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The Evolution of Institutions in the Age of Artificial Intelligence



IDHUS Institute

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Introduction

History rarely changes through a single invention. Instead, profound transformations emerge gradually as new technologies alter the way societies organise themselves, produce knowledge and govern collective life. The printing press transformed the circulation of ideas, contributing to the emergence of modern education, scientific inquiry and constitutional government. The Industrial Revolution reshaped economies and required entirely new forms of public administration capable of managing urbanisation, industrial production and expanding state responsibilities. The digital revolution fundamentally changed the way institutions communicate, process information and deliver public services, creating governments that became increasingly connected through technological infrastructures unimaginable only a few decades earlier. Each of these historical moments introduced more than new tools. They changed the evolutionary direction of institutions themselves.

Artificial intelligence appears increasingly likely to represent another such turning point. Public discussion frequently focuses on the visible applications of AI: conversational assistants, automated workflows, predictive analytics or intelligent document processing. These innovations undoubtedly attract considerable attention because they produce immediate operational benefits that are relatively easy to observe. Yet concentrating exclusively on these applications risks overlooking a much deeper transformation already beginning to unfold. The most significant consequence of artificial intelligence may not be that institutions perform familiar tasks more efficiently, but that they gradually acquire entirely new cognitive capabilities through which governance itself begins to evolve.

This possibility requires us to reconsider what institutional evolution actually means. Institutions have never remained static. Throughout history they have adapted continuously in response to changing economic conditions, political structures, scientific discoveries, demographic shifts and technological innovation. Administrative systems that proved effective in one historical period frequently became inadequate as societies grew more complex, forcing governments to redesign their structures, procedures and governing philosophies. Institutional evolution has therefore always been driven by the need to improve society's capacity for collective coordination. Artificial intelligence, however, introduces a distinctive form of transformation because it affects not only what institutions do but also how they understand the realities they are attempting to govern.

For the first time in history, public institutions possess the opportunity to augment their cognitive capacities systematically through technologies capable of processing vast quantities of information, identifying complex relationships and supporting increasingly sophisticated forms of collective reasoning. Scientific evidence generated across thousands of research publications, operational data collected through public services, citizen participation, legislative developments, environmental monitoring and international policy experiences can increasingly be integrated into shared knowledge environments that remain continuously available to institutional decision-makers. The institution gradually becomes capable of perceiving patterns and maintaining situational awareness at scales that would previously have been impossible through human effort alone.

Yet the emergence of these capabilities does not imply that institutions are becoming autonomous or that artificial intelligence is replacing democratic governance. On the contrary, the growing importance of AI makes human judgement, constitutional accountability and institutional legitimacy more significant than ever before. The greater the analytical capabilities available to institutions, the greater the responsibility to ensure that these capabilities remain aligned with democratic values, ethical principles and the public interest. Artificial intelligence expands institutional cognition, but it does not determine institutional purpose. Technology may strengthen understanding, yet it remains the responsibility of human institutions to decide how that understanding should guide legitimate collective action.

This distinction marks one of the defining characteristics of the present historical moment. Previous waves of digital transformation primarily sought to improve administrative efficiency. Artificial intelligence introduces the possibility of improving institutional intelligence itself. Rather than merely accelerating existing procedures, AI enables institutions to perceive complexity more comprehensively, preserve organisational memory more effectively, learn more systematically from experience and adapt more intelligently to continuously changing environments. Governance begins to evolve from an administrative activity centred upon managing established processes towards a cognitive activity centred upon constructing and refining collective understanding.

Understanding this transition requires looking beyond contemporary technological enthusiasm and examining institutional evolution over much longer historical timescales. Artificial intelligence did not create institutional evolution; it entered an evolutionary process that has accompanied human civilisation for centuries. Appreciating its significance therefore requires us to understand how institutions have always evolved in response to changing environments, and why the present transformation differs from those that came before.

Institutions Have Always Evolved

It is tempting to regard the transformation currently associated with artificial intelligence as something entirely unprecedented. The extraordinary pace of technological development, the growing sophistication of machine learning systems and the increasing visibility of AI across public and private life all contribute to the impression that institutions are entering a completely unfamiliar era. Yet history tells a more nuanced story. Institutions have never been static creations. They have evolved continuously alongside the societies they serve, adapting their structures, methods and governing philosophies in response to changing environments. Artificial intelligence therefore does not initiate institutional evolution; it accelerates a process that has accompanied organised human civilisation from its very beginning.

The earliest institutions emerged not because societies consciously designed complex systems of governance, but because growing communities required increasingly reliable forms of coordination. As human populations expanded beyond small groups bound primarily by personal relationships, new mechanisms became necessary to organise collective life. Rules, customs, shared authorities and systems of responsibility gradually evolved into the first recognisable institutions. These early structures possessed relatively limited administrative capacities, yet they represented one of humanity's greatest innovations. They allowed knowledge to survive individual lifetimes, enabled cooperation among strangers and created forms of continuity that extended beyond any single generation. Even at this early stage, institutional evolution was closely linked to the expanding cognitive capacity of society itself.

The emergence of written language marked one of the first great accelerations in this evolutionary process. Before writing, institutional memory depended largely upon oral tradition, making the preservation of complex legal systems, administrative practices and historical knowledge increasingly difficult as societies grew larger. Written records transformed governance by allowing institutions to preserve information with far greater accuracy and permanence. Laws could be codified, taxation documented, diplomatic agreements maintained and administrative decisions recorded across generations. Institutions acquired an external memory that dramatically expanded their capacity for continuity. This transformation was not simply technological. It fundamentally altered the cognitive architecture of governance by enabling knowledge to accumulate beyond the limits of individual human memory.

Centuries later, the development of bureaucratic administration introduced another decisive stage of institutional evolution. As states became larger and more complex, governance could no longer depend solely upon personal authority or informal coordination. Administrative procedures, professional civil services, hierarchical responsibilities and standardised decision-making processes gradually emerged to ensure consistency across increasingly extensive public systems. Bureaucracy has often been criticised for its rigidity, and many such criticisms are justified when administrative structures become disconnected from the changing realities they are intended to govern. Nevertheless, bureaucracy represented one of history's most successful innovations because it enabled institutions to coordinate complexity on a scale that had previously been impossible. It provided the organisational architecture upon which modern public governance would later be built.

The Industrial Revolution introduced another profound transformation. Rapid urbanisation, technological innovation and expanding economic systems required governments to assume responsibilities that extended far beyond traditional state functions. Public education, public health, labour regulation, infrastructure development and social welfare demanded increasingly specialised administrative capacities. Institutions responded by creating new departments, expanding professional expertise and developing sophisticated systems for managing complex public services. Governance became progressively more knowledge-intensive, relying upon scientific research, statistical analysis and professional expertise to inform public policy. Institutional evolution increasingly reflected society's growing dependence upon organised knowledge rather than administrative authority alone.

The digital revolution accelerated this trajectory further by transforming the relationship between institutions and information. For much of modern history, governments devoted considerable effort to collecting, storing and transmitting information through predominantly paper-based administrative systems. Digital technologies radically altered this landscape. Information could now be generated, shared and processed almost instantaneously across entire organisations. Citizens gained direct digital access to public services, administrative procedures became increasingly automated and governments developed entirely new forms of communication and coordination. Yet despite these remarkable advances, the underlying cognitive model of many institutions remained largely unchanged. Digital government improved the speed with which information could be managed, but it did not necessarily transform the institution's capacity to understand the information it possessed.

It is precisely at this point that artificial intelligence introduces a qualitatively different stage of institutional evolution. Earlier technological transformations primarily expanded institutional reach, efficiency or organisational capacity. Artificial intelligence begins to expand institutional cognition itself. Rather than merely increasing the quantity of information available to public institutions, AI strengthens their ability to interpret relationships, identify emerging patterns, integrate diverse knowledge sources and support increasingly sophisticated forms of collective reasoning. Information ceases to function merely as an administrative resource and becomes the foundation of continuously evolving institutional understanding. The institution gradually develops capacities that resemble less a repository of information and more a living cognitive system capable of learning from the environments it governs.

This distinction explains why artificial intelligence should not be understood simply as another chapter in digital transformation. Digital technologies largely improved communication, storage and operational efficiency. Artificial intelligence changes the institution's relationship with knowledge itself. Instead of relying primarily upon periodic analysis conducted by specialised experts, institutions begin to develop continuous cognitive environments in which learning becomes integrated into everyday governance. Scientific discoveries, operational experience, citizen participation, environmental monitoring and international developments can all contribute simultaneously to institutional understanding. Evolution therefore shifts from the improvement of administrative processes towards the improvement of institutional intelligence.

Seen from this broader historical perspective, every major stage of institutional evolution has been associated with an expansion of society's collective cognitive capacity. Writing

expanded memory. Bureaucracy expanded coordination. Professional administration expanded expertise. Digital technologies expanded connectivity. Artificial intelligence now expands cognition. Each transformation built upon those that preceded it rather than replacing them entirely. Modern institutions therefore remain the product of centuries of cumulative development, carrying forward historical capabilities while acquiring entirely new ones as society itself becomes increasingly complex.

Understanding this long evolutionary trajectory also reveals that technological change alone has never determined institutional progress. Writing did not automatically produce good governance, bureaucracy did not guarantee justice and digital technologies did not necessarily create more intelligent institutions. Every technological advance required corresponding developments in organisational culture, political legitimacy, professional practice and constitutional responsibility before its full benefits could be realised. Artificial intelligence follows exactly the same historical pattern. Its transformative potential depends not upon computational capability alone but upon the institution's ability to integrate these new capabilities into coherent systems of governance oriented towards learning, responsibility and democratic legitimacy.

Recognising this continuity prepares us to appreciate what makes the present moment genuinely distinctive. Artificial intelligence does not merely accelerate familiar administrative processes; it begins to alter the very mechanisms through which institutions perceive, interpret and understand reality. To grasp the significance of this transition, we must examine more closely why AI changes the evolutionary process itself rather than simply contributing another technological improvement.

Why Artificial Intelligence Changes the Evolutionary Process

Every significant technological innovation influences the way institutions operate, but only a small number fundamentally alter the trajectory through which institutions evolve. Most technologies improve existing capabilities. They make communication faster, transportation more efficient, administration more reliable or production more productive. Institutions adopt these innovations, incorporate them into established organisational structures and gradually refine their methods without changing their essential nature. Artificial intelligence, however, belongs to a different category of technological development because it affects not only institutional performance but also the processes through which institutions acquire, integrate and apply knowledge. In other words, it influences the mechanisms of institutional evolution itself.

To understand why this distinction matters, it is useful to consider how institutions have traditionally learned. Public organisations have historically relied upon relatively slow cycles of experience, evaluation and reform. Policies were implemented, their outcomes observed over months or years and formal reviews conducted before significant adjustments were introduced. Organisational learning depended upon reports, commissions, academic research, political debate and accumulated professional experience. These processes generated valuable institutional knowledge, but they unfolded at a pace largely determined by human analytical capacity and administrative procedure. Institutional evolution therefore tended to occur incrementally, with substantial reforms often emerging only after prolonged periods of observation or following major crises that revealed weaknesses in existing systems.

Artificial intelligence begins to compress these learning cycles dramatically. Institutions are increasingly capable of observing complex environments continuously rather than periodically. Large volumes of operational data, scientific publications, environmental indicators,

economic developments and citizen interactions can be analysed simultaneously, allowing emerging patterns to become visible long before they would have been recognised through conventional administrative processes. Learning shifts from retrospective evaluation towards continuous cognitive adaptation. Institutions become progressively more capable of identifying subtle changes while they are still developing, enabling governance to evolve alongside reality rather than reacting only after significant disruption has already occurred.

This acceleration has profound consequences because it changes the relationship between experience and institutional development. Traditionally, experience accumulated gradually as successive generations of public professionals encountered similar challenges under changing circumstances. Knowledge was transmitted through organisational memory, professional education and administrative culture, allowing institutions to improve over long historical periods. Artificial intelligence does not replace this accumulated experience, but it significantly enhances the institution's ability to interpret it. Historical records, previous policy evaluations, legal precedents and operational lessons can increasingly be connected across decades, revealing relationships that would otherwise remain hidden within fragmented documentation. Institutional memory becomes more accessible, more interconnected and considerably more influential in shaping present understanding.

Equally important is the way artificial intelligence expands the institution's capacity to engage with complexity. Contemporary public challenges rarely exist in isolation. Economic policy influences environmental sustainability. Technological innovation reshapes labour markets. Demographic change affects healthcare, housing, education and fiscal planning simultaneously. Traditional administrative structures often examine these issues through separate policy domains, making it difficult to appreciate their systemic interdependence. AI contributes by identifying patterns that extend across institutional boundaries, helping decision-makers construct more integrated representations of reality. The institution gradually evolves from analysing isolated problems towards understanding interconnected systems.

This transformation also alters the nature of institutional adaptation. Earlier forms of reform frequently relied upon structural change: creating new departments, revising procedures or introducing legislative amendments in response to emerging needs. While such reforms remain necessary, artificial intelligence increasingly enables adaptation to occur through cognitive rather than organisational evolution. Institutions become capable of improving the quality of their understanding without requiring constant structural reorganisation. Learning becomes embedded within everyday governance, allowing institutions to refine interpretation continuously while preserving organisational stability. Evolution therefore shifts from episodic institutional redesign towards permanent cognitive development.

Another distinctive feature of artificial intelligence is its ability to support anticipatory rather than purely reactive governance. Throughout much of history, institutions have improved by learning from events that had already occurred. Successful policies were replicated, unsuccessful ones revised and crises became opportunities for institutional reform. AI introduces the possibility of learning not only from the past but also from plausible futures. Scenario modelling, predictive analytics and complex simulations allow institutions to explore the potential consequences of alternative decisions before implementation. Governance begins to incorporate prospective cognition alongside historical learning, expanding the institution's capacity to prepare for uncertainty rather than merely responding to it.

Yet this new evolutionary capability also introduces new responsibilities. Institutions capable of learning more rapidly must ensure that accelerated adaptation does not undermine democratic deliberation or constitutional stability. Not every emerging pattern requires immediate policy intervention, and not every computational prediction should automatically shape public decision-making. Institutional evolution has always depended upon balancing innovation with continuity, and this balance becomes even more important as artificial intelligence accelerates cognitive change. Human judgement remains indispensable because institutions must distinguish between information that is merely novel and knowledge that is genuinely meaningful for legitimate governance.

Artificial intelligence therefore changes the evolutionary process not because it replaces existing institutions, but because it enables them to evolve in fundamentally new ways. Learning becomes more continuous, memory more active, perception more comprehensive and adaptation more responsive to changing environments. These capabilities do not diminish the importance of public institutions. They increase it, because societies become increasingly dependent upon institutions capable of transforming unprecedented quantities of information into coherent democratic understanding.

This transformation becomes even clearer when we move beyond viewing artificial intelligence as a collection of isolated applications and begin to understand it as something much more fundamental within institutional life. Rather than functioning simply as another digital tool, AI increasingly becomes part of the very cognitive architecture through which institutions perceive, reason and learn.

AI as a Cognitive Infrastructure Rather Than a Tool

Public discussion about artificial intelligence frequently begins with the technologies that people encounter most directly. Intelligent assistants answer questions, automated systems classify documents, predictive models support administrative planning and conversational interfaces simplify interactions between citizens and public services. These applications are highly visible because they resemble familiar software tools performing increasingly sophisticated tasks. As a result, artificial intelligence is often described as the next generation of digital technology, a more capable instrument that institutions can deploy wherever greater efficiency or analytical capacity is required. While this interpretation captures part of the reality, it overlooks the transformation that is gradually becoming far more significant. Artificial intelligence is beginning to evolve from being a collection of individual tools into a cognitive infrastructure upon which institutional intelligence itself increasingly depends.

The distinction between a tool and an infrastructure is more profound than it may initially appear. A tool is employed to perform a particular activity. It remains external to the institution's overall way of functioning and can generally be introduced or removed without fundamentally altering the organisation's cognitive architecture. A word processor improves document creation, a spreadsheet facilitates financial analysis and a digital communication platform accelerates collaboration, yet none of these technologies changes the underlying mechanisms through which the institution constructs understanding. An infrastructure, by contrast, reshapes the environment within which cognition takes place. It becomes part of the institutional fabric, influencing how knowledge is generated, connected, interpreted and shared across the entire organisation. Artificial intelligence increasingly belongs to this second category.

This evolution can already be observed in many public institutions. AI is no longer confined to isolated pilot projects designed to automate routine administrative activities. It is progressively becoming embedded across multiple dimensions of governance simultaneously. Knowledge management systems incorporate intelligent semantic search capable of connecting legislation, policy documents and operational guidance across vast repositories of institutional memory. Strategic planning increasingly relies upon AI-supported scenario analysis to explore multiple future pathways before policy decisions are taken. Regulatory agencies employ machine learning systems to detect emerging patterns within highly complex economic or environmental datasets. Public services integrate intelligent systems capable of supporting professionals with contextual information drawn from decades of accumulated institutional experience. Gradually,

these individual applications begin to interact, creating cognitive environments rather than isolated technological solutions.

This transition transforms the institution's relationship with information itself. For much of modern administrative history, information has been treated primarily as a resource to be collected, stored and retrieved when necessary. Digital technologies dramatically improved these processes by enabling rapid storage and transmission across organisational networks. Artificial intelligence introduces another qualitative step by allowing information to become dynamically interconnected. Documents cease to exist as isolated records. They become part of living knowledge environments in which concepts, precedents, evidence and institutional experience remain continuously linked through semantic relationships that can be explored as governance challenges evolve. The institution no longer searches merely for information. It increasingly navigates an organised landscape of institutional understanding.

One of the defining characteristics of cognitive infrastructure is its persistence. Individual AI applications may change over time as technologies improve, yet the underlying cognitive environment remains continuously available to support institutional learning. Every new policy contributes additional knowledge. Every judicial interpretation enriches legal understanding. Every programme evaluation strengthens organisational memory. Every scientific publication expands the institution's analytical horizon. Artificial intelligence helps integrate these contributions into an evolving cognitive ecosystem whose value increases through continuous use. Unlike traditional software, whose effectiveness often remains relatively stable after implementation, cognitive infrastructure becomes progressively richer because every institutional interaction contributes to its further development.

This cumulative character also changes the way expertise circulates inside public institutions. Historically, specialised knowledge has frequently remained concentrated within particular departments or professional communities. Valuable experience accumulated in one part of the organisation often remained inaccessible to others because institutional memory depended heavily upon personal relationships, local documentation or informal communication networks. AI-supported cognitive infrastructures reduce these barriers by making knowledge more discoverable, more interconnected and more readily available across organisational boundaries. Expertise becomes progressively distributed throughout the institution rather than remaining confined to isolated areas of professional specialisation. The institution's collective intelligence expands because its cognitive resources become increasingly integrated.

Equally significant is the contribution that artificial intelligence makes to institutional continuity. Governments inevitably experience political transitions, organisational restructuring and generational changes in personnel. These transformations are natural features of democratic governance, yet they often create discontinuities in institutional knowledge. Cognitive infrastructures help preserve accumulated understanding across these transitions by maintaining active connections between historical experience and present decision-making. New generations of public professionals inherit not merely archives of past documentation but evolving knowledge environments capable of supporting their reasoning from the very beginning of their careers. Institutional intelligence therefore becomes progressively less dependent upon individual continuity and increasingly embedded within the institution's enduring cognitive architecture.

This does not imply that artificial intelligence becomes the institution's principal source of knowledge. On the contrary, cognitive infrastructure derives its value precisely from the diversity of human contributions that continually enrich it. Scientific expertise, operational experience, constitutional interpretation, citizen participation, professional judgement and organisational learning all remain indispensable sources of institutional understanding. Artificial intelligence organises these contributions, strengthens the relationships among them and facilitates their integration into collective reasoning, but it does not generate their democratic legitimacy or determine their normative significance. The infrastructure supports cognition; it does not replace the institution's responsibility to think.

The emergence of AI as cognitive infrastructure also encourages a broader shift in how governments approach technological transformation. Earlier phases of digitalisation frequently focused upon improving individual services, modernising administrative procedures or replacing paper-based workflows with electronic equivalents. These initiatives delivered substantial benefits, yet they often remained fragmented because each technological solution addressed a particular operational problem. Cognitive infrastructure invites a more integrated vision. Technology becomes part of the institution's long-term intellectual architecture, designed not simply to improve isolated functions but to strengthen the institution's overall capacity to perceive complexity, preserve knowledge, support deliberation and learn continuously from experience. Digital transformation gradually evolves into cognitive transformation.

Seen from this perspective, the future of artificial intelligence in governance will not be determined primarily by the sophistication of individual algorithms but by the quality of the cognitive environments within which those algorithms operate. Institutions that treat AI merely as another administrative tool may achieve valuable efficiency gains, yet they will capture only a fraction of its long-term potential. Institutions that develop AI as an integrated cognitive infrastructure will progressively strengthen their ability to understand, anticipate and respond to increasingly complex societal challenges. The technology becomes most transformative when it ceases to be an external instrument and becomes part of the institution's own evolving capacity for collective intelligence.

This expanding cognitive infrastructure naturally reshapes one of the most fundamental capabilities of every institution: its ability to learn. As artificial intelligence becomes embedded within the processes through which knowledge is acquired, interpreted and preserved, organisational learning itself begins to evolve into a more continuous, dynamic and adaptive process.

Organisational Learning in the Age of AI

Learning has always been one of the defining characteristics of successful institutions. Governments that remain capable of improving through experience, incorporating new knowledge and adapting to changing circumstances have historically demonstrated greater resilience than those that rely exclusively upon inherited assumptions or established routines. Yet institutional learning has often progressed slowly. New practices spread gradually across administrative systems, policy evaluations required considerable time to produce meaningful insights and valuable lessons frequently remained confined to the departments where they first emerged. Organisational learning depended largely upon human communication, professional development and accumulated institutional memory, all of which remain indispensable but inevitably constrained by the limits of time, attention and organisational complexity.

Artificial intelligence is beginning to transform these dynamics in ways that extend far beyond accelerating access to information. It changes the very conditions under which institutions learn. Rather than relying primarily upon periodic reviews or isolated evaluations, cognitive institutions supported by AI can increasingly maintain continuous learning environments in which knowledge is constantly updated, connected and reinterpreted as new evidence becomes available. Learning becomes less dependent upon exceptional moments of institutional reflection and more deeply integrated into the everyday operation of governance itself.

One of the most important contributions of artificial intelligence lies in its capacity to connect experiences that would otherwise remain isolated from one another. Public institutions

generate extraordinary amounts of knowledge through policy implementation, service delivery, regulatory oversight, citizen engagement and operational management. Historically, much of this experience has remained fragmented across departments, geographical regions or administrative levels. Similar challenges have often been addressed repeatedly because previous solutions were difficult to locate, compare or adapt to new circumstances. AI-supported learning environments increasingly overcome this fragmentation by identifying conceptual relationships among apparently unrelated experiences, allowing institutions to recognise recurring patterns and transfer knowledge more effectively across organisational boundaries.

This interconnected learning significantly strengthens institutional memory. Traditional knowledge management systems have generally functioned as repositories in which information is stored for future consultation. Artificial intelligence transforms these repositories into active learning systems capable of organising knowledge according to evolving institutional needs. Previous policy evaluations become connected with current strategic priorities. Lessons drawn from one regulatory domain inform developments in another. Historical precedents remain continuously available not merely as archived documents but as relevant cognitive resources capable of informing present deliberation. Organisational memory becomes increasingly dynamic, participating actively in institutional reasoning rather than remaining passively preserved for occasional reference.

Artificial intelligence also enables institutions to learn from weak signals that might previously have escaped attention altogether. Many significant societal transformations begin as subtle changes distributed across multiple domains rather than as dramatic events immediately demanding public intervention. Shifting demographic trends, gradual changes in citizen behaviour, emerging technological practices or early indicators of environmental stress may initially appear insignificant when considered individually. AI systems capable of analysing large-scale and continuously updated information environments can identify these emerging patterns long before they become obvious through conventional administrative observation. Institutions therefore gain opportunities to learn from developments while they are still unfolding, strengthening their capacity for anticipatory governance rather than retrospective correction.

This anticipatory dimension represents one of the defining characteristics of organisational learning in the age of artificial intelligence. Learning is no longer confined exclusively to reflecting upon the past. Institutions increasingly develop the ability to explore plausible futures through scenario modelling, simulation and predictive analysis. These capabilities do not eliminate uncertainty, nor do they provide definitive forecasts of future events. Instead, they expand the institution's cognitive horizon by allowing multiple possibilities to be examined systematically before decisions are taken. Learning therefore acquires a prospective dimension alongside its traditional retrospective orientation. Institutions improve not only by understanding what has happened but also by considering what may happen under different conditions.

At the same time, artificial intelligence reinforces an important principle developed throughout the theory of Institutional Cognition: learning remains fundamentally a human and institutional activity. AI may identify emerging relationships, suggest alternative interpretations or reveal previously unnoticed evidence, but deciding what those observations mean for public governance requires professional judgement, democratic accountability and constitutional reasoning. Institutions must determine which lessons deserve incorporation into future policy, which innovations remain compatible with public values and which adaptations strengthen rather than weaken legitimate governance. Artificial intelligence accelerates learning, but institutions continue to define the meaning and direction of that learning.

This evolving relationship gradually transforms organisational culture itself. Institutions that successfully integrate AI into their learning processes become less dependent upon isolated expertise and more oriented towards continuous collective inquiry. Knowledge sharing becomes increasingly natural because information flows more easily across organisational boundaries. Reflection becomes embedded within routine governance rather than reserved for exceptional reviews. Public professionals spend less time searching for information and more time

interpreting, questioning and integrating knowledge into institutional understanding. Learning ceases to be an occasional organisational initiative and becomes the institution's normal way of operating.

Ultimately, organisational learning in the age of artificial intelligence represents far more than an improvement in administrative efficiency. It signals the emergence of institutions capable of refining their own intelligence continuously through the interaction of human expertise, institutional memory and computational support. The institution becomes progressively more capable of understanding itself as well as the society it governs, creating conditions for a form of governance that evolves through permanent learning rather than episodic reform.

Learning, however, reaches its greatest practical significance when it strengthens the quality of public decisions. As institutions become increasingly capable of acquiring and integrating knowledge, they also develop new ways of supporting the complex judgements upon which democratic governance depends.

Decision Support and Human–AI Institutional Intelligence

Every public institution ultimately exists to make decisions. Whether determining fiscal priorities, designing healthcare policies, regulating emerging technologies or responding to environmental crises, institutions continuously transform knowledge into collective action. Throughout history, the quality of governance has depended upon the quality of this transformation. Decisions that successfully integrated diverse forms of evidence, professional expertise and public deliberation have generally produced more resilient and legitimate outcomes than those based upon fragmented information or narrow perspectives. As societies become increasingly interconnected, however, the complexity surrounding public decision-making continues to expand beyond the capacity of any individual, department or traditional administrative process to comprehend fully. Artificial intelligence enters this landscape not as a substitute for institutional judgement, but as a means of strengthening the cognitive processes through which democratic decisions are constructed.

This distinction is fundamental because contemporary discussions frequently describe AI as a technology that will eventually "make decisions" on behalf of governments. Such language is both misleading and conceptually inadequate. Democratic governance is not merely a technical optimisation problem in which the most efficient computational output automatically becomes the correct public decision. Every significant governmental choice involves constitutional principles, ethical considerations, competing public interests, historical context and societal values that cannot be reduced to numerical optimisation. Artificial intelligence may contribute sophisticated analytical capabilities, but legitimacy continues to emerge through institutional deliberation, democratic accountability and responsible human judgement. Decision support therefore differs profoundly from decision replacement.

The growing importance of AI lies in its capacity to expand the range of knowledge that institutions are able to consider simultaneously before reaching conclusions. Public policy increasingly depends upon integrating scientific evidence, economic indicators, environmental data, legal frameworks, operational experience, international comparisons and citizen perspectives into coherent representations of highly complex realities. Traditionally, much of this integration depended upon teams of specialists working across extended periods of time, often under significant constraints imposed by limited analytical resources. Artificial intelligence substantially enlarges this capacity by identifying relationships among diverse sources of

information, highlighting emerging trends and organising knowledge in ways that support rather than overwhelm institutional reasoning. Decision-makers gain access to broader cognitive landscapes within which deliberation can take place more comprehensively.

One of the greatest strengths of AI-supported decision environments is their ability to illuminate complexity without eliminating uncertainty. Public institutions frequently operate under conditions where complete certainty is unattainable. Economic forecasts remain probabilistic, environmental systems evolve unpredictably and technological innovation continuously reshapes the context within which governance operates. Artificial intelligence cannot remove these uncertainties, nor should institutions expect it to do so. Instead, it enables decision-makers to understand uncertainty more clearly by exploring multiple scenarios, identifying potential consequences and revealing assumptions that may otherwise remain implicit. Governance becomes more intellectually robust because institutions learn to deliberate with a richer appreciation of complexity rather than relying upon simplified representations of reality.

Artificial intelligence also contributes to improving institutional coherence. Large public organisations often struggle to coordinate knowledge distributed across numerous departments, agencies and professional communities. Different parts of the institution may possess complementary information while lacking efficient mechanisms for integrating their perspectives into unified decision-making processes. AI-supported cognitive systems facilitate this integration by connecting evidence generated across organisational boundaries, allowing strategic discussions to incorporate insights that might previously have remained isolated. The institution begins to reason more coherently because its distributed intelligence becomes increasingly interconnected.

At the same time, these developments reinforce the indispensable role of human expertise. The more advanced artificial intelligence becomes, the more valuable professional judgement, contextual interpretation and ethical reasoning become within governance. AI may identify statistically significant correlations, but public institutions must determine whether those correlations possess constitutional relevance. Computational systems may recommend efficient policy alternatives, yet governments must decide whether those alternatives remain compatible with democratic principles, social justice and the broader public interest. Institutional intelligence therefore emerges through collaboration rather than competition between human and artificial cognition. Each contributes capacities that complement the limitations of the other.

This collaborative relationship gradually gives rise to what we at the IDHUS Institute describe as **Human–AI Institutional Intelligence**. Within this framework, intelligence is no longer understood as residing exclusively in human professionals or computational systems. Instead, it emerges through carefully designed cognitive architectures in which human expertise, institutional memory and artificial intelligence interact continuously throughout the processes of observation, interpretation, deliberation and decision-making. AI expands perception, accelerates analysis and strengthens organisational learning, while human institutions preserve legitimacy, constitutional responsibility and ethical direction. Neither component functions effectively in isolation. Together, they create institutional capacities that exceed the possibilities available to either humans or machines acting independently.

An equally important consequence of this evolution concerns transparency. As AI becomes increasingly integrated into governance, institutions must ensure that decision-support systems strengthen rather than obscure public accountability. Citizens are entitled to understand not only the decisions that affect them but also the reasoning processes through which those decisions have been reached. Artificial intelligence therefore requires governance systems capable of explaining how evidence has been evaluated, how alternative options have been considered and how final judgements remain grounded in democratic legitimacy rather than opaque computational processes. Institutional intelligence becomes trustworthy only when cognitive sophistication is accompanied by corresponding transparency and public responsibility.

Seen from this perspective, artificial intelligence contributes far more than computational efficiency. It strengthens the institution's ability to deliberate intelligently under conditions of

unprecedented complexity while preserving the fundamentally human character of democratic governance. Decision-making becomes increasingly informed, integrated and reflective without surrendering constitutional authority to technology. The institution evolves into a cognitive system capable of combining computational insight with human wisdom in ways that neither could achieve independently.

As these capabilities mature, their influence extends beyond individual decisions and begins to reshape governance itself. Institutions become progressively capable of adapting continuously to changing environments rather than relying exclusively upon periodic reforms introduced after crises have already emerged. Decision support therefore becomes one component of a broader transformation towards governance systems capable of learning, adjusting and evolving in real time.

Adaptive Governance in Real Time

For much of modern history, public governance has operated through relatively stable cycles of observation, policy design, implementation and evaluation. Governments identified emerging challenges, developed legislative or administrative responses, implemented new measures and later assessed their effectiveness through reviews conducted months or even years after the original decisions had been made. This approach reflected the practical realities of earlier societies, where information travelled comparatively slowly, policy environments changed at manageable speeds and institutional learning unfolded over extended periods of time. While this model proved remarkably successful for many decades, the accelerating complexity of the twenty-first century increasingly exposes its limitations. Societies now evolve more rapidly than the traditional rhythms of governance can often accommodate.

Artificial intelligence contributes to addressing this challenge by enabling institutions to develop forms of governance that remain continuously attentive to changing conditions rather than relying primarily upon episodic intervention. This should not be understood as a system of constant political change or perpetual regulatory instability. On the contrary, adaptive governance seeks to preserve constitutional continuity while allowing institutional understanding to evolve alongside the environments being governed. The objective is not to replace stable institutions with continuously changing ones, but to create institutions capable of learning continuously without sacrificing democratic legitimacy or organisational coherence.

The foundation of this adaptive capacity lies in the institution's growing ability to maintain persistent situational awareness. Public organisations increasingly receive information from an extraordinary diversity of sources: economic indicators, healthcare systems, environmental monitoring networks, educational institutions, scientific research, digital public services, citizen participation platforms and international cooperation mechanisms. Traditionally, much of this information remained fragmented across separate administrative domains, often becoming available for strategic analysis only after lengthy processes of collection and consolidation. Artificial intelligence enables these diverse knowledge streams to be interpreted together, creating continuously updated representations of complex societal conditions. Institutions become progressively more capable of understanding what is happening while events are still unfolding rather than reconstructing them retrospectively.

This enhanced awareness fundamentally changes the nature of policy adaptation. Instead of waiting for problems to become sufficiently visible to justify major reforms, institutions gain opportunities to recognise emerging developments during their earliest stages. Small shifts

in demographic behaviour, subtle economic trends, evolving technological practices or gradual environmental changes can be identified before they develop into large-scale governance challenges. Adaptation therefore becomes preventive rather than reactive. Institutions increasingly learn to make incremental adjustments that preserve long-term stability precisely because they respond intelligently before crises fully materialise.

Artificial intelligence also strengthens the institution's capacity to evaluate the consequences of its own actions continuously. Public policies rarely produce effects confined to a single administrative domain. Educational reforms influence labour markets, environmental regulations affect industrial development and technological policies reshape economic competitiveness as well as public services. Adaptive governance requires institutions capable of observing these interconnected consequences across multiple sectors simultaneously. AI-supported cognitive systems assist by tracing relationships that extend beyond traditional departmental boundaries, allowing governments to understand how interventions in one area may influence conditions elsewhere within the broader governance ecosystem.

An equally significant aspect of adaptive governance concerns institutional humility. The increasing availability of sophisticated analytical systems does not imply that institutions become capable of predicting every future development with certainty. Complexity remains an inherent characteristic of human societies, and unexpected events will continue to emerge regardless of technological sophistication. Artificial intelligence therefore encourages a governance philosophy based not upon the illusion of perfect prediction but upon continuous learning. Institutions become more resilient because they acknowledge uncertainty openly, monitor changing conditions carefully and remain prepared to revise their understanding whenever new evidence becomes available. Adaptation is grounded in intellectual openness rather than computational confidence.

This perspective also transforms the relationship between planning and flexibility. Traditional strategic planning has often been criticised for becoming outdated soon after its completion because rapidly changing environments quickly render initial assumptions obsolete. Adaptive governance does not abandon long-term planning; instead, it enriches planning through continuous cognitive revision. Strategic objectives may remain stable over many years, while the institution's understanding of how best to achieve those objectives evolves dynamically as new information emerges. Artificial intelligence supports this ongoing refinement by ensuring that long-term strategies remain connected to continuously updated evidence rather than static assumptions established at the beginning of planning cycles.

Importantly, adaptive governance remains fundamentally democratic. Artificial intelligence may provide institutions with unprecedented analytical capabilities, but determining which adaptations should be pursued remains a matter of political deliberation, constitutional legitimacy and public accountability. Citizens continue to define collective priorities through democratic processes, elected representatives establish public policy and professional civil services implement governance within constitutional frameworks. AI enhances the institution's capacity to understand evolving realities, yet it does not determine society's values or replace democratic choice. Adaptation therefore strengthens rather than weakens constitutional governance by enabling institutions to remain responsive while preserving legitimacy.

Perhaps the most profound implication of adaptive governance is that institutional evolution becomes increasingly continuous. Rather than viewing reform as an exceptional response to failure, institutions begin to regard learning, adjustment and refinement as normal characteristics of healthy governance. Artificial intelligence supports this transformation by embedding continuous observation, reflection and knowledge integration into everyday institutional practice. Evolution ceases to occur only through major administrative restructuring and instead becomes an ongoing cognitive process through which institutions gradually improve their understanding of the societies they serve.

This emerging capacity represents one of the defining features of the next generation of public institutions. Governance evolves from managing stable systems towards cultivating intelligent systems capable of continuous learning without abandoning constitutional principles or

democratic legitimacy. Artificial intelligence does not replace institutions; it expands their capacity to evolve responsibly within an increasingly dynamic world.

Having explored how AI strengthens organisational learning, decision support and adaptive governance, we can now consider the broader implications of these developments for the decades ahead. The question is no longer whether institutions will evolve alongside artificial intelligence, but what forms that evolution is likely to take.

The Future Evolution of Public Institutions

Every generation tends to assume that the institutions it inherits represent the natural and permanent structure of public governance. Ministries, parliaments, courts, regulatory agencies and international organisations often appear so deeply embedded within political life that it becomes difficult to imagine them evolving in fundamentally different ways. History, however, consistently demonstrates that institutions are neither fixed nor final. They are living products of human civilisation, continuously reshaped by changing knowledge, social expectations, technological capabilities and environmental conditions. Just as the institutions of the twenty-first century differ profoundly from those that governed medieval kingdoms or early industrial societies, the institutions that will serve future generations are likely to differ significantly from those we know today. Artificial intelligence does not determine the precise direction of this evolution, but it undoubtedly becomes one of its most influential catalysts.

The future evolution of public institutions should therefore not be understood primarily as a technological transformation. While advances in computational capability will continue to influence administrative practice, the deeper transformation concerns the emergence of institutions capable of learning, reasoning and adapting with unprecedented continuity. The defining characteristic of future governance will not simply be the widespread presence of artificial intelligence, but the gradual integration of AI into institutional cognition itself. Public institutions will increasingly operate as systems in which human expertise, organisational memory, computational analysis and democratic deliberation function as interconnected components of a single cognitive architecture. Governance will become progressively less concerned with managing information and increasingly devoted to cultivating institutional understanding.

One of the most visible consequences of this transformation is likely to be the gradual disappearance of the traditional distinction between policy development, implementation and evaluation. Throughout much of modern administrative history, these activities have been treated as separate stages within relatively linear governance processes. Policies were designed, subsequently implemented and only later assessed through formal evaluation procedures. Cognitive institutions supported by artificial intelligence increasingly dissolve these rigid boundaries. Evaluation becomes continuous rather than episodic, implementation generates immediate learning opportunities and policy design evolves dynamically in response to newly emerging evidence. Governance becomes a recursive process in which every action contributes simultaneously to institutional understanding and future decision-making.

This evolution will also reshape the professional role of public servants. Rather than reducing the importance of human expertise, artificial intelligence is likely to elevate its significance. Administrative work devoted primarily to routine information processing will gradually diminish, allowing professionals to concentrate on interpretation, strategic reasoning, ethical judgement, interdisciplinary collaboration and citizen engagement. The value of public leadership will increasingly depend upon the capacity to formulate meaningful questions, evaluate competing

forms of evidence, reconcile diverse public interests and guide institutions through complex environments that cannot be navigated by computational systems alone. Public professionals will become architects of institutional cognition rather than simply administrators of institutional procedures.

Equally significant will be the transformation of organisational boundaries themselves. Contemporary governance frequently operates through relatively distinct institutions, each possessing specialised responsibilities, legal mandates and administrative cultures. While these distinctions remain essential for constitutional clarity and democratic accountability, future cognitive infrastructures will enable far greater collaboration across institutional boundaries than has traditionally been possible. Knowledge generated within one part of government will increasingly inform decision-making elsewhere, scientific expertise will circulate more effectively between research institutions and public administrations, and international cooperation will benefit from shared cognitive environments capable of integrating diverse experiences across jurisdictions. Institutional intelligence will become progressively more networked while preserving the autonomy and legitimacy of individual organisations.

Artificial intelligence will also contribute to strengthening long-term governance, an area in which many contemporary political systems continue to face considerable challenges. Democratic institutions frequently operate under electoral cycles that encourage understandable attention to immediate priorities, while many of society's most significant challenges unfold across decades rather than years. Climate adaptation, demographic transformation, technological disruption, infrastructure resilience and educational development all require sustained institutional learning extending well beyond short-term political horizons. AI-supported cognitive systems can assist by preserving long-term institutional memory, maintaining continuity across political transitions and ensuring that accumulated knowledge remains available regardless of changes in governmental leadership. In doing so, they help institutions balance democratic responsiveness with strategic continuity.

Another defining feature of future public institutions is likely to be their growing capacity for anticipatory governance. Rather than focusing predominantly upon solving existing problems, cognitive institutions will increasingly dedicate resources to understanding emerging opportunities and potential risks before they fully materialise. Advances in simulation, scenario exploration and systemic modelling will allow governments to examine the possible consequences of alternative policy pathways with greater depth than ever before. These capabilities will not eliminate uncertainty, since human societies will always remain inherently unpredictable, but they will strengthen institutional preparedness by encouraging governments to think across multiple possible futures rather than assuming that current conditions will continue indefinitely. Governance will become progressively more future-oriented without abandoning its responsibility to address present needs.

Despite these remarkable possibilities, the evolution of public institutions will continue to depend fundamentally upon constitutional principles rather than technological sophistication alone. Artificial intelligence may significantly expand institutional cognition, yet it cannot define justice, legitimacy, democratic accountability or the public interest. These remain political and ethical questions requiring human deliberation and collective choice. Future institutions will therefore succeed not because they possess increasingly powerful computational systems, but because they integrate those systems within governance models that remain firmly grounded in transparency, human dignity, democratic participation and the rule of law. Technology becomes an instrument of constitutional governance rather than its replacement.

Indeed, one of the greatest dangers facing institutional evolution lies not in excessive technological development but in insufficient institutional adaptation. Organisations that attempt to incorporate artificial intelligence without simultaneously transforming their cultures of learning, collaboration and public responsibility may discover that advanced technologies merely reinforce outdated administrative assumptions. Genuine institutional evolution requires more than digital innovation. It requires intellectual evolution. Institutions must learn to understand themselves as living cognitive systems whose primary responsibility is not simply to administer society efficiently

but to improve continuously in their capacity to understand the complexity of the societies they govern.

Seen from this broader historical perspective, the future of public institutions is unlikely to be defined by a single technological breakthrough or administrative reform. Instead, it will emerge through the gradual convergence of several long-term developments: increasingly sophisticated artificial intelligence, expanding institutional memory, richer forms of interdisciplinary collaboration, deeper democratic participation and continuously evolving systems of organisational learning. Together, these developments point towards a new generation of governance in which institutions become progressively more reflective, adaptive and intellectually resilient while remaining firmly committed to the constitutional principles that sustain democratic life.

The institutions of tomorrow will therefore not simply be digital governments equipped with more advanced technologies. They will be cognitive institutions capable of transforming knowledge into wisdom, information into understanding and experience into continuous public learning. Their greatest achievement will not be faster administration but deeper institutional intelligence, an intelligence exercised collectively, guided democratically and renewed continuously through the responsible integration of human judgement and artificial intelligence.

This vision brings us naturally to the central conclusion of our article. Having explored how artificial intelligence is reshaping institutional evolution through cognitive infrastructure, organisational learning, decision support and adaptive governance, we can now consider the broader significance of these developments for the future of democratic governance itself.

Conclusion

From Digital Institutions to Cognitive Institutions

The relationship between institutions and technology has always been one of mutual transformation. Every significant technological advance has altered the way societies organise themselves, and in doing so has encouraged institutions to evolve beyond the forms that previously appeared both stable and sufficient. Writing expanded institutional memory. Bureaucracy enabled governance at unprecedented scales. Industrialisation demanded increasingly specialised public administrations, while the digital revolution transformed the circulation of information throughout government. Artificial intelligence now represents the next chapter in this long historical continuum. Yet its significance extends beyond the introduction of another generation of digital tools. It reshapes the very processes through which institutions perceive reality, construct knowledge, learn from experience and adapt to an increasingly interconnected world. The evolution taking place is therefore not simply technological. It is fundamentally cognitive.

Throughout this article, we have argued that artificial intelligence should not be understood primarily as a mechanism for automation or administrative efficiency, important though these applications undoubtedly are. Its deepest contribution lies in expanding the cognitive capacities of institutions themselves. AI strengthens organisational learning, enriches institutional memory, supports collective reasoning, enables more comprehensive decision-making and allows governance to respond more intelligently to environments characterised by continuous change. Rather than replacing human judgement, it enlarges the intellectual environment within which democratic institutions deliberate and act. The institution gradually becomes more capable of understanding complexity without abandoning the constitutional principles that give governance its legitimacy.

This transformation invites us to reconsider the meaning of digital transformation itself. For many years, governments around the world have invested heavily in digital technologies with the objective of modernising administrative procedures, improving public services and increasing organisational efficiency. These initiatives have delivered substantial benefits, making institutions more accessible, more responsive and more operationally effective. Yet digital transformation alone does not necessarily produce institutions that learn more effectively or reason more intelligently. Information can be processed at extraordinary speed while remaining poorly integrated into meaningful institutional understanding. Administrative procedures may become highly efficient without strengthening the institution's capacity to interpret the increasingly complex realities it is expected to govern.

Artificial intelligence changes this trajectory because it enables digital transformation to evolve into cognitive transformation. The focus shifts from managing information towards cultivating understanding. Institutional memory becomes an active participant in governance rather than a passive archive. Organisational learning becomes continuous rather than episodic. Decision-making becomes more systemic because diverse forms of knowledge can be integrated into coherent cognitive environments. Adaptation becomes an ordinary characteristic of governance rather than an exceptional response to crisis. The institution no longer develops simply by acquiring new technologies. It evolves by strengthening its capacity to think collectively about the challenges it faces.

At the same time, this evolution makes one principle increasingly clear: the future of governance will depend far more upon institutional design than upon technological sophistication alone. Artificial intelligence possesses extraordinary computational capabilities, but these capabilities acquire public value only when embedded within institutions that remain committed

to democratic legitimacy, constitutional accountability, ethical responsibility and the public interest. Technologies cannot determine collective purpose, establish political legitimacy or define justice. These remain fundamentally human responsibilities exercised through democratic institutions. The more capable artificial intelligence becomes, the greater the importance of institutions capable of guiding its use with wisdom, transparency and constitutional integrity.

Seen from this perspective, the distinction between digital institutions and cognitive institutions becomes increasingly significant. A digital institution employs technology to improve existing administrative activities. A cognitive institution employs technology to expand its own capacity for understanding, learning and intelligent adaptation. The first seeks greater efficiency within established organisational models. The second continuously refines the quality of its institutional intelligence while preserving the constitutional values that define its public mission. Digital transformation improves what institutions do. Cognitive transformation improves how institutions think.

This distinction will almost certainly shape the evolution of public governance throughout the coming decades. The societies that prove most resilient in the face of accelerating technological, environmental and geopolitical complexity are unlikely to be those that simply automate more administrative procedures. They are more likely to be those whose institutions become capable of integrating scientific knowledge, organisational experience, citizen participation, ethical reflection and artificial intelligence into coherent systems of collective reasoning. Governance will increasingly depend upon institutions that can learn faster than the environments they seek to govern, while remaining sufficiently stable to preserve democratic continuity across generations.

Such institutions will not emerge automatically through technological innovation. They will require deliberate investment in organisational culture, interdisciplinary collaboration, institutional memory, public trust and constitutional learning. They will depend upon professionals capable of combining technical literacy with ethical judgement, strategic foresight and deep understanding of democratic governance. They will require leaders who recognise that the true value of artificial intelligence lies not in replacing institutional responsibility but in strengthening the institution's ability to fulfil that responsibility more wisely. Above all, they will require societies willing to view governance as an evolving cognitive endeavour rather than a static administrative mechanism.

In many respects, this represents one of the most significant transitions in the history of public institutions. Earlier generations built governments capable of administering increasingly complex societies. The challenge facing the present generation is subtly different. It is to build institutions capable of understanding societies whose complexity continues to expand beyond the limits of traditional governance. Artificial intelligence provides powerful new cognitive capabilities, but it is institutional evolution that determines whether those capabilities contribute to wiser public decision-making or remain fragmented technological achievements with limited societal impact.

The age of artificial intelligence should not be remembered primarily as the moment when governments became more automated. It should be remembered as the period in which institutions began to evolve from organisations that managed information into cognitive systems capable of learning continuously, reasoning collectively and adapting responsibly. This transition marks the beginning of a new stage in the long history of institutional evolution, one in which the defining strength of public institutions will no longer be measured solely by the authority they exercise or the services they provide, but by **their capacity to understand an increasingly complex world and to transform that understanding into legitimate, intelligent and adaptive forms of democratic governance.**