
			Cybersecurity	Strengthening the national digital ecosystem. Preventing and responding to cyber risks and events.	<p>Enhancing cyber threat monitoring and management services. Developing a national cyber services network, appropriately integrated with key public and private partners.</p>

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Mission	Domain	Initiative	Object	Main goals	Actions
			<p>Digitalization of large Central Administrations</p>	<p>Redesigning and digitizing the large central administrations (e.g., National Social Security Institute, National Institute for Insurance, against Accidents at Work, Judicial System, Ministry of Defense, and Ministry of Internal Affairs). Simplifying the provision of services to citizens and with the most impact in terms of efficiency of the public system.</p>	<p>The investment involves: a comprehensive digitalization of services for citizens and the underlying internal processes; the development of applications allowing public officials to carry out remote checks in real time on personal documents and permits held by citizens and associated with the CIE; the digitalization of archival records; the implementation of artificial intelligence solutions for anonymize civil and criminal judgments, automating the identification of the victim-offender relationship in legal provisions, and analyzing and organizing case law precedent to facilitate consultation by civil judges and prosecutors; the evolution of PA digital contact points with residents, businesses and other public administrations; the enhancement of the security of three fundamental sets of information (personnel, administrative documentation, internal and external communications); the migration of all systems and applications towards an open source solutions; the introduction of data science into operational and decision-making processes.</p>

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Mission	Domain	Initiative	Object	Main goals	Actions
			Basic digital skills	Reducing the proportion of the current population at risk of digital exclusion.	Launching the "Digital Civic Service" initiative, a network of young volunteers from different backgrounds to provide people at risk of digital exclusion with training for the development and improvement of digital skills. Strengthening the existing network of "Digital Facilitation Centers" (e.g., schools, library, and community centers).
			ICT supply procedure	Introducing fast procedures for the acquisition of ICT services.	The reform implies the development of: a "white list" of certified suppliers a "fast track" for the acquisition of ICT services, especially within the scope of the NRRP; a service for a quick and easy comparison among suppliers offers, within those included in the "white list".
		Reforms – R1.	Transformation of the Local Government internal processes	Supporting Local Governments in the introduction of cloud-enabled services.	It will be developed an agency for software development and operations management to support digital transformation processes in local governments.
			Cloud services and interoperability	Fostering digitalization initiatives by simplifying rules and procedures.	The integration of the national civil registry with a "digital domain" for each Italian citizen. The innovation of public sector financial accounting rules to foster the adoption of the ICT (i.e., from opex to capex).

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Mission	Domain	Initiative	Object	Main goals	Actions
			Single recruitment web-portal	Improving human resources selection procedures for the PA.	Launching a new digital platform that makes candidate profiles available to the administrations.
	PA Innovation	Investments – I2.	Task Force for digitalization, monitoring, and performance	Strengthen administrative capacity of local administrations for the implementation of specific NRRP projects.	The temporary hiring of a pool of experts to offer technical assistance. Introducing training programs for public employees.
			Skills and administrative capacity	Strengthening the skills of Public Administration personnel at the national and local levels.	Introducing training vouchers for employee. Establishing a community of practice to support the development of managerial transformation projects for 480 administrations.

Table 3 – The analysis of “public administration digitalization” reform through the digital readiness framework

Dimension	Sub-dimension	Initiative	Mission/ component	Responsibility	Time	Funding (mln€)	Budget %
1. People	a) digital Skills	<ul style="list-style-type: none"> Implementing a national platform (i.e., https://www.inpa.gov.it/) to support employee selection and human capital deployment. Hiring specialized human resources with technical profiles. Training employee to reskill and upskill PA human capital. Introducing training vouchers for employee. Establishing a community of practice to support the development of managerial transformation projects for 480 administrations. Strategic plan “Riformare PA” for the development of human resources at national and regional level. Enhancing technical capability to audit the vulnerability of hardware and software solutions employed by public agencies 	M1C1-I2.1.1	Minister for Public administration	2022 (Q2)	11,5	7.34 %
			M1C1-I2.1.2 M1C1-I2.2.1	Minister for Public administration	2021 (Q4)	9	
			M1C1-I2.3.1	Minister for Public administration	2026 (Q2)	139	
			M1C1-I2.3.1	Minister for Public administration	2023 (Q4)	350	
			M1C1-I1.5	Minister for innovation and digital transition	2024 (Q4)	150	

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Dimension	Sub-dimension	Initiative	Mission/ component	Responsibility	Time	Funding (mln€)	Budget %	
2. Technology		<ul style="list-style-type: none"> Digitalization of procedures for delivering urban and economic development services. Supporting the adoption of "PagoPa" and "IO" applications to enhance the relationship between the public administration and the citizens. 	M1C1-I2.2.3	Minister for Public administration	2023 (Q4) 2024 (Q4)	324,4	25.15 %	
			M1C1-I1.4.3	Minister for innovation and digital transition	2026 (Q2)	750		
		a) Technology adoption	<ul style="list-style-type: none"> Promoting the adoption of national digital identity systems (e.g., SPID and CIE) and the civil registry of residents. Developing a national platform for official communications between PA and citizens, including a digital system for public records. 	M1C1-I1.4.4	Minister for innovation and digital transition	2026 (Q1)		285
				M1C1-I1.4.5	Minister for innovation and digital transition	2026 (Q2)		245
	b) Data analytics	<ul style="list-style-type: none"> Fostering the development of platform to implement local mobility as a service. Introducing the Single Digital Gateway to enable interoperability at the European level. 	M1C1-I1.4.6	Minister for innovation and digital transition	2026 (Q2)	40	0.57 %	
			M1C1-I1.3.4 M1C1-R1.3	Minister for innovation and digital transition	2023 (Q4)	90		
	c) Technological infrastructure	<ul style="list-style-type: none"> Endowing public administration with a national digital platform (i.e., Piattaforma Digitale Dati) pertaining to the National Strategic Hub (i.e., "Polo Strategico Nazionale") on which data, apps, and websites can be safely stored. Releasing Application Programming Interface to enable interoperability across public sector organizations at central and local level. 	M1C1-I1.1 M1C1-I1.3	Minister for innovation and digital transition	2026 (Q2) 2026 (Q2)	900 556	36.5 %	

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Dimension	Sub-dimension	Initiative	Mission/ component	Responsibility	Time	Funding (mln€)	Budget %
3. Process		<ul style="list-style-type: none"> Enabling cloud services to implement a comprehensive digitalization of local public administrations, schools, and health care organizations. 	M1C1-I1.2	Minister for innovation and digital transition	2026 (Q2)	1000	
		<ul style="list-style-type: none"> Developing cybersecurity infrastructure with priority focus on public sector organizations and business operating in strategic industries. 	M1C1-I1.5	Minister for innovation and digital transition	2024 (Q4)	472	
		<ul style="list-style-type: none"> Digitalization of large central administrations (i.e., national institute for social security, judicial system, minister of defense, minister of internal affairs, and fiscal police) to recover process efficiency and speed-up bureaucratic procedures. 	M1C1-I1.6	Minister for innovation and digital transition	2023 (Q4) 2025 (Q2) 2026 (Q2)	611	
	a) Back-office	<ul style="list-style-type: none"> Establishing a national unit for digital transition and a "software development & operations management" organization to support digital transition of central and local administration. 	M1C1-R.1.2	Minister for innovation and digital transition	2022 (Q2)	155	15.52 %
		<ul style="list-style-type: none"> Introducing a new regulation that allows public service organizations to adopt fast procedures for the acquisition of ICT services. 	M1C1-R.1.1	Minister for innovation and digital transition	2021 (Q4)	n.a.	
	b) Front-office	<ul style="list-style-type: none"> Improving user experience of digital public services delivery. 	M1C1-I1.4.1	Minister for innovation and digital transition	2026 (Q2)	613	11,01 %
		<ul style="list-style-type: none"> Enhancing accessibility of digital public services. 	M1C1-I1.4.2	Minister for innovation and digital transition	2025 (Q2)	80	

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Dimension	Sub-dimension	Initiative	Mission/ component	Responsibility	Time	Funding (mln€)	Budget %
4. Customer	a) awareness	<ul style="list-style-type: none"> Enhancing citizens digital skills and users' awareness of online services availability through intergenerational support (i.e., civil service for digitalization). 	M1C1-I1.7.1	Minister for innovation and digital transition	2025 (Q2)	60	2.01 %
		<ul style="list-style-type: none"> Implementing local facilitation centers for digital transformation. 	M1C1-I1.7.2	Minister for innovation and digital transition	2026 (Q2)	135	
5. Strategy and investment	a) Digital strategy	<ul style="list-style-type: none"> The main strategy is leveraging the innovative potential of digitalization to reduce red tape within administrative processes and enable information exchange among several administration with the goal of recovering efficiency of public service organizations and improving the quality of deliveries. 	M1C1-I1 M1C1-R1 M1C1-I2	Minister for Public administration Minister of innovation and digital transition	2026	n.a.	n.a.
	b) Investment	<ul style="list-style-type: none"> To implement a digitalization strategy, the M1C1 of the NRRP set out investments into 7 key areas: technological infrastructure, cloud platforms, interoperability, digital services, cybersecurity, local basic digital skills. 	M1C1-I1 M1C1-R1 M1C1-I2	Minister for Public administration Minister of innovation and digital transition	2026	n.a.	n.a.