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The Evolution of The Information And Communication Technology Paradigm In Public Administration

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ABSTRACT

The development of information and communication technology (ICT) has transformed how governments manage organisations, deliver public services, engage with citizens, and use information in decision-making. These changes are not merely technical; they also involve philosophical assumptions about the nature of public administration, the sources of administrative knowledge, and the values that government should uphold. This article examines the development of ICT in public administration through the philosophy of administrative science, focusing on traditional public administration, New Public Management (NPM), New Public Service (NPS), New Public Governance (NPG), Digital Era Governance, and digital governance and data-driven government. The study employs a qualitative design based on library research and conceptual analysis of scholarly books and articles, international policy frameworks, and relevant Indonesian regulations. The analysis applies ontological, epistemological, and axiological dimensions and compares the dominant orientation of each paradigm. The findings indicate that ICT has evolved from an instrument for bureaucratic record-keeping and control into an enabler of efficiency, participation, service integration, collaboration, and data-informed decision-making. Digital transformation also creates risks of fragmented systems, the reduction of public values to performance indicators, the digital divide, algorithmic bias, technological dependency, and privacy violations. The article proposes a three-layer evaluation framework of legality, performance, and democratic legitimacy, to be applied jointly so that digital transformation remains oriented towards the public interest.

INTRODUCTION

The development of information and communication technology (ICT) is one of the most important forces reshaping public administration. Internet networks, information systems, service applications, cloud computing, data analytics, and artificial intelligence are pushing governments to change work processes, coordination patterns, and relationships with citizens. Digital transformation is not simply the digitisation of existing services but a change in processes, structures, and organisational culture (Mergel et al., 2019). It widens the possibility of faster and more integrated services while demanding institutional adjustment, staff capacity, data governance, and accountability. E-government is expected to create public value through more efficient, open, and accountable services (Twizeyimana & Andersson, 2019), and technology has become a central driver of public sector innovation (De Vries et al., 2016).

Technology in public administration cannot be understood as a neutral tool that simply speeds up work. The choice of technology, application design, data classification, performance indicators, and algorithms can affect who receives services, which information

is treated as important, and how administrative decisions are made. ICT can shift discretion from frontline officials to the designers of systems and the rules embedded in software (Bovens & Zouridis, 2002). Artificial intelligence extends this shift, reshaping bureaucratic discretion (Bullock, 2019) and creating forms of "artificial discretion" whose effects must be judged by effectiveness, efficiency, equity, manageability, and political feasibility (Young et al., 2019). It also raises technical, legal, ethical, and social challenges (Wirtz et al., 2019), including the difficulty of holding algorithms to account (Busuioc, 2021). Digitalisation is therefore directly linked to questions of authority, procedural justice, and democratic control.

These changes need to be read through the evolution of public administration paradigms. Traditional public administration emphasises legality, hierarchy, procedure, and impartiality. New Public Management (NPM) strengthened the orientation towards efficiency, outputs, and performance measurement (Hood, 1991). New Public Service (NPS) treats people as citizens with rights and the capacity to shape the public interest (Denhardt & Denhardt, 2000), while New Public Governance (NPG) emphasises networks and interdependence among actors (Osborne, 2006), and the value of public services is co-created by providers and users (Osborne et al., 2016). Digital Era Governance highlights reintegration, needs-based holism, and the digitalisation of government processes (Dunleavy et al., 2006). Digital governance and data-driven government widen attention to data integration, digital service design, openness, responsible data use, and user-centred services (OECD, 2020), and trustworthy use of data depends on deliberate data governance (Janssen et al., 2020). These paradigms rarely replace one another entirely; in practice, elements of traditional administration, NPM, and governance coexist within the same organisations (Iacovino et al., 2017).

In Indonesia, digital transformation of government is grounded in Presidential Regulation No. 95 of 2018 on the Electronic-Based Government System (SPBE), Presidential Regulation No. 39 of 2019 on One Data Indonesia, and Law No. 27 of 2022 on Personal Data Protection. Together these regulations show that digital transformation requires not only applications but also governance, integration, data standards, security, and protection of citizens' rights. The existence of regulations does not, however, prove that all digital services are effective, inclusive, or accountable. Evidence from Indonesia shows that new digital systems introduced without transition management and user support can increase administrative burden and lower citizens' assessments of procedures and processing time (Nabawi et al., 2026). Digital encounters are not equally easy for all users (Lindgren et al., 2019), and gaps in digital skills determine who benefits from online services (Scheerder et al., 2017).

From the perspective of the philosophy of administrative science, these developments raise fundamental questions (Ongaro, 2019; Wessels, 2021). Ontologically, how do the nature of public organisations and the relationship between government and citizens change when administration is mediated by technology? Epistemologically, how are data, algorithms, citizens' experiences, and professional knowledge used to produce accountable decisions? Axiologically, which values should underpin digital transformation: efficiency, legal certainty, justice, openness, participation, or the protection of rights? These questions matter so that technological progress is not treated as an end in itself.

Accordingly, this article analyses the evolution of ICT paradigms in public administration through ontology, epistemology, and axiology. It compares the orientations of the paradigms and develops an evaluation framework integrating legality, performance, and democratic legitimacy. Its intended contribution is the conceptual understanding that the success of digital government must be judged not only by the availability of systems and the speed of transactions, but also by the quality of decisions, equitable access, protection of rights, and the creation of public value.

METHOD

This article uses a qualitative design based on library research and conceptual analysis. This approach was chosen because the study examines the development of ideas and paradigms of ICT in public administration rather than measuring the impact of a particular application or digital programme at a specific site; it therefore presents no field data or empirical claims about the success of digitalisation in government agencies. A conceptual article must make explicit its choice of theories, the role of each concept, and how the argument leads to its conclusions (Jaakkola, 2020). The review was conducted integratively so that literature from different traditions could be synthesised into a coherent framework (Snyder, 2019; Torraco, 2016). The materials comprise academic literature on traditional public administration, NPM, NPS, NPG, Digital Era Governance, and digital transformation of the public sector; the OECD digital government policy framework; and Indonesian regulations on the Electronic-Based Government System, One Data Indonesia, and personal data protection. Policy documents and regulations were read as texts whose content, purpose, and limits had to be interpreted critically (Morgan, 2022), and literature was selected for its relevance to the study's focus and its connection to the philosophical dimensions of public administration.

The analysis proceeded in three stages. First, the main ideas and orientation of each paradigm were identified, including how it positions ICT. Second, the implications of each paradigm were interpreted through ontology, epistemology, and axiology, drawing on work that treats these dimensions as foundations for understanding public value in public administration (Ongaro & Yang, 2025). Third, a comparative synthesis was developed to formulate an evaluation framework for the use of ICT covering legality, performance, and democratic legitimacy. Because the study is conceptual, its results are an argumentative synthesis of the literature, and their application to particular government contexts requires empirical testing.

RESULT AND DISCUSSION

Traditional Public Administration: ICT as an Instrument of Bureaucratic Rationality

Traditional public administration grew out of the legal-rational model of bureaucracy, which grounds administrative order in a division of labour, a hierarchy of authority, documentation, and formal rules. Officials act on the basis of institutionalised competence and authority, and public action is expected to be traceable through standard procedures. Its strength lies not only in orderliness, but also in guaranteeing impartiality and equal treatment under the same rules. Equating classical bureaucracy solely with slowness is therefore a simplification that overlooks the function of administrative law.

Within this orientation, ICT was first understood as a tool to strengthen internal bureaucratic functions: typing and record-keeping, electronic archiving, correspondence, data storage, document control, and reporting. Digitalisation made administrative trails easier to audit and rules more consistent to apply. Applications, however, often followed the organisation's division of labour, producing databases and systems separated by unit. Computerisation without process simplification can simply move cumbersome procedures onto a digital interface without changing citizens' experience.

The relationship between technology and administrative authority becomes more complex when decisions are encoded in software. Discretion does not necessarily disappear through automation; it can move from frontline officials to the designers of systems and decision rules (Bovens & Zouridis, 2002). This insight is relevant to algorithmic governance: coded rules may increase consistency, but they risk closing off contextual judgement, error correction, and explanation to citizens (Bullock, 2019). Electronic government should therefore be designed to preserve the equality and impartiality that bureaucracy was meant

to secure (Cordella, 2007).

Ontologically, public administration is seen here as a formal institutional order defined by office, authority, and legal rules; ICT serves this order and is not an independent source of legitimacy. Epistemologically, legitimate administrative knowledge rests mainly on document classification, standard procedures, consistent records, and the conformity of decisions with legal norms, so administrative truth tends to be established by verifying compliance. Axiologically, the core values are legal certainty, orderliness, impartiality, and procedural accountability. A philosophical tension arises when digital uniformity is treated as sufficient justice: decisions that are consistent with the rules may still ignore citizens' vulnerabilities or special circumstances. ICT within the traditional frame should therefore be accompanied by a right to reasons, objection mechanisms, and human oversight, so that formal legality is not separated from substantive justice.

New Public Management: ICT as an Instrument of Efficiency and Performance Measurement

New Public Management emerged as a critique of bureaucratic rigidity and input-oriented control. Its doctrines include professional management, explicit performance standards, an emphasis on outputs, disaggregated units, competition, private-sector management styles, and discipline in resource use (Hood, 1991). Service users tend to be treated as customers who expect speed, accuracy, and quality, and organisational performance must be shown through measurable results rather than procedural compliance alone.

In relation to ICT, NPM encouraged process automation, management information systems, performance dashboards, budgeting applications, service tracking, and indicator-based evaluation. Administrative databases were developed to compare costs and outcomes, monitor targets, and identify service bottlenecks. As an analytical illustration, a digital licensing service can track average processing time, transaction costs, application error rates, and user satisfaction. Such tools can strengthen information-based decisions, provided that indicators are valid and not manipulated.

The logic of efficiency is not without risk. NPM itself embodies a tension between efficiency and equity (Hood, 1991). When success is defined mainly by quantitative targets, organisations may focus on easily counted services, neglect complex cases, or exclude citizens with limited digital literacy (Scheerder et al., 2017). Fragmentation caused by organisational disaggregation and contracting can also impede information integration between agencies, which is why reintegration became a central response in digital-era governance (Dunleavy et al., 2006).

Ontologically, public organisations are imagined as resource managers that can be steered through incentives, targets, and provider–user relationships; ICT is a technology for optimising operations. Epistemologically, the approach privileges instrumental rationality and quantitative evidence: efficiency, outputs, processing time, and performance indicators justify managerial action. Axiologically, efficiency, effectiveness, responsiveness, and economy take priority. The philosophical problem arises when what is easy to measure is equated with what matters most: customer satisfaction is not the same as justice for citizens, and speed targets do not necessarily capture the protection of rights. Digital indicators must therefore be tested against wider public values, including the distribution of benefits, access for vulnerable groups, decision quality, and accountability (Twizeyimana & Andersson, 2019).

New Public Service and New Public Governance: ICT as a Democratic Space and Collaborative Network

New Public Service and New Public Governance share a rejection of public service

centred solely on hierarchical control or market efficiency, but they should be distinguished. NPS is a normative orientation that emphasises democracy, citizenship, dialogue, and the public interest, whereas NPG is a governance perspective that highlights interdependence among organisations, networks, and coordination among multiple actors. The distinction matters so that the idea of serving citizens is not equated with every form of cross-sector cooperation.

Under NPS, public servants should help citizens articulate and meet shared interests rather than steer society (Denhardt & Denhardt, 2000). ICT is thus judged not only by transaction speed but by its capacity to open information, amplify citizens' voices, support public deliberation, and ensure that digital processes are accessible to diverse groups. Complaint channels, online policy consultation, and open government data can be democratic tools if they are accompanied by clear follow-up, opportunities for deliberation, and transparent reasons for decisions.

Under NPG, ICT functions as infrastructure for information exchange, coordination, and joint problem-solving. Government can work with civil society, universities, technology providers, communities, and service organisations to address problems that no single agency can solve. NPG treats plural actors and inter-organisational relationships as defining features of public services (Osborne, 2006), and the co-creation literature shows how such collaboration can generate public value (Osborne et al., 2016; Torfing et al., 2019). In digital settings, interoperability, data-exchange standards, multi-stakeholder forums, and co-design of services can support such networks.

Open platforms are not the same as substantive participation. Gaps in devices, connectivity, disability, language, and digital literacy can produce unequal representation (Lindgren et al., 2019; Scheerder et al., 2017). The role of technology companies in providing service infrastructure can also create vendor dependency, concentrated information, and blurred accountability. Government must set limits of authority, data protection standards, proportionate access rules, and mechanisms for audit and collaborative evaluation, and digital participation must be accompanied by evidence that citizens' input is heeded and their rights protected.

Ontologically, NPS sees citizens as political subjects with dignity, rights, and the capacity to shape the common good, while NPG sees administration as relationships among interdependent institutions and actors; technology is part of a social space and a configuration of power, not a neutral medium. Epistemologically, policy knowledge comes not only from official rules or performance metrics but also from citizens' experiences, deliberation, and collective learning in networks, so its validity requires openness to multiple perspectives and argumentative scrutiny. Axiologically, the core values are democracy, inclusion, equal voice, trust, solidarity, and public value creation. The philosophical tension lies in power asymmetry: platforms that appear participatory may still marginalise the unconnected or let dominant actors set the agenda. ICT should therefore be judged by the real influence of participation on policy, fairness of representation, and clarity of accountability, not merely by numbers of users or interactions.

Digital Era Governance: Reintegration and Holistic Government

Digital Era Governance (DEG) emerged as a response to the limits of reforms that overemphasised disaggregation, competition, and contracting. It identifies three orientations: reintegration of government functions, needs-based holism, and the digitalisation of administrative processes (Dunleavy et al., 2006). Technology is positioned as a driver of process redesign and inter-agency relationships rather than merely a means of converting paper forms into electronic ones.

Reintegration means reducing organisational and information-system fragmentation so that government can work in a more joined-up way. Holism emphasises understanding

citizens' needs as a whole rather than forcing them to adapt to internal bureaucratic structures. Process digitalisation redesigns workflows, reduces repeated data entry, and links previously separate services. Conceptually, citizens who need several services should not have to submit the same information repeatedly to different agencies, provided that data exchange has a legal basis and adequate safeguards.

DEG also stresses government's internal capacity to manage technology. Full dependence on external providers risks the loss of organisational knowledge, vendor lock-in, integration difficulties, and weak control over critical systems. Government needs the capacity to define requirements, manage technology architecture, oversee contracts, maintain security, and ensure that systems evolve in the public interest. Digital transformation is therefore not merely an application procurement project but an agenda of organisational change and institutional capacity (Mergel et al., 2019; Pribadi et al., 2024).

Ontologically, public administration is understood as an interconnected system that crosses organisational boundaries, with citizens' needs as a point of orientation for service design and ICT as the infrastructure that forms these connections. Epistemologically, administrative knowledge is built by combining information across units, understanding citizens' service journeys, and analysing processes as a whole, while respecting data quality, context, access rights, and provenance. Axiologically, the emphasised values are integration, accessibility, service continuity, responsiveness, efficiency, and accountability. The tension arises when integration is treated as a reason to collect and link all data without limits; necessity, purpose limitation, security, transparency, and citizens' rights must remain normative boundaries on digital reintegration.

Digital Governance: From Electronic Government to Digital Governance

Digital governance refers to governance that strategically uses digital technology and data in policymaking, organisational management, service delivery, and government–citizen relations. It is broader than e-government, which often focuses on providing information or electronic transactions, and it requires change in processes, structures, capacity, organisational culture, and stakeholder interaction (Mergel et al., 2019). The OECD Digital Government Policy Framework sets out six dimensions: digital by design, a data-driven public sector, government as a platform, open by default, user-driven, and proactiveness (OECD, 2020). Digital by design means embedding digital considerations from the outset of policy and service design; government as a platform means providing shared infrastructure, standards, and components; open by default promotes openness within legal limits; user-driven places users' needs at the centre; and proactiveness means anticipating citizens' needs responsibly.

Digital governance also requires cross-sector coordination and public involvement. Government is not always the sole source of innovation or infrastructure; universities, communities, civil society, and the private sector can contribute. Collaboration does not remove the state's responsibility, however. Government must still guarantee service standards, accessibility, security, data protection, transparent contracts, and complaint mechanisms, and those who exercise public authority remain answerable for its use (Koliba, 2025).

Ontologically, government is understood as an institutional and digital ecosystem involving the state, citizens, technology, data, and non-state actors. Epistemologically, government knowledge combines administrative data, digital analysis, professional knowledge, and citizens' experiences. Axiologically, digital governance aims to create public value through openness, responsiveness, inclusion, collaboration, effectiveness, and protection of rights. The fundamental problem is how to prevent digital innovation and connectivity from obscuring who is responsible for public decisions and services.

Data-Driven Government

Data-driven government treats data as a strategic asset across the policy cycle, from problem identification and agenda-setting to the formulation of alternatives, implementation, monitoring, and evaluation. Data help government recognise patterns of need, map problems, improve targeting, and assess policy results, and the OECD treats a data-driven public sector as a key dimension of digital government maturity (OECD, 2020).

Data use requires governance that ensures standards, quality, metadata, interoperability, security, and clear responsibility; trustworthy use of data and artificial intelligence depends on such organisational arrangements (Janssen et al., 2020). In Indonesia, Presidential Regulation No. 39 of 2019 on One Data Indonesia emphasises data standards, metadata, interoperability, and reference codes and master data to reduce inconsistent definitions and duplication across agencies. Integration does not mean, however, that all data should be opened or exchanged without restriction. The processing of personal data requires a lawful basis and must meet the protection obligations set out in Law No. 27 of 2022.

Data-driven government must also distinguish between data as an input to judgement and data as the sole determinant of decisions. Administrative data may be incomplete, outdated, or blind to hard-to-reach groups, and analytical models can reproduce biases present in historical data. If algorithmic scores or classifications are used to select aid recipients, prioritise inspections, or allocate access to services, government must ensure that criteria can be explained, results can be checked, and citizens have routes to correction and appeal (Busuioc, 2021). Public decisions still require legal, ethical, and contextual judgement, and exclusion from data systems can translate into exclusion from services (Martin & Taylor, 2021).

Ontologically, data are a selective representation of social and administrative reality, not reality itself; the categories and variables used reflect human decisions about what is recorded and considered important. Epistemologically, policy knowledge is produced through collecting, processing, interpreting, and triangulating data, and its validity depends on the quality of sources, methods, representativeness, and openness about assumptions (Wessels, 2023). Axiologically, data use must serve distributive justice, policy effectiveness, transparency, security, privacy, and accountability. The philosophical challenge is the tendency to treat numbers as final, objective truth; data-driven decisions must therefore remain open to critique, contextual explanation, human review, and citizens' experiences. Table 1 summarises the challenges and governance prerequisites.

Table 1. Challenges and governance prerequisites for data-driven digital government

Aspect	Challenge	Governance prerequisite
Data quality and integration	Inconsistent data, duplication, data silos, weak metadata	Data standards, metadata, interoperability, designated data stewards
Fairness and inclusion	Unequal access, digital literacy gaps, data or algorithmic bias	Alternative service channels, bias audits, accessibility, correction mechanisms
Privacy and security	Excessive collection, leaks, use beyond stated purposes	Lawful basis for processing, purpose limitation, security, data protection
Decision accountability	Automated decisions that are hard to explain or contest	Transparent criteria, audit, human oversight, appeal procedures
Institutional capacity	Vendor dependency and limited staff competence	Internal capacity building, procurement governance, digital leadership

Source: Authors' synthesis, 2026

Data-driven government is therefore not the same as government that hands all

decisions to analytical systems. Data should strengthen government's capacity to understand problems and evaluate policy, while decisions remain explainable, legally reviewable, and accountable to the public.

Comparative Synthesis and Implications for Digital Transformation

The paradigms should not be seen as stages that wholly replace one another. Digital administration still needs the legal certainty and audit trails emphasised by traditional bureaucracy; NPM's indicators and cost control remain necessary to safeguard public resources; and NPS and NPG supply democratic legitimacy, participation, and collaboration that cannot be derived from rules or performance targets alone. Empirical research confirms that elements of different paradigms coexist within the same organisations (Iacovino et al., 2017). The paradigms differ mainly in their dominant way of defining problems and measuring the success of ICT. Table 2 compares them.

Table 2. Comparison of paradigms in the use of ICT in public administration

Dimension	Traditional administration	NPM	NPS / NPG	Digital Era Governance / digital governance
Core logic	Legality and procedure	Efficiency and results	Citizens, public value, and collaboration	Integration, holistic services, openness, and data use
Function of ICT	Record-keeping, control, audit	Automation, metrics, evaluation	Participation, data exchange, networks	Process integration, platforms, analytics, proactive services
Source of justification	Rule compliance	Performance indicators	Deliberation and shared legitimacy	Data quality, service outcomes, transparency, accountability
Dominant risk	Rigidity and data silos	Reduction of value to metrics	Unequal participation and blurred responsibility	Excessive surveillance, algorithmic bias, privacy, technological dependency

Source: Authors' conceptual, 2026

The paradigms are better understood as analytical lenses that complement each other while containing value tensions. Digital Era Governance and digital governance extend the ways of integrating their elements through process design, shared infrastructure, and data governance.

On this basis, this article proposes a three-layer framework for evaluating the use of ICT in public administration. The legality layer assesses the basis of authority, conformity with rules, protection of rights, decision trails, and correction mechanisms. The performance layer assesses cost, service time, quality of outcomes, and operational sustainability. The democratic legitimacy layer assesses equitable access, representation of groups, meaningful participation, and the transparency of government responses. In data-driven government, the three layers must be complemented by attention to data quality, security, privacy, and the explainability of algorithms. The layers can be used together without reducing normative categories to indicators that can all be counted numerically.

In Indonesia, Presidential Regulation No. 95 of 2018 provides a basis for aligning digital governance and services, Presidential Regulation No. 39 of 2019 makes data governance a cross-agency agenda, and Law No. 27 of 2022 affirms that the use of information must respect data subjects' rights. Read together, they call for combining governance certainty, integrated

work, and citizen protection in the design of digital government, although regulation alone does not prove that services are effective or inclusive. The OECD framework likewise signals a shift from owning applications towards user-centred government design (OECD, 2020). User orientation must, however, be reconciled with citizens' status as democratic rights-holders: an easy interface is not enough if service refusals cannot be explained, complaint channels are ineffective, or citizens without internet access lose their entitlements (Madsen et al., 2022).

An online complaint service illustrates how the framework works. The legality layer asks whether procedures and follow-up are documented and within the agency's authority. The performance layer assesses speed, resolution rate, and quality of response. The democratic legitimacy layer asks whether complainants receive reasons, whether citizens' input changes procedures, and whether cross-agency problems are resolved collaboratively. The data-driven perspective adds questions about the accuracy of complaint classification, data quality, protection of complainants' identities, and transparency in the use of analytics. Together these questions yield a fuller assessment than application downloads or portal visits alone, showing that the success of digital transformation must be measured multidimensionally: numbers of applications, data volume, or transactions are inadequate indicators unless accompanied by better service quality, equitable benefits, protection of rights, and public trust.

CONCLUSION

The development of information and communication technology (ICT) in public administration represents a socio-technical transformation shaped by evolving administrative paradigms, from procedural control and legal certainty to efficiency, performance, citizen participation, collaborative governance, and data-driven decision-making. Ontologically, digital public administration involves interconnected institutions, citizens, technologies, data, and non-state actors; epistemologically, digital information expands administrative knowledge but requires critical assessment of its validity, quality, and context; while axiologically, technological innovation must uphold justice, transparency, privacy, accountability, and democratic participation. This article proposes a three-layer evaluation framework integrating legality, performance, and democratic legitimacy to assess digital transformation beyond technological adoption and service efficiency. Accordingly, governments should prioritize institutional reform, system interoperability, data protection, cybersecurity, transparent algorithmic decision-making, human oversight, and inclusive public services that accommodate citizens with limited digital access or literacy. Strengthening administrative capacity and ensuring accountable partnerships with technology providers are also essential for sustainable transformation. As this conceptual study relies on literature synthesis without empirical data, its conclusions require further validation through case studies of regional governments and public services, incorporating document analysis, interviews with officials, and citizens' experiences to examine the legal, operational, and democratic implications of digital transformation.

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AUTHOR CONTRIBUTIONS

DH: conceptualization, investigation, formal analysis, and writing–original draft preparation. DA: methodology, theoretical framework development, validation, and writing–review and editing. ATPYA: literature review, data curation, and writing–review and editing.

RS: supervision, interpretation of findings, and writing–review and editing. All authors have read and approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest related to the research, authorship, or publication of this manuscript.

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