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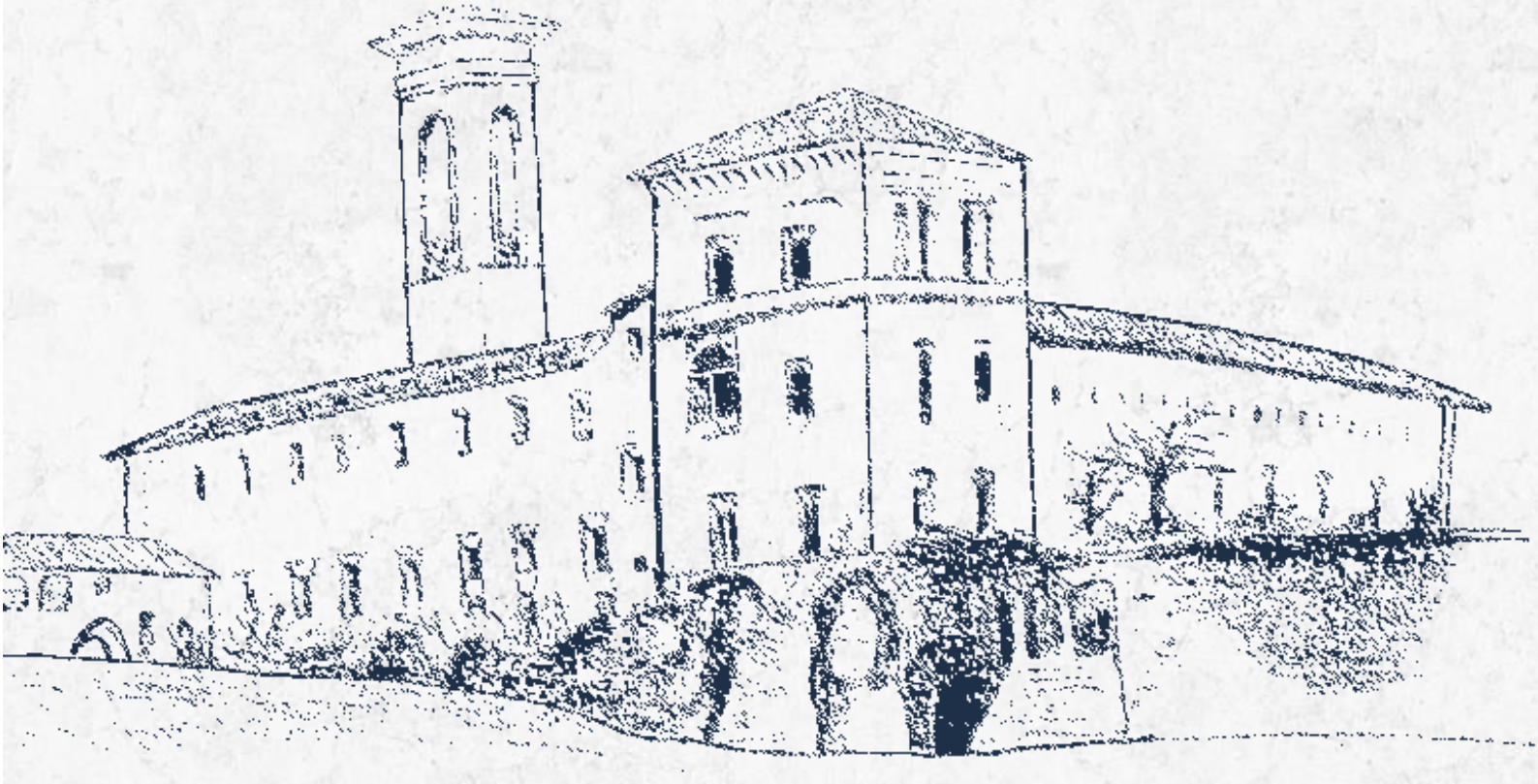

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The *Replacement Risk* of Artificial Intelligence in Civil Service Employment: A Reflection on Concrete Risks and Opportunities for Well-being

Massimino Crisci *

Abstract. *The impact of Artificial Intelligence (AI) on employment in public administration calls for a careful assessment of the actual risk of large-scale replacement of civil servants by machines. However, the immediate negative effect may not lie primarily in job losses, but rather in the emergence of "techno-stress" resulting from perceived competition with AI systems. The crucial challenge, therefore, is to harness the potential of AI to develop a model of "augmented work", in which algorithms perform repetitive tasks, thereby enabling employees to focus on more complex, strategic activities that carry greater responsibility. Achieving this vision will require a profound reorganisation of work structures and recruitment processes, moving beyond traditional hierarchical control towards a culture founded on trust, results-based accountability, and agile working practices.*

Keywords: *Artificial Intelligence; civil service employment; replacement risk; techno-stress; augmented work; work process reorganisation.*

1. Introduction: Research Objectives

The term *Artificial Intelligence* (AI) has long evoked an ambivalent response. On one hand, it conjures the image of boundless processing power – precise, instantaneous, impartial, and thus, ostensibly, "just". On the other hand, it provokes anxiety and unease – sensations frequently amplified by

* Research Fellow at the University of Bari (Italy). Email address: massimino.crisci@uniba.it.
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popular media[1] - around the prospect of machines[2] rendering human labour redundant[3].

This latter concern, following an initial wave of enthusiasm about AI's potential, has become particularly pronounced in the domain of employment. There is growing apprehension that many existing occupations may soon become obsolete[4]. In other words, it may no longer be productive to assign certain tasks to humans when machines could perform them more efficiently and effectively.

Public administration is by no means immune to this tension. The introduction of AI into governmental operations has sparked a discourse around the possibility of algorithms supplanting the current civil service workforce. Yet one must ask: is this fear justified? Or is it merely the result of a limited or distorted understanding of the actual implications AI may have – based on current technological capabilities – for the activities carried out by public officials?

This study does not purport to offer definitive conclusions – indeed, it fully acknowledges the risk that its findings may become outdated before they are even published[5]. Nonetheless, it aims to provide a reasoned reflection on the likely impact of AI on public sector employment. Specifically, it seeks to evaluate the plausibility of the so-called

[1] The clear reference is to the production of science-fiction films based on the idea of the prevalence of the 'intelligent machine' over man. One thinks of the entire 'Terminator' saga, where the machine, having become sentient and, above all, socially structured, carries out a systematic extermination of the human race; or of the much more philosophical '2001 A Space Odyssey', where the computer HAL 9000 eliminates astronauts in order not to be deactivated, manifesting a survival instinct that, if considered 'normal' in man, becomes an anomaly in the machine. Or the Matrix saga, in which machines have created a social system that exploits humans as 'food' for its biochemical components. Also of interest are 'The Two-Hundred-Year-Old Man' and 'A.I.', which address, albeit in a romantic key, the theme of the human subjectivity of the machine.

[2] The concept of 'machine' is used in a deliberately generic way, in order to refer to all manifestations of artificial intelligence, from simple computing programmes to anthropomorphic systems capable of moving in the surrounding space.

[3] Stephen Hawking has even expressed his fear that the advent of AI could spell the end of humanity. S HAWKING, *AI could spell end of the human race*, http://www.youtube.com/watch?v=fFLVyWBDTfo; for A. SANTOSUOSSO, these are 'trascendent fears', in Intelligenza artificiale e diritto, perchè le tecnologie di IA sono una grande opportunità per il diritto, Milan, 2020, 14.

[4] J. KAPLAN, *Intelligenza artificiale – Guida al prossimo future*, Rome, 2018, 123.

[5] W. WALLACH, G. MARCHANT, *Toward the Agile and Comprehensive International Governance of AI and Robotics*, in *Proceedings of the IEEE*, vol. 107, no. 3, 2018, cited by A. SANTOSUOSSO, *op. cit.*, XIII.

"replacement risk" and to consider the countervailing possibility of an improvement in job quality for public employees, in line with the concept of *augmented work*.

To proceed, it is necessary to draw a fundamental distinction—based on potential impact—between what properly constitutes Artificial Intelligence and what, although often described as such, should not be classified under this label in the context of civil service functions. Only once this conceptual distinction has been established can we meaningfully assess whether there exists a present threat of civil servant displacement, or whether AI—though likely to significantly transform the structure of public administration—may instead usher in a new era of occupational well-being within the sector.

Will the drive for technological efficiency ultimately overwhelm the human worker, revealing our inadequacies in comparison to machines? Or will a synergistic model emerge in which artificial and human intelligences complement one another, each realising their unique potential?

2. What is Artificial Intelligence?

It is important at the outset to recognise that the label *Artificial Intelligence* is frequently applied to phenomena that, strictly speaking, do not fall within its proper scope. Misattributions of this kind are common and contribute to public and institutional confusion about what AI truly entails.

Historically, the term *Artificial Intelligence* did not emerge from a mature scientific trajectory that defined its parameters and then formulated a corresponding term. Rather, it was the coining of the phrase itself that catalysed the development of a new field at the frontier of computational science.

The term was first introduced at the Dartmouth Conference in 1956, where John McCarthy, Marvin Minsky, Claude Shannon, and Nathaniel Rochester[6] proposed the organisation of a research project to explore the possibility of building machines capable of replicating human intelligence

[6] J. MC CARTHY, M. MINSK, C. SHANNON, N. ROCHESTER, *A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence*, 1955: "*...that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer*"; J. KAPLAN, *op. cit.*, 24; A. SANTOSUOSSO, *op. cit.*, 4-5.

– beginning with natural language processing. While the conference itself did not produce immediate scientific breakthroughs, it played a decisive role in establishing AI as a distinct interdisciplinary field, situated between computer science and mathematics[7], and more recently extending into philosophy and statistics.

It is worth noting, however, that even before this formal inception, discussions around machines capable of self-learning—through symbolic language and the modification of their own instructions—can be traced back as early as 1936[8]. These early systems were not yet referred to as *intelligent*, but they laid the conceptual groundwork for what would later be recognised as AI.

This somewhat unconventional origin has led to a lack of consensus on a universally accepted definition of Artificial Intelligence. The nature and scope of AI tend to shift depending on the disciplinary lens through which it is examined. In response to this ambiguity, a somewhat ironic attempt was made to define AI by querying AI itself[9]. Unsurprisingly, the effort did not yield a definitive result.

As a consequence, multiple definitions of Artificial Intelligence[10] now coexist: mathematical, philosophical, and – only recently – legal. A significant milestone in this regard is the adoption of Regulation (EU) 2024/1689, which introduces a general legal definition applicable across the European Union[11]. According to Article 3 of the AI Act: 'AI system'

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[7] S.P. NORVIG, *Artificial intelligence. A modern approach*, in F. AMIGONI (ed.), Prentice Hall, 2010, 24.

[8] Elvesier Report, *Artificial Intelligence: How knowledge is created, transferred, and used. Trends in China, Europe, and the United States,* in https://p.widencdn.net/jj2lej/ACAD-RL-AS-RE- ai-report-WEB.

[9] Elvesier Report, *Artificial Intelligence: How knowledge is created, transferred, and used. Trends in China, Europe, and the United States,* in https://p.widencdn.net/jj2lej/ACAD-RL-AS-RE- ai-report-WEB.

[10] Particularly interesting is the definition offered by S. BRINGJORD, N.S. GOVINDARAJULU, *Artificial-Intelligence*, httpss://plato.stanford.edu/archives/fall2018/entries/artificial-intelligence, 2018, according to which artificial intelligence is the field dedicated to the construction of artificial animals or artificial people capable of overcoming natural cognitive limits, translation by A. SANTOSUOSSO, *op. cit.*, 7. It must be emphasised how the field of investigation also changes the contours of individual definitions, causing potentially irrelevant, or even irrelevant, profiles to emerge for other fields.

[11] For the sake of completeness, it should be noted that such a definition, unlike the 'technical' ones, may not coincide with that of other legal systems, even supranational ones, so that no unambiguous legal definition of Artificial Intelligence can be deduced. On this point, B. CARAVITA DI TORITTO, *Principi costituzionali e intelligenza artificiale*, in U. RUFFOLO (ed.), *Intelligenza artificiale, il diritto, i diritti, l'etica*, Milano, 2020, 454; P. KHANNA, *Connectography.*

means a machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments'[12].

Despite this regulatory effort, the definitional fragmentation remains, making it difficult to clearly delineate the boundaries of AI. This often results in the inclusion of technologies under the AI umbrella that do not, in fact, exhibit characteristics of Artificial Intelligence, although they may be technologically adjacent.

This distinction is particularly relevant when considering the so-called *replacement risk* associated with AI implementation in the workplace. Technologies such as blockchain, smart contracts, or even digitisation more broadly, do not present a direct threat to workers. These are tools operated and controlled by humans, and their function is entirely dependent on human input and oversight[13].

Le mappe del futuro ordine mondiale (Maps of the Future World Order), Rome, 2016, highlighted how the advent of artificial intelligence has overtaken the geographical concept of sovereignty, replacing it with a technological type of sovereignty, i.e. no longer based on the political borders of individual states, but on the territorial capacity of technological tools to cover them. In this perspective, therefore, the *reductio* of regulation in the domestic and national sphere is a failure, as it must necessarily embrace a direct Community-type sphere of application, so as to reach a sufficient size to allow the European Community to compete with the other *players*, in particular China and the USA. For this reason, the only effective response is that of the European legislator. On the other hand, it has also been emphasised how the jumbled world of legislation actually makes it extremely difficult to introduce legal rules into algorithm *design*, cf. U. PAGALLO, *Etica e diritto dell'Intelligenza Artificiale nella governance del digitale: il Middle-out Approach*, in *Intelligenza artificiale, il diritto, i diritti, l'etica*, edited by U. RUFFOLO, Milan, 2020, 38.

[12] In this sense, we cannot fail to point out how the definition proposed at EU level is not erroneous, but responds to the clear aim of regulating all computational phenomena, even those that *stricto sensu* would not come under artificial intelligence. By operating with a rigid definitional orthodoxy, the real risk would be that of leaving gaps in the discipline, perhaps precisely for those activities that, although more elementary, may have a particularly significant impact on private citizens.

[13] They are more correctly defined as tools using the *Internet of Things*, which exploit the network in a totally innovative way not only to transmit data but also to store data and process transactions, making the centralisation of data in a single *server* superfluous - and indeed dangerous. The idea behind the *blockchain* technology is, precisely, that of a *chain (chain) of* blocks (*blocks*), made up of all the transactions that connect the various *servers* (nodes) of the parties involved. It is a model in which, through *peer to peer*, a set of subjects (the nodes) share information by forming a virtual, public and, above all, decentralised *database*. The blockchain, therefore, constitutes a *decentralised ledger*, widely owned by each

The real dividing line, then, lies in whether a system possesses the capacity to fully substitute human labour in the performance of specific tasks. In the context of this analysis, the key concern is whether an AI system can replace a civil servant in the execution of functions essential to administrative governance and public service delivery.

3. Artificial Intelligence and Administrative Action

The public sector is one of the domains in which the potential use of Artificial Intelligence (AI) has been most strongly felt. This is largely due to the overarching objective of serving the public interest, which makes the promise of *impartiality* – seemingly guaranteed by algorithmic processes – particularly appealing.
The main directions in which AI is currently being integrated into public administration can be summarised as follows:

(i) enhancing internal efficiency within public bodies; (ii) streamlining and improving decision-making processes; and (iii) strengthening the interaction between citizens and public institutions, including the expansion of participatory mechanisms[14].

These developments pose particularly intricate challenges, not least because the very purpose of administrative law is to uphold citizens'

individual node, in which the transactions and/or operations that the algorithm transforms into a unique and unmodifiable code are recorded. Each transaction constitutes a block in the chain. The peculiarity is that in the blocks, one does not transfer a 'copy' of the original *ledger*, but one finds the original itself, which, therefore, is spread among the individual nodes, thus ruling out the centralisation of information in a single *server*. One of the fields of application of this technology is precisely that of *smart contracts*, which are '*computer protocols that facilitate, verify, or enforce the negotiation or execution of a contract, or avoid the need for a* contractual *clause*'. Through *smart contracts*, the level of 'contract self-enforceability' is reached in that, once an agreement has been reached and computed within the *blockchain*, the underlying algorithm is able to enforce contractual clauses without the need for external intervention, such as that of a judge. Although the smart contract has an extremely broad and *appealing* prospect of use, it is not actually smart. In fact, the logic on which the *smart contract* is based is that of the basic deterministic algorithm, structured according to the *if-this-then-that* chain: i.e., "*if a presupposition* (this) *occurs, then a result* (that) *follows*". No self-learning or 'improvement' techniques are envisaged for such tools.

[14] P. MIELE, *Intelligenza artificiale e pubblica amministrazione*, in *Quaderni della rivista della Corte dei conti*, *Intelligenza artificiale - Impiego e implicazioni sotto il profilo tecnologico, etico e giuridico*, 2/2024, 145.

choices by safeguarding the collective interests of the broader community[15].

It is within this specific purpose that one finds the resilience of public sector work against the actual risk of human workers being replaced by increasingly sophisticated algorithms.

From the outset, scholars and experts dealing with the deployment of AI in the public sphere have consistently stressed the centrality of the human role, advocating for a form of *digital humanism* in which machines remain subordinate to human control[16]. The emerging possibility of automating the exercise of public authority – and thus of dehumanising administrative action – has, in turn, thrown into sharper relief the *personalist* structure of administrative procedures as established by current legal frameworks[17].

Within this structure lies what may be described as an immanent principle: the principle of human oversight, sometimes referred to as the *humanity reserve*[18]. This principle is intimately connected to the issue of legal and formal attribution of the outcomes – and consequences – of administrative activity.

This principle reflects the essential requirement that decision-making power, when exercised by a public authority, must remain fundamentally in human hands. While it may be *delegated* to an AI system under certain conditions, the human operator must always retain the authority to override or *re-decide* the outcome originally produced by the algorithm[19].

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[15] P. MIELE, *op. cit.*, 147.

[16] L. FLORIDI, *Etica dell'intelligenza artificiale. Sviluppi, opportunità, sfide*, Milan, 2022, 98.

[17] I.M. MARINO, *Prime considerazioni su diritto e democrazia, cit.*, 168, highlights that the law on the procedure "*it is based on the personalist principle: from the rights of the participants, to the communication of the reasons preventing the acceptance of the request, from the agreements supplementing or replacing the provision, to the person responsible for the procedure*".

18 G. GALLONE, *Riserva di umanità e funzioni amministrative*, Padua, 2023; G. GALLONE, *Digitalizzazione, amministrazione e persona: per una "riserva di umanità" tra spunti codicistici di teoria giuridica dell'automazione*, in *PA Persona e Amministrazione*, 329 ff.; F. FRACCHIA, M. OCCHIENA, *Le norme interne: potere, organizzazioni e ordinamenti. Spunti per definire un modello teorico-conceptettuale generale applicabile anche alle reti, ai social e all'intelligenza artificiale*, Naples, 2020, 137; A.G. OROFINO, R.G. OROFINO, *L'automazione amministrativa: imputazione e responsabilità*, in *Giorn. dir. amm.*, 2005, 1300 ff.; S. CIVITARESE MATTEUCCI, *"Umano troppo umano". Automated administrative decisions and the principle of legality*, in *Dir. Pubbl.*, vol. XXIV, 22 ff.; V. BRIGANTE, *Evolving pathways of administrative decisions. Cognitive activity and data, measures and algorithms in the changing administration*, Naples, 2019, 129; D.U. GALETTA, J.G. CORVALÁN, *Artificial Intelligence for a Public Administration 4.0? Potentialities, risks and challenges of the ongoing technological revolution*, in www.federalismi.it, 6 February 2019, 2 ff.; A. CASSATELLA, *La discrezionalità amministrativa nell'età digitale*, in Aa.Vv., *Diritto amministrativo: scritti per Franco Gaetano Scoca*, vol. I, Naples, 2021, 675.

[19] L. FLORIDI, *op. cit.*, 98.

In this sense, the principle aligns with the *human-in-the-loop* (HITL) approach[20], which prescribes human involvement throughout the training, fine-tuning, and testing of AI systems. This model fosters true synergy between human and machine, while ensuring that human actors retain a primary and non-transferable role—in other words, they do not fall "out of the loop"[21].

The European legislator has moved in this direction for some time[22]. Even prior to the adoption of the AI Act, the first relevant rule to acknowledge the centrality of human oversight in automated decision-making processes appeared in Article 22 of Regulation (EU) 2016/679 (General Data Protection Regulation – GDPR) [23].

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[20] For a general discussion of the *HITL* approach see P. BENANTI, *Human in the loop. Decisioni umane e intelligenze artificiali*, Milan, 2022.

[21] B. MARCHETTI, *La garanzia dello* human in the loop *alla prova della decisione amministrativa algoritmica*, in *BioLaw*, 16 June 2021, at www.teseo.unitn.it/biolaw/article/view/1675; D.U. GALETTA, *Digitalizzazione e diritto ad una buona amministrazione (il procedimento amministrativo, fra diritto UE e tecnologie ICT)*, in, *Il diritto dell'amministrazione pubblica digitale*, edited by R. CAVALLO PERIN and D.U. GALETTA, Turin, 2020, 85 ff.; L. PARONA, *Poteri tecnico-discrezionali e machine learning: verso nuovi paradigmi dell'azione amministrativa*, in *Intelligenza artificiale e diritto: una rivoluzione*, edited by A. PAJNO, F. DONATI, A. PERRUCCI, Bologna, Vol. II, 146; K. BRENNAN-MARQUES, K LEVY, D. SUSSER, *Strange Loops: Apparent versus Actual Human Involvement in Automated Decision Making*, in *Berkeley technology law journal*, 2019, no. 34, 745; A. RUBEL, C. CASTRO, A. PHAM, *Algorithms in Autonomy*, Cambridge, 2021.

[22] Of particular interest is the supranational dimension of the legislative provision. On this point, careful doctrine, B. CARAVITA DI TORITTO, *Principi costituzionali e intelligenza artificiale, cit.*, 454, has pointed out how the advent of artificial intelligence has overtaken the geographical concept of sovereignty, replacing it with a technological type of sovereignty, i.e. no longer based on the political borders of individual states, but on the territorial capacity of technological instruments to cover them. In such a perspective, therefore, the *reductio* of regulation in the domestic and national sphere is a failure, as it must necessarily embrace a direct application sphere of a community type, so as to reach a sufficient size to allow the European Community to compete with other players, in particular China and the USA.

[23] Art. 22 Reg. N. 2016/679/EU: "*1. The data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her.*

2. Paragraph 1 shall not apply if the decision:

a) is necessary for entering into, or performance of, a contract between the data subject and a data controller;

b) is authorised by Union or Member State law to which the controller is subject and which also lays down suitable measures to safeguard the data subject's rights and freedoms and legitimate interests; or

c) is based on the data subject's explicit consent.

3. In the cases referred to in points (a) and (c) of paragraph 2, the data controller shall implement suitable measures to safeguard the data subject's rights and freedoms and legitimate interests, at least the right to obtain human intervention on the part of the controller, to express his or her point of view and to contest the decision.

Building on this foundation, the Italian legislator introduced – thus far[24] – the only explicit legal provision regulating the exercise of public functions through automation: Article 30 of Legislative Decree No. 36/2023. While the provision is limited in scope to public procurement, it marks the first formal recognition of principles "governing the use of automated procedures"[25].
Specifically, paragraph 3 of Article 30 stipulates that decisions made using automation must adhere to the principles of:

(i) *knowability* and *comprehensibility*[26];
(ii) *non-exclusivity*[27]; and
(iii) *algorithmic non-discrimination*[28].

4. Decisions referred to in paragraph 2 shall not be based on special categories of personal data referred to in Article 9(1), unless point (a) or (g) of Article 9(2) applies and suitable measures to safeguard the data subject's rights and freedoms and legitimate interests are in place".

[24] Awaiting the parliamentary debate on the draft bill on artificial intelligence, which aims to harmonise national legislation with the provisions of EU Regulation 2024/1689 ('AI Act'). With reference to public administration, Articles 14 and 15 of the bill stipulate that AI should only have a supporting role, without replacing the assessment and decision-making of the human operator, who must be adequately trained in the conscious and responsible use of AI. On the other hand, with regard to the world of work (including the private sector), the bill adopts a 'milder' provision (in terms of the risk of substitution), emphasising the importance of respect for human dignity, transparency and the prohibition of discrimination in the use of AI, as well as specifying the obligation to inform workers on the use of artificial intelligence systems, particularly with regard to remote control of workers, which require the activation of safeguard mechanisms provided for by the Workers' Statute.

[25] Illustrative Report to Legislative Decree 36/2023, Article 30. Therefore, it does not appear erroneous to assume that, until a specific *body of* rules is enacted that will generally regulate the exercise of the administrative function through automation tools, Article 30 of Legislative Decree 36/2023 may constitute a rule of general application, at least for the direct application of the principles set forth therein.

[26] The principle of knowability, codified for the first time in Art. 22 GDPR, and also present in Art. 30 Legislative Decree n. 36/2023, consists in the duty to inform the citizen "whether" the procedure to which he is subjected is automated or not. Complementary to this principle is the principle of comprehensibility, which aims to guarantee the data subject the possibility of understanding the 'algorithmic logic' that governed the assessment and adoption of the automated act.

[27] The principle of non-exclusivity, also codified in Art. 22 GDPR and Art. 30 Legislative Decree n. 36/2023, establishes that the data subject has right to request, within the automated process, human intervention that can (variously) affect the result of the algorithmic computation.

[28] The principle of non-discrimination requires the administration to implement appropriate technical and organisational measures in order to prevent discriminatory effects on the addressees of the procedure.

These principles give concrete form to the HITL approach[29] in the context of public administration, affirming the inalienable centrality of human oversight in the exercise of public authority.

However, it must be emphasised that this centrality acquires the status of a binding principle only in the context of the public sector. The principle's normative force arises from its link to the exercise of public power – an activity aimed at advancing the common good and therefore subject to heightened legal constraints. The irreducibility of human oversight is directly tied to the public interest objective that administrative action must serve. In short, the *humanity* of public administration is essential for ensuring that the bureaucratic apparatus genuinely acts in the interest of the citizen.

Indeed, the evolution of Italian administrative law has moved progressively in this direction, systematically reducing impersonal elements of bureaucracy and pursuing the *humanisation* of administration in order to bring it closer – relationally and functionally – to the citizen[30].

By contrast, the imperative for *humanity* is less compelling within the dynamics of private enterprise. The logic of private profit, which seeks not to realise the general interest by satisfying individual needs, but rather to meet the internal objectives of the enterprise itself[31], lacks the checks and balances inherent in the exercise of public power.

Even Article 22 GDPR, which applies to both public and private sectors, offers only a minimal safeguard for individuals in private settings: the *option* to request human intervention in an automated decision-making process. This is a reactive mechanism, not a structural or mandatory obligation.

In other words, within a framework governed by economic efficiency, private enterprises are far more likely to substitute human labour with AI systems whenever the latter offer faster or more profitable outcomes. It is through this interpretative lens that we should read projections—such as

[29] A. SIMONCINI, *L'algoritmo incostituzionale: Intelligenza artificiale e il futuro delle libertà*, in *Intelligenza artificiale e diritto, come regolare un mondo nuovo*, edited by A. D'ALOIA, Rome, 2020, 190, highlights how the *HITL* model is corollary to the principle of non-exclusivity.

[30] G. GALLONE, *Riserva di umanità, cit.*, 108, points out how the introduction of the figure of the person in charge of proceedings is precisely demonstrative of this trend.

[31] Such a 'ruthless' description of the logic that drives the interest of private companies is functional in bringing out clearly the distinction between public administration and private enterprise. A distinction that, as we shall see later on, is essential for understanding the different attitudes of the 'substitution risk' in the two plexuses.

those forecasting that by 2055, half of today's work activities may be automated[32].

4. The Perceived Fear of Human Replacement in Civil Service Employment: Between Real Risk and a Change of Perspective

Any kind of work can, at least partially, be subject to automation. In this sense, the estimate that around half of today's workforce will be impacted by Artificial Intelligence (AI) appears broadly accurate. However, the true extent of this impact depends significantly on the interpretative approach adopted.

Firstly, it is essential to understand the neutrality of the concept of "exposure to Artificial Intelligence". This term simply denotes the degree of overlap or interaction between the tasks performed by human workers and those that AI systems are capable of executing[33].

Thus, a high level of exposure to AI does not automatically equate to a high risk of substitution. Rather, it is first necessary to assess the potential for complementarity or even enhancement of the worker's capacity[34].

Accordingly, estimates of exposure to AI vary depending on the analytical framework applied—an approach that itself must be adapted to the field of investigation, whether public or private.

In fact, shifting from an occupation-based to a task-based approach reveals that, within a given job role, only a subset of specific tasks is automatable. Consequently, the actual risk of *complete* worker replacement affects approximately 9% of occupations[35].

This insight is particularly significant within the context of public administration.

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[32] McKinsey Global Institute - MGI, *A Future That Works: Automation, Employment and Productivity*, Report, January 2017, at https://www.mckinsey.com/~/media/mckinsey/featured%20insights/Digital%20Disruption/Harnessing%20automation%20for%20a%20future%20that%20works/MGI-A-future-that-works-Executive-summary.ashx.

[33] E. FELTEN, M. RAJ, SAEMANS R., *Occupational industry, and geographic exposure to artificial intelligence: a novel dataset and its potential uses*, in *Strategic Management Journal*, 2021, vol. 42, 254 – 280, cited in the CNEL study edited by E. DAGNINO, *Intelligenza artificiale e mercati del lavoro. Prima rassegna ragionata della letteratura economica e giuridica*, n. 3/2024, 10.

[34] FPA DATA INSIGHT, *L'impatto dell'intelligenza artificiale sul pubblico impiego*, maggio 2024, 15.

[35] D. ARNTZ, T. GREGORY, U. ZIERAHN, *Revisiting the risk of automation*, in *Economic letters*, 2017, vol. 159, 157-160. It should be noted that the study concerns work in the USA. The same study is referred to, in line of approach, by the CNEL study edited by E. DAGNINO, *Intelligenza artificiale e mercati del lavoro, cit.*, 9.

Applying a task-based lens to the exercise of public powers—carried out in the interest of the community—inevitably leads to the conclusion that virtually no job in public administration can be entirely automated, that is, carried out without human input.

This conclusion is, at least in part, consistent with the findings of statistical studies analysing the employment risk in the Italian public administration.

Estimates relating to the Italian public sector show that of the approximately 3.2 million civil servants (as of 2021), 57% are highly exposed to AI (around 1.85 million), 28% are moderately impacted, and the remaining 15% are minimally or not affected at all.

Among the highly exposed employees[36], around 80% (just under 1.5 million) are likely to experience a *complementary* benefit rather than a *substitution* risk from the implementation of AI tools.

By contrast, of the remaining 20% of highly exposed individuals, only 12% (just over 218,000)—typically those in roles characterised by lower skill requirements or high repetitiveness—show a low potential for synergy with AI. The remaining 8% lie in a "grey zone", where the potential for complementarity with AI tools remains uncertain.

From the analysis of this data alone, it becomes clear that the actual risk of replacement within the public administration is significantly lower than popularly perceived. Only 12% of the 57% of civil servants highly exposed to AI are currently at potential risk of replacement[37].

This segment primarily includes workers classified under the Areas of Operators and Expert Operators, according to the new classification model outlined in Article 52, paragraph 1-bis of Legislative Decree No. 165/2001[38]. These include employees:

– *"who carry out support activities for production processes and service delivery systems, which do not presuppose specific knowledge and/or professional qualifications, corresponding to widely fungible roles"* (Operators); and

– *"workers involved in the production process and in service delivery systems and who carry out process phases and/or processes, within the framework of general directives and predetermined procedures, also through the management of technological instruments which presuppose specific knowledge and/or professional qualifications"* (Expert Operators)[39].

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[36] FPA DATA INSIGHT, *op. cit.*, 18.

[37] FPA DATA INSIGHT, *op. cit.*, 18.

[38] By way of example only, reference is made to the new classification contained in the CCNL Local Functions, signed on 16 November 2022.

[39] Annex A 'Declarations', CCNL Local Functions of 16 November 2022.

However, on closer inspection—and in light of the earlier definitions—it appears that these roles are not at significant risk of replacement by AI, but rather by other forms of automation, including those not involving intelligent systems.

For instance, more "manual" skills may be subject to *robotisation*[40], but not to replacement by algorithms capable of adapting their decisions based on complex interactions. On the contrary, the use of a machine whose output is unpredictable is fundamentally inconsistent with the aim of automating repetitive processes, which by nature rely on consistent and homogeneous outputs.

It should also be noted that, particularly in the Italian context, tasks of a manual or highly repetitive nature are often outsourced via public tenders, meaning that such roles are already in decline within public administration.

Given the above, it follows that nearly all roles within public administration fall into the category of *high exposure–high complementarity occupations*, where AI may be widely used, but only in a supportive capacity due to the essential need for human oversight and interaction. In these roles, AI may assist with specific tasks, but the core activities—centred around the public interest—cannot be delegated to automation[41].

Therefore, any assessment of the "replacement risk" in public administration (and, more broadly, any application of AI in this context) must always be guided the «*general principle […] that, when automation processes are applied in the context of the public sector, supervision of the results by a "natural person official" must always be guaranteed*". In this perspective, therefore, it is not "*imaginable to replace the figure of the official responsible for the procedure with an algorithm: rather, it is certainly possible to imagine that the official responsible for the procedure makes useful use of Artificial Intelligence to be able to carry out more quickly, and with greater precision, activities of the preliminary investigation phase for which he obviously remains responsible: both in terms of verifying the results of the same, and in terms of linking the findings of the preliminary investigation phase and the adoption of the final decision that flows into the final provision of the procedure*"[42].

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[40] E. DAGNINO, *Intelligenza artificiale e mercati del lavoro, cit.*, 11.

[41] M. CAZZANIGA, F. JAUMOTTE, L. LI, G. MELINA, A.J. PANTON, C. PIZZINELLI, E. ROCKAL, M.M. TAVARES, *Gen-AI: Artificial Intelligence and the Future of Work*, IMF Staff Discussion Notes, 2024, in https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2024/01/14/Gen-AI-Artificial-Intelligence-and-the-Future-of-Work-542379, cited in the CNEL study edited by E. DAGNINO, *Intelligenza artificiale e mercati del lavoro, cit.*, 9 ff.

[42] D.U. GALETTA, J.G. CORVALÁN, *Intelligenza Artificiale per una Pubblica Amministrazione 4.0?, cit.*, 19.

From this perspective, it is not conceivable to replace the *responsible official* with an algorithm. Rather, it is entirely feasible—and advisable—for the official to make use of AI tools in order to carry out certain investigatory or preparatory tasks more quickly and accurately. Nonetheless, the official remains fully accountable for verifying the results and for connecting the findings with the final decision issued in the administrative procedure.

In short, the specific characteristics of public employment make it inappropriate to directly transpose the most pessimistic predictions concerning human replacement by AI that are often applied to the private sector[43].

Even the compelling arguments that AI will blur the traditional distinction between "white-collar" and "blue-collar"[44] jobs do not necessarily extend to the public sector, where this distinction continues to have relevance due to the unique impact of AI on public service roles.

Similarly, trends such as *cyclical unemployment*[45], which are likely to define the near-future of the labour market, are expected to affect the private sector more acutely than the public sector. Historically, public sector employment has been less susceptible to dismissals[46], particularly those for "objective justification" such as organisational restructuring or skills obsolescence[47].

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[43] C.B. FREY, M.A. OSBORNE, *The future of employment: How susceptible are jobs to computerisation?*, in *Technological forecasting and social charge*, 2017, vol. 114, 254-280.

[44] S. CRISCI, *Artificial Intelligence and the Ethics of the Algorithm*, in *Foro amm.*, 2018, f. 10, 1801.

[45] *Rivoluzione digitale e occupazione: politiche attive e passive*, in *Lav. Giur.*, 2019, 4, 329 ff.; G.R. SIMONCINI, *L'incidenza della rivoluzione digitale nella formazione dei lavoratori*, in *Lav. Giur*., 2018, 1, 39 ff.

[46] Although legislative developments have led to an increase in the number of cases of termination of employment with the public administration (see A. TAMPIERI, *Il licenziamento del dipendente pubblico*, Turin, 2021; P. ICHINO, *I nullafacenti. Perché e come reagire alla più grave ingiustizia della nostra amministrazione pubblica*, Milano, 2006; see B. CARUSO, L. ZAPPALÀ, *La riforma "continua" delle pubbliche amministrazioni: licenziare i nullafacenti o riorganizzare la governance?*, in *Lav. P.A.*, 2007, 1 ff.), the phenomena of public employee dismissal continue to have a predominantly sanctioning and disciplinary connotation. Therefore, the occurrence of terminations of employment due to obsolescence of skills, or to 'replacements' by automation systems, seems unlikely. On the other hand, it should be pointed out that the phenomenon could equally have devastating effects on the public administration, as continued expenditure to 'maintain' employees lacking essential digital skills could prevent the recruitment of the necessary 'new' skills. The solution to this issue, as will be seen, is through the provision of re-skilling pathways for recruited resources.

[47] One could speak of 'technological dismissal'.

As a result, the real impact of AI in the public sector is more likely to manifest in the form of *techno-stress*[48], stemming not only from an inability to manage new technologies and their rapid evolution but also from perceived competition with machines.

Unlike humans, machines do not rest or work fixed hours. This may cause civil servants to feel inefficient or anxious about being outperformed—fuelled by a largely theoretical, rather than actual, risk of replacement.

The most significant danger, therefore, lies in the potential erosion of work-life balance, as employees strive to maintain their sense of usefulness—irrespective of the actual likelihood of being replaced[49].

In conclusion, the risk associated with AI in civil service employment is subtler and more closely tied to the psychological well-being of public sector workers than to the concrete threat of job loss[50].

5. Conclusions: The Opportunity of 'Augmented Work'

The risks outlined above may, paradoxically, present an opportunity to enhance the well-being of civil servants.

Assuming the general stability of employment within the public sector, corporate welfare initiatives should aim to promote upskilling and reskilling pathways, enabling employees to fully understand and exploit the functionalities of Artificial Intelligence (AI)[51]. This would support the transition towards what has aptly been described as *augmented work*—a form of human–algorithm integration in which employees are relieved of purely executive tasks and enabled to focus on the more professional,

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[48] M. ISCERI, R. LUPPI, *L'impatto dell'intelligenza artificiale nella sostituzione dei lavoratori: riflessioni a margine di una ricerca*, in Lav. Dir. Eu., 1/2022, 3, define techno stress as "*A disorder caused by the inability to cope with or process information and new communication technologies in a healthy way. Salanova, contextualizing it in the workplace, defined it as a negative psychological state associated with the use of information and communication technologies and highlighted that this experience can be linked to feelings of anxiety, mental fatigue, and inefficiency (INAIL 2016, 2017a)*".

[49] P. MANZELLA, M. TIRABOSCHI, *The prevention system and insurance coverage in the context of the IV industrial revolution*, ADPAT University Press, 2021, 220 ff., points out that where the necessary skills to exploit AI are not implemented, the risk is an increase in labour intensity. See also A. GREEN, *Artificial intelligence and jobs: no signs of slowing labour demand (yet)*, in *OECD Employment outlook 2023: Artificial intelligence also the labour market,* Paris, 2023, 102 - 127.

[50] J. KAPLAN, *Le persone non servono*, Roma, 2016; J. KAPLAN, *Intelligenza Artificiale. Guida al futuro prossimo*, *cit.*; M. ISCERI, R. LUPPI, *op. cit.*, 3.

[51] P. ICHINO, *Le conseguenze dell'innovazione tecnologica sul diritto del lavoro*, in *Riv. It. Dir. Lav.*, 2017, 4, 525 ff.; G. SANTORO PASSARELLI, *Trasformazioni socioeconomiche e nuove frontiere del diritto del lavoro. Civiltà giuridica e trasformazioni sociali nel diritto del lavoro*, in *Dir. Rel. Ind.*, 2019, 2, 417 ff.

value-added aspects of their roles. In this model, increased efficiency is achieved through immediate access to strategic information, even in the context of complex and high-risk decisions[52].
The ultimate goal is to improve administrative performance by *"eliminating all the most repetitive work processes and freeing up space for creativity"* among civil servants[53]. This vision entails entrusting certain routine tasks to machines[54], thereby allowing for the more strategic redeployment of staff. In doing so, employees' contributions are no longer submerged in the vast sea of minor, routine activities but are instead enhanced and better aligned with their professional capacities.
However, such a transformation requires a fundamental reorganisation of work processes within the public administration, moving beyond the traditional hierarchical-bureaucratic logic of physical supervision and control. This legacy model represents a *"nineteenth-century mentality, in which the civil servant was monitored through the extreme fragmentation of tasks—rendered repetitive and mechanical—and a vast control apparatus. The logic of control explains the traditional preference for in-office presence, a preference that fails to acknowledge the simple truth that one can spend entire days in the office producing nothing, or conversely make a decisive contribution while working remotely"*[55].
The automation of repetitive activities and the corresponding reallocation of time and talent to more qualified tasks demand a reengineering of work processes centred around a results-based approach[56]. In this new framework, rigid adherence to working hours becomes less relevant, as

[52] F. BUTERA, G. DE MICHELIS, *Intelligenza artificiale e lavoro, una rivoluzione governabile*, Venezia 2024; F. BUTERA, *Disegnare l'Italia. Politiche e progetti per organizzazioni e lavori di qualità*, Milan, 2023.
[53] A. RIPEPI, *Il pubblico impiego e la dirigenza alla prova dell'Intelligenza Artificiale*, in *Amm. e Cont.*, https://www.contabilita-pubblica.eu/2024/11/12/il-pubblico-impiego-e-la-dirigenza-alla-prova-dellintelligenza-artificiale/, 12 novembre 2024.
[54] Theoretically, within the set of tasks managed by a civil servant, automated systems could manage more efficiently all the more repetitive activities, such as, for instance, the sorting of e-mails or incoming documents, internal protocol. In addition, the use of chatbots for the initial front-office management with the citizen could be ventilated. This would make it possible to have a front office that draws directly on all the necessary information in real time and that functions 24 hours a day, which provides for human intervention (during working hours) only in the event of an express request by the citizen, or in cases where the support offered by automated means was not sufficient to solve the problem submitted.
[55] A. RIPEPI, *op. cit.* On the culture of control see also G. ASTUTO, *L'amministrazione italiana. Dal centralismo napoleonico al federalismo amministrativo*, Rome, 2021, 77.
[56] A. RIPEPI, *op. cit.*, 6.

employees' efforts are directed towards specific projects, rather than diluted across numerous micro-tasks.

This is the context in which the tool of *agile work* in the civil service should be strengthened—not merely as an alternative to in-person work, but as a component of *augmented work*. Such an approach enables the employee to manage time autonomously, beyond the constraints of fixed hours, thereby enhancing moments of heightened creativity and insight in pursuit of organisational goals, which should also serve as the basis for performance evaluation.

Agile work is, therefore, among the most effective mechanisms for rethinking working methods in public administration (particularly in the Italian context), as true *agile work* is feasible only within *agile organisations*. These are entities capable of rapid adaptation to external change through new organisational models characterised by decentralised responsibility, the strengthening of integrative roles, the promotion of horizontal relationships and teamwork, the digitisation of services, management by objectives, and a culture oriented towards shared values, a sense of belonging, risk-taking, innovation, and accountability as opportunity[57].

Within this emerging paradigm, the key driver of workplace well-being is *trust*[58].

On the one hand, employees who, when entrusted with greater responsibility for achieving objectives, are also granted more autonomy and flexibility in managing their work–life balance, will likely feel more motivated and satisfied, leading to enhanced individual and organisational

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[57] A. RIPEPI, *op. cit.*, 6.

[58] The 'Principle of Trust' was first codified in Article 2 of Legislative Decree 36/2023. According to this provision, "*The attribution and exercise of power in the public procurement sector is based on the principle of mutual trust in the legitimate, transparent and correct action of the administration, its officials and economic operators*". E. QUADRI, *Il principio della fiducia alla luce del nuovo Codice dei contratti pubblici e delle prime applicazioni della giurisprudenza*, in *Riv. Trim. Scienza amm.*, 2024, Vol. 4, 3, clarifies how the principle of trust is closely linked to the professionalisation of administrations and its officials, given that "*only a professionally competent and qualified administration can regain the discretion that allows it to act in a truly efficient and effective manner. This also applies, for example, to digitalization, given that only highly competent officials will be able to carry out essentially digitalized public tender procedures, using the specific platforms designated for this purpose*". For T. GRECO (2021). *La legge della fiducia. Alle radici del diritto*, 2021, Bari, trust is at the basis of law, since "*the law requires us to trust one another, and it does so when it establishes our mutual rights and duties within any relationship it governs. Of course, it also tells us (and cannot fail to tell us) that when trust is broken, remedies will be ready to support us. But first and foremost, it tells us to trust and requires us to behave accordingly, one that can adequately meet the expectations of those with whom we establish our relationships*".

performance[59]. On the other hand, top management figures within public administration, by granting such autonomy, will be rewarded with higher levels of engagement and effectiveness.
Nonetheless, this shift in approach necessarily requires a prior, detailed analysis of existing work processes, staffing levels, the professional classifications of current employees, and their actual skills and aptitudes—which do not always align with the roles they have been assigned[60].
According to data provided by the Italian Chamber of Deputies, only one in ten workers currently possesses AI-related skills[61].
This highlights the centrality of training in the reorganisation of public sector work—making it evident that continuous learning[62] is not merely a right of the employee, but a structural necessity across their entire career[63].
Moreover, effective implementation of *augmented work* requires algorithms to be used with both competence and critical awareness. In the absence of such expertise, there is a high risk of *automation bias* or the *anchoring effect*[64].
This risk is particularly concerning in the context of public decision-making, where a civil servant—due to convenience or implicit trust in algorithmic outputs—may be inclined to *rationalise* the machine-generated result rather than apply the necessary critical scrutiny.

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[59] Such an approach must, at least for the Italian experience, overcome the preconception of the inefficiency and unreliability of civil servants. Preconceptions that make it difficult, especially for management, to abandon the hierarchical-bureaucratic model based on employee control.

[60] A. RIPEPI, *op. cit.*, 7.

[61] Commission XI Public and Private Employment of the Chamber of Deputies, *Indagine conoscitiva sul rapporto tra Intelligenza Artificiale e mondo del lavoro*, 2023, 9-10.

[62] In terms of a real worker's right, see D. GAROFALO, *Rivoluzione digitale, cit.*, 334.

[63] On the subject of training, it has been pointed out that a distinction should be made between occupations that concern the development and maintenance of artificial intelligence systems (in which new jobs and new work figures should be included), and occupations in which, as a consequence of the complementary effects of AI, workers find themselves having to use or interact with artificial intelligence systems. See CNEL study by E. DAGNINO, *Intelligenza artificiale e mercati del lavoro, cit.*, 9 quoting J. LASSÉBIE, *Skill needs and policies in the age of artificial intelligence*, in *OECD Employment outlook 2023: Artificial Intelligence and the Labour market*, Paris, 151-181.

[64] The *automation bias*, also called *anchoring effect*, is the psychological mechanism, or cognitive error, whereby the official tends to supinely rely on the algorithmic decision believing it to be intrinsically and presumptively right. L. FLORIDI, *"Agere sine Intelligere". L'intelligenza artificiale come nuova forma di agire e i sui problemi etici*, in L. FLORIDI, F. CABITZA, *Intelligenza artificiale. L'uso delle nuove macchine*, Florence, 113 ff., emphasises that this will increase administrative *agere*, to the detriment of the *intelligere* activity of officials, arriving at *artificial agere*, instead of *artificial intelligere*, cf. L. PARONA, *op. cit.*, 146.

Consequently, training should not be limited to technical or technological aspects but must also encompass ethical considerations[65]. Civil servants must be educated in the principles and application of *algoretics* (the ethics of algorithmic decision-making), in order to prevent the opacity of AI from becoming—consciously or otherwise—a source of discrimination.

At the European level, the importance of transforming the risk of replacement into an opportunity for improved work–life balance and individual growth has also been recognised.

In its Resolution 2011/C 372/01 on a Renewed European Agenda for Adult Learning, the Council of the European Union identified skills development—particularly through lifelong learning—as the key to smart, sustainable, inclusive, and secure growth. The ultimate objective of training, as outlined in the resolution, is to foster a cultural transformation in how workers' competencies are planned and developed, so they are better equipped for the evolving demands of the labour market.

This includes the promotion of digital literacy and innovation, according to the principle of *safe innovation*[66].

More recently, the Council Recommendation of 22 May 2018 (2018/C 189/01) on lifelong learning identified eight key competences to be cultivated throughout life:

1. Literacy;
2. Multilingualism;
3. Numerical, scientific, and engineering skills;
4. Digital and technology-based competences;
5. Interpersonal skills and adaptability;
6. Active citizenship;
7. Entrepreneurship;
8. Cultural awareness and expression.

Training in the public sector must evolve in line with these principles.

Indeed, these considerations assume even greater importance in public administration, where—as discussed—the centrality of human judgment is crucial to preserving the discretionary value inherent in public decision-making. This value cannot and should not be abdicated to machines, which lack contextual awareness and, most importantly, the uniquely human capacity for empathy.

Furthermore, the discussion raises another crucial issue: the potential impact of AI competence on recruitment procedures in the public sector.

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[65] S. CRISCI, *op. cit.*, 1787 ff.

[66] Let us recall M. CRISCI, *Lo sviluppo della I.A. da parte della pubblica amministrazione: dall'eccesso di precauzione al principio di "innovazione sicura"*, in www.ambientediritto.it, fasc. 1/2025, 1 ff.

It is conceivable that, in the near future, knowledge of AI tools will become a formal requirement for entry into public employment.
If so, careful thought must be given to the nature and placement of this requirement: should it be an *eligibility criterion* for participation or a *specific area of assessment* within competitive examinations?
There is a risk that AI competence may be reduced to a mere formal certification, which in practice does not adequately reflect an individual's real ability to use algorithmic tools effectively.
If AI literacy is made a requirement for participation, it would need to be evidenced at the application stage through certified qualifications. However, experience with public competitions indicates that certificates alone are poor proxies for practical ability. This is especially true in a field such as AI, where technological developments quickly render prior knowledge obsolete.
Moreover, the imposition of such a requirement could unjustly exclude many candidates who have acquired AI proficiency through hands-on experience. Given the diversity of AI systems, it also seems impractical to standardise such a requirement without creating an excessively restrictive selection framework[67].
A more appropriate solution may be the inclusion of *practical tests* on the use of algorithms, tailored to the specific tools employed by the recruiting administration. Performance in these tests could be scored and used as part of the overall assessment.
In the author's view, this approach offers the most balanced solution—ensuring both broad access to public competitions and the ability to evaluate candidates' practical aptitude for integrating AI into administrative workflows.

[67] On this point, reference is made to the copious and long-standing Italian administrative case law that limits the discretion of the administration in identifying and including participation requirements, establishing that such requirements cannot be illogical in terms of, for example, superfluity, uselessness and excessive burden (Consiglio di Stato, Sez. V, 24 september 2003, n. 5457). Of particular interest is the decision of the T.A.R. Sicilia, Palermo, 13 december 1985, n. 2052, which affirms the invalidity of requirements that are greater and more stringent than those required for employees already in service and performing the same duties.

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