



TECHNIUM
SOCIAL SCIENCES JOURNAL

www.techniumscience.com



Vol. 71/2025
A New Decade for Social Changes

PLUS
COMMUNICATION P



International
Communication & PR

Towards an innovative digital transformation of public administration in Romania through the implementation of artificial intelligence in the process of developing public policies in the field of health

Daniela Georgiana Golea¹, Andreea Florina Radu², Ștefania Oana Coșa³

¹PhD candidate in Political Science (University of Ruse "Angel Kanchev", Bulgaria),

²PhD in Administrative Sciences (Babeș- Bolyai University, Cluj-Napoca, Romania),

³PhD candidate in Economic and Humanistic Sciences ("Valahia" University of Târgoviște, Romania)

kolerdaniela@gmail.com, andre.radu@gmail.com, oanastefaniacosa@gmail.com

Abstract. In the context of global digitisation and the increasing complexity of public health challenges, the integration of artificial intelligence (AI) into public administration emerges as a transformative strategy. This article explores the potential of AI to fundamentally reshape the process of policy-making in Romania's healthcare sector, aiming to transition from reactive governance to anticipatory and data-driven decision-making. The study begins by outlining the conceptual framework of digital transformation and algorithmic governance, followed by an analysis of current limitations in Romania's public health administration. By examining international best practices and identifying contextual opportunities, the paper proposes a structured model for AI integration, tailored to Romania's institutional landscape. The originality of this study lies in its interdisciplinary approach, combining digital innovation theory with empirical public policy analysis to support a paradigm shift in governance.

Keywords. Artificial Intelligence; Artificial Intelligence; Public Administration; Digital Transformation; Public Policy; Health Sector; Algorithmic Governance; Romania

1. Introduction

In an era marked by the accelerated convergence of technology and governance, the digital transformation of public administration is becoming a structural requirement, not just a strategic option. In particular, the health sector in Romania is facing systemic challenges, ranging from chronic under-financing and institutional inefficiency, to major difficulties in accessing and utilising relevant data to inform public policies. This context underlines the imperative need for deep and innovative reform, with artificial intelligence (AI) at its centre as a driver of paradigmatic change.

In Romania, public health policies have traditionally been influenced by administrative constraints, a lack of transparency in decision-making and a limited institutional capacity to anticipate and adapt to the needs of the population. Artificial intelligence, with its advanced

capabilities for predictive analytics, massive data processing and the generation of machine learning-based solutions, offers a revolutionary framework for reshaping public policy-making. In this context, the integration of AI in public administration should not be seen as a mere automation of processes, but as a conceptual mutation that redefines the relationship between the state, the citizen and knowledge.

This paper aims at a rigorous and transdisciplinary analysis of the possibilities of integrating artificial intelligence in public administration in Romania, with a focus on the health sector. The study starts from sound theoretical premises on digital transformation and algorithmic governance, investigates relevant international best practices and proposes a functional architectural model adapted to the Romanian context. It also critically analyses the ethical, legal and institutional challenges associated with such an approach, offering a series of strategic recommendations for a sustainable and inclusive implementation.

The originality of the endeavour lies in the **integrated approach to emerging technologies in the context of public administration in Romania, articulating an innovative vision with empirical foundations and concrete policy proposals**. Through this contribution, it aims to advance the academic and applied discourse on digital transformation, while providing a strategic direction of action for public sector decision-makers.

2. Theoretical and conceptual framework. Foundations of an emerging paradigm

Digital transformation and artificial intelligence are more than just technological tools; they must be understood as systemic vectors of institutional reform that can profoundly reconfigure the architecture of public administration. Particularly in the Romanian context, where the administration is facing **chronic functional deficits**, these technologies may be the only viable chance to recalibrate the relationship between the state and the citizen, in the sense of intelligent, proactive and adaptive governance.

In the context of accelerating digital transformations and increasing pressures on healthcare systems, artificial intelligence (AI) is increasingly emerging as a strategic tool for institutional and decision-making reform. This paper proposes to anchor an emerging theoretical framework that combines concepts from political science, governance studies, adaptive systems theory and digital innovation in the public sector¹.

The research aims to establish an algorithmic governance model applicable in the Romanian public healthcare system, starting from the recognition of three major theoretical premises:

1. Digital transformation is a systemic and institutional process, not just a technological one. It involves a profound restructuring of the functioning mechanisms of public institutions through the native integration of digital technologies², with a focus on interoperability, automated processes, transparency and digital citizen participation;

2. Artificial intelligence is a frontier technology that enables the simulation of human decisions through advanced cognitive processing and machine learning³. In public administration, AI is already being used for predictive analytics, automatic resource allocation and decision scenario modelling;

¹ Helen Margetts, Cosmina Dorobanțu, *Rethinking Public Policy in the Era of AI. Nature Machine Intelligence*, Springer Nature, Vol. 3, pp. 10-15, London, 2021;

² European Commission, *Europe's Digital Decade: Digital Compass 2030*, Bruxelles, accessed on: 5 April 2025, available at: https://ec.europa.eu/info/sites/default/files/communication-digital-compass-2030_en.pdf;

³ OECD, *Recommendation of the Council on Artificial Intelligence*, OECD Publishing, Paris, available at: <https://www.oecd.org/going-digital/ai/principles/>, accessed on: 5 April 2025;

3. Public policies can no longer be understood in the classical paradigm of linear and normative planning. They become adaptive, iterative processes, based on real-time data and capable of self-correction through digital feedback and algorithmic participation⁴.

This triple dimension defines a **new institutional paradigm** in which algorithmic governance is conceptualised as a hybrid decision-making system, made up of human and technological actors⁵ working together to develop tailored, transparent and efficient policies.

Moreover, in the Romanian context, this paradigm cannot be built by mechanically adapting Western models, as there is no mature institutional basis to support AI integration. As a result of the above, the article proposes a new conceptual and regulatory framework, built "from scratch", based on the principles of institutional innovation and digital governance.

This theoretical section will elaborate on the three fundamental components:

- Digital transformation as an adaptive institutional process;
- algorithmic governance and its characteristics;
- reconstruction of the public policy-making process on algorithmic and predictive bases.

2.1. Digital transformation - from computerisation to institutional reconstruction

The concept of **digital transformation** in public administration involves more than the adoption of information technologies. In the specialised literature, digital transformation is defined as a **systemic and integrative process**, which simultaneously affects organisational structures, administrative processes, institutional culture and the state-citizen relationship⁶. Unlike classical computerisation, which aims at optimising existing processes through technological tools, digital transformation involves reinventing these processes on the basis of data and digital interoperability.

In modern public administration, digital transformation involves:

- migration to data-driven **governance**;
 - developing **integrated and collaborative digital platforms**;
 - redefining citizen interaction through proactive digital means⁷;
- and, crucially,
- **decision-making transparency and administrative traceability**.

According to the OECD⁸, successful digital transformation involves four structural dimensions: government digital strategy, data governance, the digital capabilities of institutions, and co-creation mechanisms with citizens. This approach implies moving from a technocratic vision of digitisation to a political-institutional one, in which technological reform is closely linked to governance reform.

In Romania, however, the digitisation of the administration is often understood in an instrumental, fragmented and reactive key. Although strategies such as the *Digital Agenda for*

⁴ World Bank (2023b), *Leapfrogging Governance: Digital Strategies in Emerging States*, Washington, available at: <https://www.worldbank.org/en/topic/governance/publication/reimagining-digital-government>, accessed on: 5 April 2025;

⁵ UNDP, *Governing AI for Public Good: Building Ethical and Effective Institutions*, United Nations Development Programme, New York, available at: <https://www.undp.org/publications/governing-ai>, accessed on: 5 April 2025;

⁶ *Ibid*³;

⁷ *Ibid*⁴;

⁸ OECD, *The E-Leaders Handbook on the Governance of Digital Government*, OECD Publishing, Paris, available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/12/the-e-leaders-handbook-on-the-governance-of-digital-government_2523ea2c/ac7f2531-en.pdf, accessed on: 5 April 2025;

Romania 2020 or *Component C7 of the PNRR* promote the idea of digitisation, the reality of implementation shows a **low digital maturity**⁹, lack of interoperability between institutions and the absence of a functioning digital ecosystem.

According to the *eGovernment Benchmark* report (2023)¹⁰, Romania is well below the European Union average in terms of:

- online availability of public services;
- Data re-use in the public sector;
- inter-institutional interoperability.

These deficiencies are not just technical, but reflect a **closed governance model centred on outdated processes and a lack of strategic integration of technology** into core state functions. This turns digital transformation from a modernisation objective into a **condition for institutional survival**, especially in critical sectors such as health.

In this context, Romania has to make a transition from a **technological logic of "adding software"** to a **logic of "institutional reengineering"**, based on data, algorithms, transparency and real-time digital interaction. Only such an approach can prepare the administration for the effective integration of AI into decision-making processes.

2.2. Algorithmic governance: from reactive decision to anticipatory governance

Algorithmic governance is an emerging field at the intersection of artificial intelligence, data science and public administration, and is fundamentally redefining the way public sector decision-making is conceptualised. This advanced form of governance involves the use of algorithms, in particular those with machine learning capabilities, to analyse massive volumes of data in real time, model scenarios, predict social or economic developments, and formulate public policy recommendations with a high degree of contextual accuracy¹¹. In this sense, algorithmic governance is not limited to the integration of technological tools into the administrative apparatus, but entails an epistemological shift in the very structure of governance - from reaction to anticipation, from bureaucratic routine to adaptive decision, from political intuition to data-driven reasoning.

The concept of algorithmic governance has emerged over the last two decades as a response to the limitations of traditional bureaucratic governance in the face of systemic complexity and information overload¹². It designates the systematic and structured use of algorithms - especially those powered by artificial intelligence models - to assist, augment or even automate decision-making processes in public administration.

Algorithmic governance is a set of automated or semi-automated decision-making processes in which algorithms play an active role in problem identification, resource allocation, prioritisation of interventions and public policy formulation¹³. Unlike classical digitisation, which involves the integration of technology to streamline service delivery, algorithmic governance involves a partial delegation of decision-making authority to technical systems while maintaining public control and accountability.

⁹ European Commission, *eGovernment Benchmark Report 2023*, Brussels, available at: <https://digital-strategy.ec.europa.eu/en/policies/egovernment-benchmark>, accessed on: 5 April 2025;

¹⁰ *Ibid*;

¹¹ *Ibid* ¹¹;

¹² OECD (2023a), *Artificial Intelligence in the Public Sector: Frameworks and Guidelines*, OECD Publishing, Paris, available at: <https://www.oecd.org/gov/ai-in-the-public-sector/>, accessed on: 5 April 2025;

¹³ *Ibid* ¹;

This paradigm involves more than a technological transformation; it marks a profound epistemological shift, in which the human factor collaborates with algorithmic systems in a hybrid decision-making ecosystem. In it, data is collected from multiple sources (administration, health, education, environment), analysed by statistical and machine learning models¹⁴, and the results are used to generate recommendations or administrative decisions with immediate impact. These decisions are not rigid, but adapt to new data through feedback and self-learning mechanisms in a continuous process of policy optimisation and adjustment.

The international literature outlines algorithmic governance as a hybrid architecture in which algorithms become co-decision-makers together with human actors¹⁵, contributing to policy-making by detecting hidden patterns, optimising interventions and continuously learning from previous results. At the same time, this paradigm imposes high demands on transparency, auditability and democratic control of algorithmic decisions, so that technological autonomy does not replace public accountability. The core elements of a mature algorithmic governance system include the collection and processing of data of public interest, predictive modelling of intervention scenarios, partial decision automation, adaptive feedback mechanisms, and, indispensably, ethical and legal auditing of algorithm performance.

Key features of algorithmic governance include:

- Predictive capacity: the use of algorithms to predict social phenomena (e.g. epidemiological outbreaks);
- Decision automation: reducing decision-making time through pre-calibrated data-driven decisions;
- Explainability and accountability: mechanisms for auditability of algorithms to ensure transparency of public decision-making;
- Iterative feedback¹⁶: continuous learning of algorithmic systems based on the results of interventions.

In **international public administration**, algorithmic governance is already applied in areas such as:

- assessing risks of re-offending (e.g. the COMPAS system in the US);
- allocation of health resources (e.g. NHS - UK);
- predictive analysis for urban planning and traffic (e.g. Singapore Smart Nation);
- Tax fraud detection¹⁷ (e.g. Australia, France).

In Romania, the topic of algorithmic governance is in a deep conceptual, normative and institutional vacuum, reflected both in the strategic documents and in the lack of public and academic debate on the subject. Although the National Recovery and Resilience Plan (NRRP), through its Component C7 - Digital Transformation, supports the transition to a digital state, it does not contain any explicit chapter dedicated to the use of AI in public decision-making. Terms such as machine learning, algorithmic governance, auditability or explainable algorithms are completely absent in key strategies such as the National Strategy for Artificial Intelligence (in work), the Digital Agenda for Romania or the Administrative Capacity Building Strategy 2021-2030.

¹⁴ *Ibid* ⁴;

¹⁵ *Ibid* ⁵;

¹⁶ World Bank (2023a), *GovTech: Putting People First*, Washington, available at: <https://www.worldbank.org/en/topic/governance/brief/govtech-putting-people-first>, accessed on: 5 April 2025;

¹⁷ *Ibid* ¹¹;

This absence is not accidental but reflects a **generalised lack of administrative innovation infrastructure**. Romania has no regulatory sandboxes for algorithms in public administration, nor inter-institutional government policy labs to facilitate controlled testing of emerging technologies before their application at scale. In countries such as Estonia, the Netherlands or Finland, these structures not only exist, but are actively involved in the co-creation of public policies, based on iterative, ethically tested and technologically validated digital prototypes.

In contrast, in Romania, the piloting of emerging technologies in the public sector is almost non-existent, and technology procurement is centralised and often isolated from the functional logic of the beneficiary institutions. There are neither clear regulations on the accountability of automated decisions nor national standards on algorithmic explainability, which places the Romanian administration in an area of legal and ethical vulnerability to global technological developments.

Moreover, the Romanian administration system is confronted with a weakly digitised organisational culture, where civil servants are rarely involved in continuous professional training, and fundamental concepts associated with AI - such as algorithmic auditing, digital ethics or user-centred design - are absent from the curriculum of the National School of Administration or from the training programmes coordinated by the institutions in the field. Thus, AI is perceived rather as a "technological luxury" reserved for the private sector, rather than as an operational tool for administrative reform.

This disconnect between global technological advancement and local institutional absorption capacity creates a critical gap which, in the absence of a well-coordinated strategic intervention, may lead to the digital marginalisation of the state. In practical terms, **Romania risks becoming a mere consumer of external technologies**, without the capacity to adapt them to the national context, assess their impact or control the consequences of automated decisions.

And yet, in this landscape dominated by absences, Romania has the unique opportunity of a **leapfrogging institutional reconstruction**¹⁸. Unlike countries that have to reform inherited digital systems, **Romania can design from scratch an algorithmic institutional model**, compatible with the ethical, democratic and transparency requirements of a modern administration. Such a model would require a clear regulatory framework, based on principles such as explainability, shared responsibility and the protection of citizens' rights in the face of automated decision-making, as well as an inter-institutional data strategy that would enable interoperability, standardisation and the re-use of public information in a secure and efficient manner. The absence of outdated, mutually incompatible platforms can enable the design of a **coherent, modular and scalable** institutional digital ecosystem without the transition costs and internal resistance associated with partial reforms.

In this proposed architecture, algorithms would not replace human decision-making, but would support it by providing anticipatory capacity, scenario analysis and personalisation of interventions. Moreover, it would create the preconditions for a state that can respond proactively and intelligently to social, health and economic crises, through policies tailored in real time to citizens' needs.

¹⁸ The concept of *leapfrogging* comes from the economic and development literature and refers to the ability of an organisation, institution or even a state to leapfrog traditional stages of technological or organisational evolution by directly adopting innovative next-generation solutions. In the context of public administration, institutional leapfrogging means that a state that lacks a mature digital infrastructure is not condemned to go slowly through all the classic digitisation steps, but can adopt advanced solutions such as algorithmic governance, explainable AI, open data infrastructures and cloud interoperability from the start;

In particular, the Romanian public health system perfectly illustrates the logic of leapfrogging institutional reconstruction. Although it faces chronic shortcomings - such as fragmented digitisation, lack of interoperability between hospitals, poor IT infrastructure or a non-centralised epidemiological data system - these weaknesses should not be interpreted exclusively as obstacles. From an institutional development theory perspective, they can function as a strategic window of opportunity.

The lack of legacy IT systems that hinder modernisation makes it possible to leap straight to **next-generation digital solutions without high transition costs and without the need to reform already rigid structures**. This is the essence of leapfrogging - the possibility for a system with low digital maturity to leapfrog the classical stages of computerisation, directly adopting infrastructures and processes specific to algorithmic governance, based on data, prediction and automation.

Applied to public health, this model would allow Romania to implement:

- Algorithmic decision systems in medical resource planning;
- real-time epidemiological monitoring based on AI and structured and unstructured data;
- prioritisation of public health interventions based on predictive analysis;
- ethical models for transparent and audited health policy recommendations.

Instead of reforming an outdated hospital IT system, Romania could **design a completely new institutional architecture, interoperable, scalable and based on adaptive algorithmic models**. All on the condition of a clear strategy, an open data infrastructure, a favourable legal framework and an administration able to collaborate across sectors.

This vision of "leapfrogging" in public health is illustrated in Figure 1, which summarises the logical sequence of a mature, adaptive and ethical algorithmic decision-making system. The diagram proposed below is a working tool for Romanian decision-makers who aspire to implement AI not simply as auxiliary software, but as a strategic vector for health policy transformation.

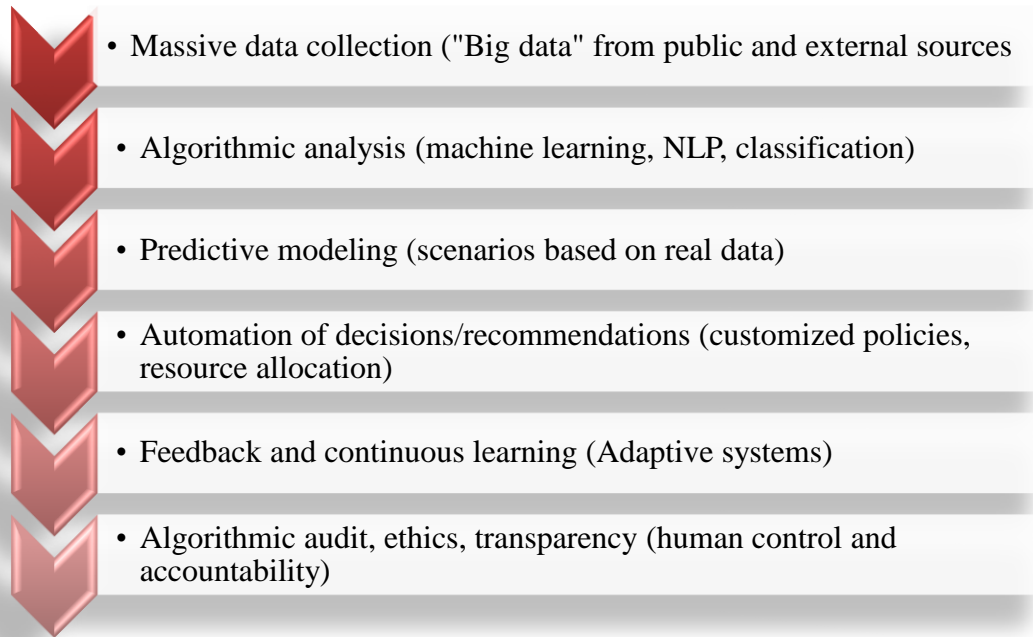


Figure 1 - Conceptual flow of algorithmic governance in public administration. It represents an integrated conceptual scheme of algorithmic governance, structured in a circular sequential model, specific to adaptive artificial intelligence systems. The model illustrates the decision flow of a modern public administration, capable of transforming collected data into dynamic, personalised and efficient public policies, in an ethical and democratic regulated framework. *The figure is not the reproduction of a pre-existing graphical model, but is the result of an original conceptual and visual synthesis by the authors.* It transposes into a clear and coherent format the most important steps identified in the literature on algorithmic governance (OECD, 2023a; UNDP, 2023; WHO, 2021), but logically reorganises them into an adaptive and complete circuit, which specifically reflects: the authors' theoretical vision of algorithmic governance, the needs of the Romanian public health system and the methodological requirements of AI-based public policies. *The construction of the figure was achieved through an iterative process that combined: research of international literature on AI and public administration, analysis of systemic bottlenecks in Romania (data fragmentation, lack of regulation, resistant organisational culture) and logical conceptual modelling of the governance flow in an ideal AI system applicable to administration.*

In the figure above, the first step is the collection of massive data (Big Data) from administrative, epidemiological, social or digital sources (electronic health records, CNAS databases, disease reporting platforms, etc.). Algorithmic analysis follows, in which the data are processed using machine learning, classification or neural network models to extract hidden patterns and understand social and medical dynamics. In the third stage, algorithms allow predictive modelling of administrative or epidemiological scenarios - such as the evolution of an outbreak, the demand for ICU beds, the need for medical staff or the assessment of the impact of health policies. On the basis of these models, algorithmic systems generate recommendations or even automate recurrent decisions (e.g. allocation of local budgets, prioritisation of vaccination, re-deployment of medical staff).

A key component of the model is automatic feedback and continuous learning: algorithms adjust future decisions based on past results, creating an adaptive system that is able

to evolve over time and react dynamically to change. The cycle ends - but does not stop - with the algorithmic audit, transparency and ethics stage, which ensures that automated interventions respect the principles of human rights, non-discrimination, explainability and public accountability. Each of these stages is interdependent and operates in a continuous cycle of refinement, learning and institutional accountability. **The model can be adapted and extended to any public policy area, but is of particular relevance to public health, where speed of reaction and anticipation of risks can save lives.**

Following this conceptual framework, a distinct analysis of artificial intelligence as an institutional cognitive mechanism with a central role in supporting algorithmic governance applied in the health sector is required.

2.3. Artificial intelligence - cognitive mechanism for public systems

Artificial intelligence (AI) is one of the most transformative technologies of the 21st century, with the potential to completely reshape the functions of the state, particularly in terms of analysing, formulating and implementing public policy. Unlike other digital tools, AI is not limited to automating repetitive tasks, but introduces a new type of administrative reasoning, based on simulated cognitive processing, learning from data and real-time adaptive capacity.

Conceptually, AI is defined by the Organization for Economic Co-operation and Development as "a technology-based system that, for a given objective, perceives its environment and takes actions that, with some degree of autonomy, maximize the chance of achieving that objective"¹⁹. This definition emphasizes the deliberative nature of AI, its ability to simulate human thinking and to make decisions under conditions of uncertainty and complexity.

In public administration, AI can fulfil multiple roles: from automatically analyzing official documents, to predicting demand for certain public services, detecting risks in public health or efficiently allocating resources in times of crisis. Applications already validated in other countries include algorithms that optimize the distribution of vaccines, automatically identify eligible beneficiaries for social programs or support prediction in early warning systems for infectious diseases²⁰.

In the health sector, AI can become an irreplaceable institutional cognitive mechanism. In addition to predictive analysis of epidemiological dynamics, AI can support decision making in strategic planning of health services, identification of gaps in health coverage, allocation of human and material resources in hospitals, and in tailoring public health interventions to the demographic and medical profile of the population. AI systems can also help strengthen institutional capacity to respond rapidly to health crises such as pandemics, natural disasters or mass casualties.

¹⁹ OECD (2019), *Recommendation of the Council on Artificial Intelligence*, OECD Publishing, Paris, available at: <https://www.oecd.org/going-digital/ai/principles/>, p.6, accessed on: 5 April 2025;

²⁰ *Ibid* ¹²;

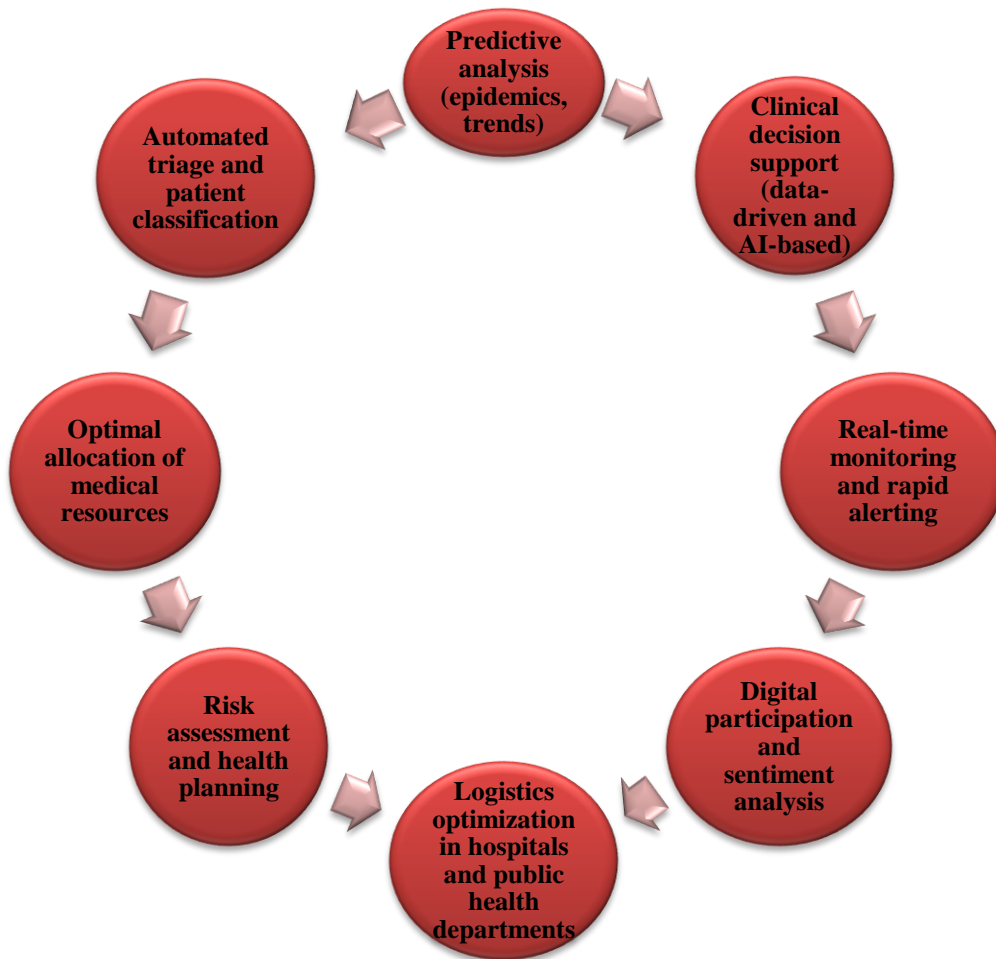


Figure 2 - The roles of artificial intelligence in public health. The figure provides a summary and functional representation of the main operational roles of artificial intelligence in public health, illustrating how AI can support strategic, clinical and logistical decision making in an administrative system geared towards anticipation, efficiency and personalisation. The diagramming of these functions is not abstract, but reflects concrete applications already tested in public health systems in countries such as the UK (through the NHS AI Lab), France, Luxembourg (Predi-COVID) or Estonia - countries with consolidated digital infrastructures and regulatory frameworks adapted to the 21st century (NHS England, 2023; Luxembourg Institute of Health, 2022; OECD, 2023; WHO, 2021). The functions included in the framework - such as predictive analytics, automated triage, clinical decision support, real-time monitoring, adaptive health planning, risk assessment, digital participation and logistics optimisation - are essential dimensions of an outcome-oriented and citizen-centred algorithmic governance. *The figure does not represent the reproduction of a pre-existing graphical model, but is the result of an original conceptual synthesis made by the authors based on theoretical observations and international best practices synthesised in the literature.*

A notable example is the implementation of the NHS AI Lab system in the UK, which supports health authorities in making decisions on equipment allocation and case prioritization

by machine learning from historical and current patient data²¹. Likewise, the Predi-COVID platform in Luxembourg uses the AI²² to assess individual risks of complications in COVID-19 infected patients and to allocate personalized interventions. Such initiatives could be replicated in Romania, provided there is a reliable data infrastructure, clear regulation on algorithmic accountability and an administration ready to integrate AI not as an auxiliary technology but as a complementary institutional actor in the decision-making process.

Currently, Romania is at an early stage in the development of a favorable AI ecosystem. There is no operational legal framework for the use of artificial intelligence in the public sector, and medical data is stored in incompatible, non-transparent and rarely reusable systems. Moreover, there are no functional public algorithm testing platforms (testbeds), and training programs for civil servants do not contain AI modules, even at an introductory level. This context makes **the integration of AI in public health a structural challenge, but also a strategic opportunity to transform the Romanian administration into an intelligent, adaptive and anticipatory decision-making actor.**

In the short term, it is necessary to create an institutional and legal framework for the integration of AI in public administration, accompanied by standards for algorithmic auditing, data protection regulations and investment in human capital training. In the long term, AI should become the central cognitive mechanism of modern Romanian administration, especially in critical areas such as health, where speed, accuracy and the ability to personalise decisions can make the difference between effective interventions and system failures. For a clear and applied understanding of how artificial intelligence can transform the functioning of the public health system, including in Romania, Figure 2 above visually maps visually its main functional roles - from prediction and allocation, to adaptive intervention, clinical decision support and digital citizen participation, being tailored to the needs of the Romanian healthcare system.

In Romania, where the implementation of AI in public administration is at an early stage, **this diagram provides an original, adaptable and realistic conceptual model** that can guide institutional actors in the process of strategic integration of artificial intelligence in the health sector.

In conclusion, artificial intelligence should no longer be seen as a mere digital extension of bureaucratic processes, but as an **institutional cognitive mechanism** with the capacity to fundamentally reconstruct the decision-making architecture of public administration. In the health sector, this capacity translates into a proactive, adaptive and personalised administration, where decisions are not just based on general rules, but on predictive analytics, explainable algorithms and interventions calibrated to each region, institution or population group.

Therefore, the applied analysis of AI in public health governance must be followed by a rigorous methodological reflection on the conditions, criteria and dimensions through which this transformation can be conceptualised, designed and evaluated. These aspects will be detailed in the next subchapter.

²¹ NHS England (2023), *NHS AI Lab: Roadmap and Achievements*, NHS Transformation Directorate, London, available at: <https://transform.england.nhs.uk/ai-lab/nhs-ai-lab-roadmap/>, accessed on: 5 April 2025;

²² Luxembourg Institute of Health (2022), *Predi-COVID: Using AI for Personalised Risk Assessment*, Luxembourg, available at: <https://www.lih.lu/en/research/projects/predi-covid-14107>, accessed on: 5 April 2025;

3. Strategic directions for the integration of artificial intelligence in the Romanian public health administration

In Romania, public administration is in a tense transition phase: on the one hand, the pressure of digital modernisation is accelerated by European requirements and social expectations, and on the other hand, the actual institutional capacity to absorb innovation is deeply limited by structural factors - rigid bureaucracy, lack of data interoperability, lack of training and cultural resistance to change. In this context, the introduction of artificial intelligence in governance - and particularly in public health - cannot be conceived as a mere technological upgrade, but as a far-reaching reform with structural, ethical and organisational implications.

This paper proposes a series of innovative strategic directions for the integration of AI in health administration, starting from the Romanian specificity and avoiding the mechanical replication of Western models. The originality of the proposals lies in adapting algorithmic logic to the system's current dysfunctions - not just to compensate for them, but to transform them into opportunities for intelligent institutional reconstruction. In this way, AI is treated not as an external tool, but as an internal digital actor of the administration, capable of contributing to streamlining decision-making, anticipating risks, optimising resources and increasing equity in access to services.

3.1. Reconfiguration of the institutional architecture for AI in health

The implementation of artificial intelligence in the public health sector in Romania cannot be conceived in the absence of a substantial institutional restructuring, which would allow the absorption and operation of these technologies under conditions of legality, ethics and administrative efficiency. Currently, the Romanian administration is organised around a linear bureaucratic model, with fragmented decision-making centres, discontinuous information flows and disparate IT systems, which cannot support the integration of algorithmic processes such as machine learning or adaptive prediction.

The reconfiguration of the institutional architecture implies, first and foremost, institutionalising AI within existing administrative structures by setting up cross-sectoral algorithmic units. These could operate in the form of *AI Policy Labs* or *Algorithmic Governance Directorates*, subordinated to the Ministry of Health, with a coordinating role, data analysis, policy simulation and ethical audit. Such structures would enable the state not only to utilise AI, but to **learn institutionally**, on an ongoing basis, based on algorithmically generated results.

Secondly, there is a need to **interoperable existing platforms and databases** (CNAS, INS, DSPs, county hospitals), which currently operate in isolation and are technically incompatible. AI cannot operate in a closed, fragmented and non-transparent data environment. Standardisation and semantic unification of health data is an essential technical prerequisite for training algorithms and generating reliable results.

At the same time, the reconfiguration of the architecture must also include a **clear legislative framework** on the accountability of algorithmic decisions, the right of citizens to challenge automated decisions and the obligation of external audit for all AI systems used in the administration. Romania does not currently have a regulation dedicated to algorithmic governance, and the absence of a coherent legal framework may lead to abuses, institutional opacity or loss of citizens' trust.

In this respect, it is essential that the future **National Strategy for Artificial Intelligence** includes a special chapter dedicated to public administration, in which health is

treated as a strategic priority sector, not only from an economic point of view, but also in terms of the social and ethical impact of decision automation.

3.2. Proposal of an algorithmic ecosystem adapted to Romania

In order for artificial intelligence to become an efficient and ethical governance tool in the Romanian public health system, it is necessary to create an integrated algorithmic ecosystem, which logically and functionally interconnects all the institutional, technological and social components involved in the decision-making process.

Figure 3, which follows, proposes a conceptual architecture adapted to the Romanian context, centred on an intersectoral algorithmic unit (AI Lab), under the coordination of the Ministry of Health and a possible national AI Policy Unit. This unit would function as a point of convergence between medical systems (public and private), existing digital platforms (e.g. CNAS, DSP, SIUI) and AI modules responsible for analysis, triage and recommendations.

The critical point of the ecosystem is the interoperable national database, which would unify information flows between institutions, eliminating current fragmentation and inconsistencies. This database would enable the continuous feeding of relevant information, updated in real time, into the AI modules, thus facilitating machine learning and adaptive prediction.

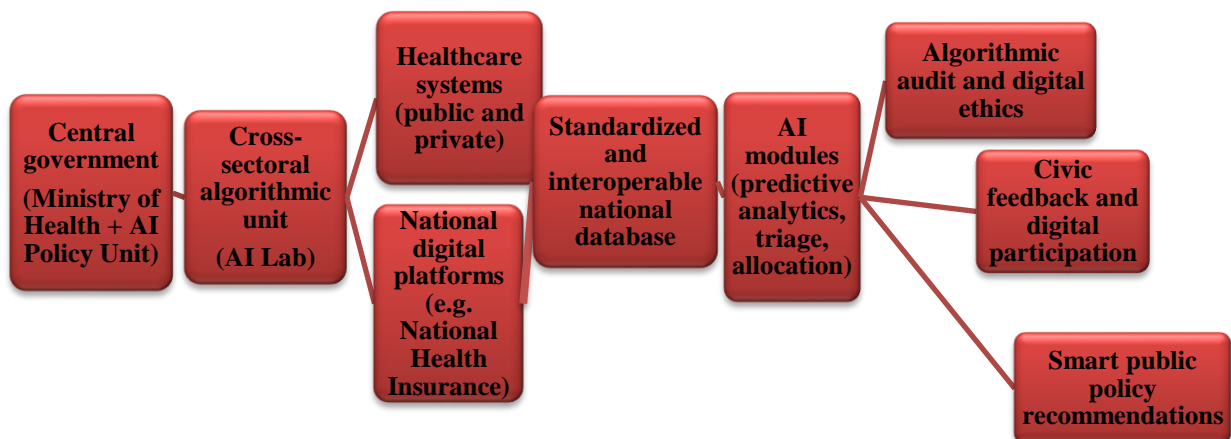


Figure 3 - Algorithmic ecosystem adapted to the Romanian context in healthcare.

The figure proposes an integrated conceptual model for the algorithmic ecosystem necessary for the integration of artificial intelligence in public administration in the health sector in Romania. This schema visualises the functional and institutional interdependencies essential for the coherent and ethical operation of AI technologies in an administrative system that, in its current form, is fragmented, bureaucratic and insufficiently digitised. At the heart of the ecosystem is the standardised and interoperable national database, which enables the seamless and uniform flow of data between actors. This is the key infrastructure without which AI modules cannot function - as algorithms require large volumes of structured data to learn and generate valid results. On the basis of this data, the system activates a series of specialised AI modules: for predictive analytics, automated triage, intelligent resource allocation and identification of critical points in the system. The output generated by these modules is then routed to three verification and feedback components: algorithmic auditing and digital ethics - for assessing legality, transparency and bias; civic feedback and digital participation - for

adjusting decision based on citizens' perceptions; intelligent public policy recommendations - delivered to decision-makers, for fast, personalised and evidence-based interventions. This model reflects a system-loop logic, where data, decision, ethics and feedback regulate each other in real time, in a process of adaptive algorithmic governance. Moreover, **the proposal has an applicable character**, being specifically designed for Romania, where such a functional architecture does not yet exist, but where institutional leapfrogging is possible through strategic digitisation. *The conceptual model reflected in the Figure is the result of the authors' own synthesis, based on a comparative analysis of global policy documents in the field of artificial intelligence and digital governance*²³. *The components were chosen based on criteria of strategic functionality, technical feasibility and institutional applicability in the context of Romania, where such a systemic framework is lacking. Therefore, the figure is not adapted from a pre-existing model, but constructed in an original way, as a result of the applied interpretation of international good practices and the identification of structural gaps in the national administration.*

In its ideal form, such an ecosystem would contribute to transforming the Romanian administration (even systems in other European countries) into an intelligent and proactive actor, able to respond quickly to health crises, to optimise strategic planning and to tailor public health policies to the needs of the population.

3.3. Final strategic recommendations

In the light of the theoretical findings and the proposed conceptual model, we consider that the integration of artificial intelligence in public administration in Romania, with a focus on the health sector, requires a strategic approach based on six essential directions.

First of all, it is imperative that the forthcoming National Strategy for Artificial Intelligence expressly includes public administration and health as priority areas for intervention. This strategy should enshrine a set of standards for the responsible use of AI in administrative decision-making, with a focus on algorithmic auditing, transparency, explainability and digital ethics. The lack of a clear regulatory framework in this respect is currently one of the most important institutional vulnerabilities.

Secondly, it is recommended to operationalise an interoperable, standardised and open national data infrastructure to provide the technological foundation for the effective application of artificial intelligence. This infrastructure should integrate existing data from CNAS, DSP, SIUI and other public entities in the health sector, in a format compatible with machine learning and prediction algorithms.

A third direction is the institutionalisation of a dedicated AI structure under the Ministry of Health, such as an AI Lab, to act as a national hub for testing, validating, auditing and applying AI solutions in public health. Such a unit could collaborate with universities, research institutes and private actors, while becoming a centre of excellence in algorithmic governance.

At the same time, there is a need to train a new generation of digitally-savvy civil servants who are able to interact competently with data, algorithms and the ethical principles of

²³ Sources used include: OECD (2023); WHO (2021); UNESCO (2021), *Recommendation on the Ethics of Artificial Intelligence*, UNESCO Publishing, Paris, available at: <https://unesdoc.unesco.org/ark:/48223/pf0000381137>, accessed on: 5 April 2025; UNDP (2023); World Bank (2023), sources already mentioned above.

AI. Training programmes should include modules on data-driven policy, explainable AI, digital ethics and technologically augmented public participation.

Another key element is the adoption of sector-specific legislation on AI governance in the public sector, in line with the European Commission's proposals for an AI Act. Such regulation should define responsibilities, prevent algorithmic risks and ensure transparent democratic control over automated decisions.

Finally, the integration of AI into public administration must go hand in hand with the strengthening of a participatory culture and digital civic dialogue, so that technology becomes an enabler of inclusion, not a tool of alienation. Algorithmic governance should be understood as an extension of open governance - one in which citizens can understand, influence and challenge AI-supported decisions, based on clear public accountability mechanisms.

These strategic directions do not constitute an exhaustive list, but a guiding framework for the digital reform of the Romanian administration, which can transform the healthcare system from a reactive and fragmented domain into a proactive, integrated and equitable digital ecosystem. It is essential that all these transformations are realised within a robust regulatory and ethical framework that prevents the risks of algorithmic discrimination, decision opacity and digital exclusion. Romania must learn from international examples, but must also build its own model of digital governance, in which AI is a means of strengthening citizens' trust in institutions, not a distancing factor.

4. Conclusions

The aim of this paper was to formulate a theoretical and applied vision on the integration of artificial intelligence in the Romanian public administration, focussing on the health sector. In a context marked by institutional fragmentation, systemic challenges and the absence of a functional regulatory framework, the proposed research offers a double scientific contribution: conceptual, by defining the theoretical framework of algorithmic governance, and applied, by developing an institutional model adapted to the realities and needs of Romania.

A central element of the paper is its innovative character. In Romania, the topic of algorithmic governance applied to public policies is insufficiently explored, and its application in the field of public health has not been, so far, addressed in a systematic academic framework. Therefore, the article fills an epistemological and strategic gap, proposing not only a critical analysis of the international literature, but also a contextualised adaptation with immediate practical relevance.

The proposed conceptual model - detailed by the figure of the algorithmic ecosystem - constitutes a methodological and visual innovation, representing a coherent synthesis between the international recommendations formulated by organisations such as OECD, WHO, UNDP or UNESCO and the particularities of the Romanian administration. This model could serve as a guiding framework for future digitisation policies in healthcare, especially given that Romania does not yet have a National Strategy for AI that includes the public administration and the healthcare sector as central pillars.

The findings also emphasise the importance of developing new institutional capacities - including the creation of cross-cutting algorithmic units, an interoperable data infrastructure and a robust ethical framework - to enable the responsible and effective use of AI. More than a technological solution, AI is understood here as an institutional cognitive mechanism, capable of transforming the way public policies are formulated, implemented and evaluated.

The paper emphasises that digital transformation should not be understood as a mere automation of existing processes, but as a profound reconstruction of administrative logic, in

which data, algorithms, ethics and civic participation form a living, adaptive and open system. In this sense, the integration of AI in the public health sector becomes a test of institutional maturity and an indicator of the state's capacity to innovate in the interest of the citizen.

For future research, proposed directions include empirical validation of the model through institutional pilot projects, comparative analyses of digital governance strategies in other post-communist countries and the study of public perception of the use of AI in administrative decision-making. These extensions will contribute to the development of a new administrative paradigm in Romania: one that is anticipatory, intelligent and anchored in the digital reality of the 21st century.

Selective Bibliography

- [1] Helen Margetts, Cosmina Dorobanțu, *Rethinking Public Policy in the Era of AI. Nature Machine Intelligence*, Springer Nature, Vol. 3, London, 2021;
- [2] European Commission, *Europe's Digital Decade: Digital Compass 2030*, Bruselles, accessed on: 5 April 2025, available at: https://ec.europa.eu/info/sites/default/files/communication-digital-compass-2030_en.pdf;
- [3] Organization for Economic Co-operation and Development (OECD), *Recommendation of the Council on Artificial Intelligence*, OECD Publishing, Paris, 2019, available at: <https://www.oecd.org/going-digital/ai/principles/>, accessed on: 5 April 2025;
- [4] World Bank (2023b), *Leapfrogging Governance: Digital Strategies in Emerging States*, Washington, accessed on: 5 April 2025, available at: <https://www.worldbank.org/en/topic/governance/publication/reimagining-digital-government>;
- [5] United Nations Development Programme (UNDP), *Governing AI for Public Good: Building Ethical and Effective Institutions*, United Nations Development Programme, New York, available at: <https://www.undp.org/publications/governing-ai>, accessed on: 5 April 2025;
- [6] **Organisation for Economic Cooperation and Development (OECD)**, *The E-Leaders Handbook on the Governance of Digital Government*, OECD Publishing, Paris, available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2021/12/the-e-leaders-handbook-on-the-governance-of-digital-government_2523ea2c/ac7f2531-en.pdf, accessed on: 5 April 2025;
- [7] European Commission, *eGovernment Benchmark 2023*, Publications Office of the European Union, Brussels, 2023, <https://digital-strategy.ec.europa.eu/en/policies/egovernment>, , accessed on: 5 April 2025;
- [8] OECD (2023a), *Artificial Intelligence in the Public Sector: Frameworks and Guidelines*, OECD Publishing, Paris, available at: <https://www.oecd.org/gov/ai-in-the-public-sector/>, accessed on: 5 April 2025;
- [9] World Bank (2023a), *GovTech: Putting People First*, Washington, available at: <https://www.worldbank.org/en/topic/governance/brief/govtech-putting-people-first>, accessed on: 5 April 2025;
- [10] **Organisation for Economic Cooperation and Development (OECD)** 2019, *Recommendation of the Council on Artificial Intelligence*, OECD Publishing, Paris,

- available at: <https://www.oecd.org/going-digital/ai/principles/>, p.6, accessed on: 5 April 2025;
- [11] NHS England (2023), *NHS AI Lab: Roadmap and Achievements*, NHS Transformation Directorate, London, available at: <https://transform.england.nhs.uk/ai-lab/nhs-ai-lab-roadmap/>, accessed on: 5 April 2025;
- [12] Luxembourg Institute of Health (2022), *Predi-COVID: Using AI for Personalised Risk Assessment*, Luxembourg, available at: <https://www.lih.lu/en/research/projects/predi-covid-14107>, accessed on: 5 April 2025;
- [13] World Bank, *Data-Driven Decision-Making in the Public Sector*, World Bank Group, Washington D.C., 2023;
- [14] European Commission, *Proposal for a Regulation Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act)*, Brussels, 2021;
- [15] World Health Organisation WHO, *Ethics and Governance of Artificial Intelligence for Health*, World Health Organization, Geneva, 2021;
- [16] United Nations Educational, Scientific and Cultural Organisation UNESCO, *Recommendation on the Ethics of Artificial Intelligence*, UNESCO Publishing, Paris, 2021;
- [17] Romanian Ministry of Research, Innovation and Digitalisation, *Component C7 - Digital Transformation. National Recovery and Resilience Plan (PNRR)*, Romanian Government, Bucharest, 2021, <https://mfe.gov.ro/pnrr/>.