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Anticipatory AI governance for territorial digital inclusion strategies: action research within the Provincial Council of Gipuzkoa (Basque Country)



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Highlights:

- Operationalizes anticipatory AI governance at subnational (city-regional) level.
- Embeds AI policy in territorial digital inclusion strategy.
- Applies public innovation to AI governance through Science for Policy approach.
- Uses action research with multi-stakeholder engagement.
- Identifies context-sensitive governance principles for democratic AI oversight.

Abstract: This article examines the implementation of Anticipatory Artificial Intelligence (AI) Governance within the Provincial Council of Gipuzkoa (Basque Country) through an action research project designed to inform Territorial Digital Inclusion Strategies led by the General Directorate for Human Rights and Democratic Culture (Presidency). Situating the study within debates on anticipatory governance, it addresses the following research question: how can city-regional governments operationalise anticipatory AI governance to advance territorial digital inclusion while safeguarding democratic accountability and human digital rights? Moving beyond industrial and productivity-centred approaches, the study focuses on the ethical, socio-economic, and territorial implications of AI for citizens. The action research follows an eight-step methodological roadmap (2024–2026) driven by a *Science-for-Policy* approach. Methodologically, the study integrates a multi-actor action research design structured around (i) Knowledge Exchange, (ii) Stakeholder Engagement, and (iii) Open-Science Dissemination. Findings indicate that embedding anticipatory AI governance within territorial digital inclusion strategies enhances policy foresight, strengthens ethical reflexivity in algorithmic



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decision-making, and consolidates public trust through participatory governance. The analysis also incorporates an emerging legal dimension, informed by the leading author's selection to recent European Commission initiatives, including the *Frontier AI Expert Forum* and the *AI Act Advisory Forum*, enabling preliminary alignment with evolving EU AI regulatory frameworks. The Gipuzkoa case offers a context-sensitive governance framework, highlighting design principles that may inform other territorial administrations under varying institutional and resource conditions. The central empirical contribution of the article is to demonstrate that anticipatory AI governance capacity is unevenly distributed across civil society organisations (CSOs), provincial directorates, and municipalities. These asymmetries affect how AI-related risks, digital inclusion priorities, and governance responsibilities are interpreted and operationalised across territorial governance scales. Consequently, anticipatory AI governance emerges not as a universally replicable institutional model, but as a context-sensitive governance capability conditioned by administrative capacity, territorial coordination, and stakeholder participation.

Keywords: artificial intelligence; anticipatory governance; digital inclusion; institutional innovation; action research; multi-actor governance; policy foresight; science for policy; stakeholder engagement; Basque Country

1. Introduction: anticipatory AI governance adoption for territorial digital inclusion strategies

The rapid diffusion of digital technologies is reshaping how public institutions operate, with core governance functions—consultation, coordination, service delivery, and accountability—increasingly mediated by data infrastructures and AI systems. AI is no longer a peripheral tool but an infrastructural component of public value creation, institutional organisation, and legitimacy. Consequently, scholarship has shifted from viewing digitalisation as efficiency enhancement to analysing its implications for power, accountability, and democratic capacity in datafied governance systems [1–4]. This shift is particularly urgent as AI is deployed in high-stakes domains—such as welfare administration and decision support—where opacity and bias can generate asymmetric harms [5–7].

A central challenge lies in the tension between efficiency and legitimacy. While AI promises improved performance, it may simultaneously reduce transparency and contestability, reinforcing inequalities through biased data and automated classification [6,8]. Algorithmic opacity, compounded by outsourcing and procurement asymmetries, creates institutional governance gaps that undermine accountability and due process [3,4,6,7,9]. Empirical evidence, including cases such as Robodebt, demonstrates how weak governance can erode public trust and produce harmful outcomes [5,7,10]. The key question is therefore not whether AI will be adopted, but how it can be governed to preserve accountability and inclusion.

This article addresses this question through anticipatory AI governance, focusing on subnational administrations where AI is implemented and experienced. Territorial contexts matter because digital divides, institutional capacities, and civic infrastructures vary across places, shaping the distributive effects of AI adoption [3,4,11–13]. Anticipatory governance offers a framework for addressing uncertainty through foresight, reflexivity, and iterative learning, enabling institutions to remain both robust and adaptive [14–16].

The article does not treat anticipatory AI governance as a pre-existing institutional condition, but as an emergent governance capacity produced through action research. The analytical tension examined is

whether a territorial administration can move from fragmented digital inclusion concerns toward a structured governance architecture capable of integrating foresight, stakeholder legitimacy, and institutional learning. In this sense, the study does not test a causal hypothesis in a positivist sense; instead, it examines how anticipatory capacity is constructed through iterative engagement with civil society organisations (CSOs), public directorates, and municipalities.

Recent work on mission-oriented policy and public value further emphasises the role of the state as an active shaper of socio-technical transitions, requiring capabilities to steer AI toward inclusion, rights protection, and democratic accountability [17,18]. In parallel, digital inclusion research highlights that participation, contestability, and institutional design are central to equitable governance, not merely access or skills [12,13]. Public-sector AI literature reinforces the importance of implementation, organisational capacity, and cross-departmental coordination [4,11,19].

Against this backdrop, the article examines how anticipatory AI governance is operationalised within the Provincial Council of Gipuzkoa (Basque Country) through an action research project (2024–2026) informing a Digital Inclusion Strategy under the II Diversity Plan. Framed through a *Science-for-Policy* approach, the study integrates institutional engagement, civic participation, and knowledge production to address emerging AI governance challenges [20,21]. The research asks: how can subnational governments operationalise anticipatory AI governance to advance digital inclusion while safeguarding democratic accountability and human rights?

While the Gipuzkoa case provides insights into anticipatory AI governance, its transferability is conditioned by its distinctive institutional setting, particularly its fiscal autonomy and administrative capacity under the *Concierto Económico*. The Gipuzkoa case should not be interpreted as a universally replicable model, but rather as an enabling configuration that illustrates how anticipatory AI governance can be institutionalised under conditions of high administrative capacity and fiscal autonomy. Its broader contribution lies in identifying transferable governance principles—such as co-production, transversal coordination, and rights-based framing—that require adaptation to local institutional contexts. Future research should therefore examine how such principles can be operationalised in resource-constrained settings and across different governance scales. The findings suggest a form of conditional replicability, in which governance architectures can be transferred only when enabling institutional conditions—capacity, legal autonomy, and coordination mechanisms—are present.

The article advances three contributions. Conceptually, it links anticipatory governance with mission-oriented public innovation, framing AI governance as a state capability challenge [14,17,18]. Empirically, it provides a subnational case of implementation through an eight-step action research roadmap connecting institutions, municipalities, and civil society [20–24]. The article’s central empirical finding is that anticipatory governance capacity is distributed unevenly across governance actors and territorial scales. CSOs, provincial directorates, and municipalities identify different risks, institutional responsibilities, and governance priorities regarding AI adoption. These asymmetries demonstrate that anticipatory AI governance depends on coordination mechanisms capable of aligning heterogeneous institutional capacities rather than on uniform governance models. Methodologically, the article demonstrates how a multi-actor action research design can function as a *Science-for-Policy* governance architecture connecting institutional learning, stakeholder participation, and public dissemination. Rather than methodological triangulation in the positivist sense, the research design combines cross-scalar

engagement with CSOs, provincial directorates, and municipalities in order to construct anticipatory governance capacity through iterative institutional learning processes. [19,22,25].

By grounding AI governance in a territorial context, the article shifts attention from abstract principles to the institutional production of anticipatory capacity. The Gipuzkoa case illustrates how place-based governance can embed foresight, inclusion, and coordination into AI adoption, contributing to broader debates on digital sovereignty, regional development, and democratic resilience in datafied societies [12,13,25].

The remainder of the article is structured as follows. Section 2 reviews the literature on anticipatory governance, AI policy, and digital inclusion [3,4,6,11,18]. Section 3 outlines the action research design and a multi-actor action research design methodology [21]. Section 4 presents the findings on institutional learning, ethical reflexivity, and governance capacity. The final section concludes with policy implications and future research directions [18].

2. Literature review: from digital inclusion to anticipatory AI governance

2.1. Gipuzkoa province as a devolved territorial governance setting

Gipuzkoa province is not simply a “local” unit of administration: it is a Historical Territory within the Basque Country with distinctive devolved governing capacity and a strong tradition of policy experimentation at the subnational scale. This matters for the study of anticipatory AI governance because the practical feasibility of responsible AI adoption depends on institutional capabilities—financing, coordination, procurement discretion, implementation capacity, and public accountability mechanisms—many of which are exercised territorially rather than only at national or supranational levels. Across Europe, AI policy is increasingly framed as an adoption agenda (sectoral diffusion, productivity goals, and competitiveness), but implementation is simultaneously conditioned by compliance expectations, oversight guidance, and infrastructural readiness [26–29]. This creates a governance tension for devolved administrations: how to deploy AI-enabled tools while maintaining legitimacy, ensuring contestability, and protecting rights under conditions of rapid technological change. This institutional configuration constitutes a critical enabling condition for the anticipatory governance approach analysed in this article and limits direct comparability with less autonomous or resource-constrained administrations.

Gipuzkoa province is one of the three Historical Territories of the Basque Autonomous Community, with the larger Basque Country cultural-linguistic commonwealth (at the north of Spain and the south of France), operating under the *Concierto Económico* (Economic Agreement), a distinctive fiscal and political arrangement that grants the Basque institutions full tax-raising powers and broad self-government within the Spanish constitutional framework (Figure 1) [30]. Unlike ordinary provinces in Spain, the Provincial Council of Gipuzkoa collects and manages its own taxes, finances public policies autonomously, and transfers an agreed quota to the central state for shared competences. This fiscal autonomy underpins a high degree of policy experimentation and institutional coordination capacity at the territorial scale. Gipuzkoa has approximately 720,000 inhabitants within 1980 km² (density ~360 inhabitants/km²), combines strong industrial traditions with advanced service sectors, and consistently ranks among Spain’s highest regions in GDP per capita and R&D intensity. The territory hosts advanced innovation assets (MUBIL and ZIUR centres, in smart mobility and cybersecurity, respectively) [21], including the

recently inaugurated IBM Quantum System Two in Donostia–San Sebastián, positioning it within European high-performance computing and AI research infrastructures [27]. This combination of fiscal sovereignty, compact territorial scale, high social cohesion, and innovation capacity makes the province of Gipuzkoa an analytically distinctive case for examining anticipatory AI governance: it is neither a nation-state nor a conventional municipality, but a devolved territorial government with the financial, administrative, and technological capability to shape AI adoption while remaining directly accountable to citizens.

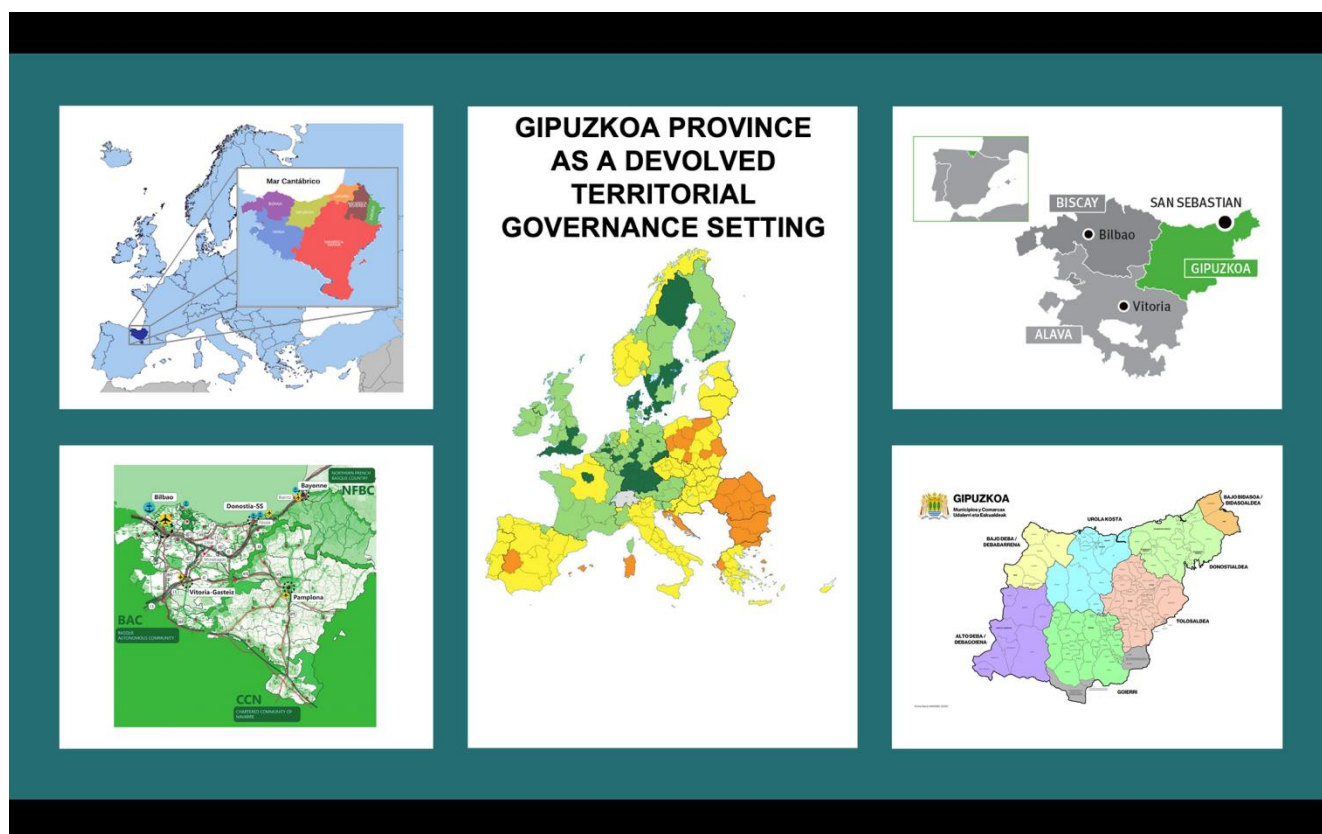


Figure 1. Gipuzkoa province as a devolved territorial governance setting. Copyright 2026 Calzada & Eizaguirre.

The Basque Country within Gipuzkoa context also intersects with a wider geopolitical and sovereignty debate about AI. Comparative regulatory perspectives highlight that AI governance is shaped by strategic competition and regulatory models across the European Union (EU), the United States, and China, affecting what subnational governments can procure, deploy, and explain to citizens [31]. Policy work on AI sovereignty argues that administrations should treat dependencies—compute, cloud infrastructures, data supply chains, standards ecosystems, and vendor lock-in—as long-run strategic choices rather than technical afterthoughts [32,33]. This sovereignty turn is reinforced by frameworks that propose measuring “capability” and “agency” for policymakers, foregrounding the uneven distribution of AI power and the importance of institutional strategy rather than reactive rulemaking [34].

2.2. *Digital inclusion beyond access: participation, literacy, and contestability*

Digital inclusion scholarship has expanded from a focus on connectivity and digital skills toward a deeper concern with democratic participation, service accessibility, and unequal exposure to harms in datafied governance environments. In practical terms, inclusion increasingly concerns whether citizens can access public services fairly, participate meaningfully in decision-making, and contest outcomes—especially when decisions are mediated by automated systems. Basque civic-innovation work on digital technologies and democracy reflects this shift, emphasizing that platforms can widen participatory channels, yet also introduce new asymmetries of voice, expertise, and institutional responsiveness [35]. These concerns are not confined to “online participation”: they implicate how public services are designed and how legitimacy is sustained when data-driven systems shape eligibility, prioritization, and administrative decision support [36–40].

From this perspective, digital inclusion for AI governance requires at least three expanded components. First, algorithmic literacy: citizens and frontline workers need intelligible explanations of how automated systems influence services and decisions. Second, contestability: there must be accessible pathways to challenge outcomes and request human review, consistent with oversight guidance and rights protections [41]. Third, institutional mediation: inclusion depends on whether public institutions can translate complex AI systems into accountable, auditable, and publicly legible arrangements—rather than shifting authority into opaque vendor infrastructures [38–41]. These requirements position digital inclusion as democratic capacity, not merely access to devices or networks.

This action research is situated within that broader shift from digital inclusion toward rights-based AI governance. The action research project presented in this article is funded by the Human Rights and Democratic Culture Directorate of the Provincial Council of Gipuzkoa, reflecting the territory’s long-standing policy commitment to embedding democratic values and human rights within institutional innovation. Historically, this agenda has focused on civic participation, memory policies, and democratic culture after decades of political violence [30]; however, it is increasingly being extended to the digital sphere as algorithmic systems begin to shape public service provision and administrative decision-making. In this sense, the project interprets contemporary AI governance challenges—particularly those associated with generative AI, automated decision support, and data-driven public services—through the normative lens of digital rights. By linking human-rights discourse with emerging debates on algorithmic accountability, transparency, and citizen oversight, the initiative aims to explore how devolved territorial institutions can translate established human digital rights commitments into practical governance mechanisms capable of addressing the algorithmic transformations currently affecting democratic societies. By linking human-rights discourse with emerging debates on algorithmic accountability, transparency, and citizen oversight, the initiative aims to explore how devolved territorial institutions can translate established human rights commitments into practical governance mechanisms capable of addressing the algorithmic transformations currently affecting democratic societies. In this sense, the transition from traditional human rights policy domains toward algorithmic and data-driven governance is consolidating the digital rights agenda within the Human Rights and Democratic Culture Directorate as a strategic institutional positioning.

2.3. AI in the public administration: legitimacy, accountability, and rights risks

The literature on public-sector AI governance consistently shows that risks in automated decision-making are socio-technical and institutional rather than merely technical. Comparative analyses of AI governance in democratic settings emphasize recurring challenges: opacity, unclear accountability chains, difficulties in redress, and legitimacy gaps when systems are embedded into administrative routines [42]. Public-sector engagement work similarly focuses on the institutional questions agencies should ask before and during adoption—questions about accountability, procurement, appropriate use, and governance safeguards—signaling a move from “AI principles” to implementation realism [43]. In the EU context, governance discussions also foreground regulatory compliance pressures and international dimensions, underscoring the difficulty of treating AI deployment as a purely local administrative matter [44].

A distinctive contribution of *Law, Ethics & Technology* is the bridging of governance issues with concrete legal domains. Anti-discrimination scholarship, for example, illustrates how harms can arise not only from model design but from institutional implementation contexts—highlighting the “weight” of protected characteristics and the complexity of aligning deployments with non-discrimination law [43]. Governance frameworks for mitigating bias in generative AI argue that accountability requires institutional responsibilities, monitoring practices, and governance structures that persist after initial deployment, not solely technical bias fixes [44]. Comparative legal-ethical analysis of AI-driven predictive policing further demonstrates how ethical tensions and governance instruments are shaped by the political and legal environment, implying that “best practice” cannot be transplanted without attention to institutional context [45]. Meanwhile, privacy and data protection work increasingly frames rights protection in environmental and systemic terms, emphasizing that data governance is shaped by infrastructures and exposure patterns, not only individual consent [46,47].

From a legal perspective, these governance challenges are increasingly structured by emerging regulatory frameworks such as the EU Artificial Intelligence Act, which introduces risk-based classifications, transparency obligations, human oversight requirements, and accountability mechanisms for high-risk AI systems. In this context, issues identified in the empirical analysis—such as automated decision opacity, lack of contestability, and discriminatory outcomes—can be interpreted as potential points of legal non-compliance or regulatory friction. This connection highlights the importance of translating rights-based principles into enforceable governance practices within public administration. To operationalise this legal dimension, the Digital Inclusion and Generative AI Decalogue can be interpreted as a governance interface linking normative principles with concrete administrative obligations. Several dimensions correspond directly to emerging legal and procedural duties within AI governance frameworks. Experiences of algorithmic discrimination relate to anti-discrimination obligations and the prevention of unequal treatment in automated administrative systems. Concerns regarding data and control connect with GDPR-related principles, including lawful processing, purpose limitation, transparency, proportionality, and institutional accountability. Statistical invisibility raises fairness and equality concerns because under-represented populations may become systematically excluded from policy design and automated decision systems. Likewise, digital rights incidents and policy gaps reveal the need for contestability mechanisms, complaint procedures, human review pathways, and institutional redress capacities. In the context of generative AI adoption, transparency

obligations and human oversight requirements become particularly significant where AI-assisted systems influence public service delivery or administrative decision-making. From this perspective, anticipatory AI governance requires not only ethical principles but also operational administrative mechanisms capable of translating evolving legal standards into institutional practice. Further developments can be followed through the European Commission's Frontier AI Expert Forum and AI Act Advisory Forum, where the corresponding author of this article was appointed as a member of both forums in an expert capacity.

To make this legal dimension operational, the Decalogue is interpreted not only as a normative framework but also as a legal-governance interface. Its dimensions correspond to concrete duties and risk areas in public-sector AI governance. Experiences of digital or algorithmic discrimination relate to anti-discrimination obligations and the need to prevent unequal treatment in automated or data-supported administrative processes. Data and control concerns connect with data protection duties, including lawful basis, purpose limitation, data minimisation, transparency, and accountability. Statistical invisibility raises equality and fairness concerns, since under-representation in datasets may generate exclusionary policy outcomes. Digital rights incidents and policy gaps point to the need for accessible complaint mechanisms, human review, and remedies. Finally, generative AI use in public administration requires transparency, human oversight, documentation, and institutional accountability. In this sense, the Decalogue translates broad legal principles into an operational checklist for territorial administrations seeking to align anticipatory AI governance with emerging EU regulatory expectations as indicated by *Frontier AI Expert Forum* and *AI Act Advisory Forum* (https://www.ehu.eus/es/web/departamento-politicas-publicas-e-historia-economica/home/-/asset_publisher/dqywuaPJwTYJ/content/igor-calzada-europako-batzordearen-adimen-artifizialari-buruzko-nazioarteko-goi-mailako-bi-forotako-kid-e-hautatua).

2.4. Anticipatory AI governance and science for policy

Anticipatory governance has emerged as a pragmatic approach for governing under conditions of uncertainty by embedding foresight, reflexivity, and iterative learning within decision-making processes. Rather than equating anticipation with prediction, foundational contributions—particularly within United Nations Educational, Scientific and Cultural Organization (UNESCO) frameworks—conceptualise it as a capability oriented toward preparedness, deliberation, and adaptive institutional learning in the face of complex socio-technical transformations [48]. Within European policy, this orientation has increasingly been operationalised through “Science for Policy” approaches, which connect evidence production, structured stakeholder engagement, and policy experimentation in iterative cycles of learning and adjustment [49]. The relevance of this framework to artificial intelligence (AI) governance is immediate: generative AI systems evolve rapidly, diffuse across sectors faster than administrative reform cycles can accommodate, and generate social impacts that are both uncertain and normatively contested [50–54].

This shift toward anticipation is reflected in a growing body of policy instruments that emphasise implementation-oriented governance. At the European level, AI adoption strategies promote diffusion while simultaneously underscoring the need for institutional readiness, risk management, and governance safeguards within the public sector [26]. Complementary work on generative AI and regulatory compliance highlights the transnational character of AI systems and the resulting limitations of purely national regulatory approaches [28]. Guidance from the Joint Research Centre further specifies

that human oversight must be institutionalised as a practice—through clearly defined roles, procedures, and documentation—rather than treated as a declarative principle [29]. International standard-setting efforts reinforce this operational turn: the International Telecommunication Union (ITU) advances the translation of governance principles into actionable standards and implementation mechanisms [50,51], while Organisation for Economic Co-operation and Development (OECD) toolkits and definitional frameworks clarify the scope of AI systems and provide practical guidance for public-sector deployment and oversight [52–55]. Collectively, these initiatives signal a transition from abstract ethical commitments toward institutionalised governance capacities grounded in operational practice [56–60].

At the same time, critical scholarship cautions that anticipatory governance is not normatively neutral. The concept of “AIdeology” highlights how AI can function as an ideological construct that naturalises particular infrastructures and power relations, especially when narratives of innovation displace democratic deliberation over distributional consequences and accountability [61,62]. Related work on “AIs as oracles” suggests that generative AI may reshape anticipatory governance itself by reinforcing technocratic forms of decision-making unless counterbalanced by robust mechanisms of contestability, transparency, and rights protection [63–65]. These critiques resonate with broader analyses of AI governance that emphasise the risks of depoliticisation, infrastructural lock-in [66–69], and asymmetries in data control [66–69], particularly in contexts characterised by uneven institutional capacities and digital divides [70–72]. From this perspective, anticipation risks becoming a legitimising discourse for accelerated technological deployment rather than a substantive practice of democratic governance [73–75]. Accordingly, anticipatory AI governance must be understood as a form of democratic institutional design oriented toward legitimacy, inclusion, and rights protection [76–79], particularly within subnational and territorial contexts such as Gipuzkoa [80–82].

Against this backdrop, anticipatory AI governance can be conceptualised as an institutional architecture composed of interdependent capacities: (i) a clearly articulated public mission centred on inclusion; (ii) infrastructural readiness, particularly through digital public infrastructure (DPI); (iii) implementable oversight mechanisms grounded in legal and procedural standards; (iv) stakeholder participation and legitimacy through structured engagement; and (v) a governance strategy attentive to technological dependencies, institutional capacity, and long-term public accountability [83–85]. This conceptualisation responds directly to calls in the literature to move beyond principle-based frameworks toward actionable governance arrangements that integrate legal, institutional, and socio-technical dimensions [86–88].

A territorial capability perspective is especially relevant in the case of Gipuzkoa. Here, digital inclusion is not framed narrowly as connectivity or skills acquisition, but as an institutional mandate embedded within the II Diversity Plan, which positions inclusion as a rights-based and place-sensitive governance responsibility. Capacity-building, therefore, extends beyond administrative instruments to encompass co-production infrastructures that connect public institutions with CSOs working directly with structurally excluded populations. Within this framework, the six CSOs of Aniztasunaren Sarea (Diversity Network in Gipuzkoa) were engaged as epistemic partners rather than as stakeholders consulted *ex post*, aligning with participatory governance traditions that foreground power, voice, and representation as conditions for meaningful inclusion [41,44,52,59].

Taken together, this literature review positions anticipatory AI governance as a territorial capability: the capacity of subnational administrations to connect digital inclusion, legal accountability, stakeholder

participation, and institutional learning under conditions of technological uncertainty. This framework directly informs the action research design presented in Section 3 and the empirical analysis of the Decalogue, directorates, and municipalities in Section 4.

This co-production process resulted in the development of a Decalogue structured around ten dimensions organised into four thematic blocks—Digital Divide, Algorithmic Bias, Data Divide, and Digital Futures. The Decalogue functions both as a diagnostic framework and as an operational roadmap for anticipatory AI governance. It conceptualises digital inclusion as a layered phenomenon encompassing access, devices, and literacy, as well as more complex dimensions such as discrimination, representation deficits, data control, statistical invisibility, mechanisms of redress, and collectively articulated visions of just digital futures. In doing so, it translates abstract AI governance principles into a territorially grounded and policy-relevant framework that supports institutional learning, legal interpretation, and policy design [23,38,41,49,51].

Empirical findings further indicate that anticipatory AI governance cannot be confined to a single administrative unit—such as digitalisation or innovation departments—if it is to effectively safeguard rights and maintain public trust. Instead, governance must be transversal across institutional structures. Evidence from interviews conducted across seven directorates demonstrates that AI-related risks and opportunities are unevenly distributed across organisational functions, including taxation, infrastructure management, service delivery, data governance, procurement, legal compliance, communication, and social policy. Without deliberate cross-departmental coordination, these asymmetries generate governance gaps that undermine accountability and coherence, reinforcing findings from public-sector AI research on institutional capacity and oversight practices [50–54].

At the same time, engagement with eleven municipalities through the ElkarBizi intermunicipal network highlights the importance of multi-level governance. Municipal administrations operate under varying constraints—differing in capacity, staffing, vendor dependence, proximity to citizens, and exposure to digital divides—making territorial variation analytically significant rather than merely contextual. These findings reinforce the argument that anticipatory AI governance must be constructed as a multi-level capability aligning provincial strategy with municipal implementation and civil society knowledge. Such alignment is essential to avoid standardised governance models that overlook place-based inequalities and risk undermining democratic legitimacy [80–84].

For this reason, the Decalogue is not treated as a standalone output but as a governance interface linking civil society evidence, provincial coordination, and municipal practice. It provides both the methodological foundation for the action research design and the empirical basis for analysing governance frictions and inclusion outcomes in subsequent sections. In this sense, anticipatory AI governance is operationalised not as a static framework but as an evolving institutional capability embedded within territorial governance systems, consistent with broader calls in the literature to integrate foresight, participation, and institutional accountability in AI governance under conditions of uncertainty [48–50].

Crucially, anticipatory AI governance must be aligned with evolving legal standards, ensuring that foresight and experimentation are compatible with regulatory compliance, fundamental rights protection, and procedural accountability.

3. Methods and empirics: multi-actor action research design through eight methodological steps

Consistent with action research traditions, the intervention is part of the empirical process rather than external to it. The study therefore evaluates anticipatory AI governance through observable process indicators: (i) whether stakeholders are able to articulate AI-related risks and inclusion priorities; (ii) whether these concerns are translated into a shared governance framework; (iii) whether institutional actors identify cross-departmental coordination needs; and (iv) whether municipal engagement reveals place-based differences relevant to implementation.

The qualitative analysis follows a theory-informed thematic approach structured around the Digital Inclusion and Generative AI Decalogue. The four thematic blocks and ten dimensions of the Decalogue function as a deductive coding framework guiding both data collection and analysis. Empirical material—comprising interview transcripts, workshop notes, and participant-generated inputs—was systematically coded and organised according to these dimensions. The analytical process involved three stages: (i) initial categorisation of data within Decalogue dimensions, (ii) cross-case comparison across stakeholder groups (CSOs, provincial directorates, and municipalities), and (iii) synthesis into structured analytical matrices. Coding and interpretation were conducted manually by the authors, following an iterative and reflexive process consistent with action research methodology. The resulting tables therefore represent analytical syntheses of empirical material rather than direct quotations.

The analytical procedure followed four iterative stages consistent with action research methodology. First, empirical material generated through interviews, workshops, facilitator notes, and participant-generated inputs was organised according to the four thematic blocks and ten dimensions of the Digital Inclusion and Generative AI Decalogue. Second, the authors conducted manual interpretive coding to identify recurring themes, institutional divergences, governance concerns, and emerging anticipatory capacities across stakeholder groups. Third, cross-case comparison was undertaken between CSOs, provincial directorates, and municipalities in order to identify asymmetries in institutional capability, governance priorities, and AI-related concerns across territorial governance scales. Fourth, the material was synthesised into analytical matrices, which function as interpretive reconstructions of empirical findings rather than verbatim reproductions of participant statements.

The analytical approach followed a thematic interpretive strategy. Rather than formal coding procedures, empirical material was organised according to the Decalogue framework to identify patterns, divergences, and institutional perspectives. The entries do not reproduce verbatim statements but reflect the authors' interpretation of data collected through interviews and workshops, consistent with action research methodologies where knowledge is co-produced and analytically reconstructed.

Semi-structured interviews followed a common protocol organised around digital inclusion barriers, AI-related governance risks, institutional responsibilities, data governance concerns, and future governance priorities. Workshop discussions were similarly structured around the Decalogue dimensions and facilitated through guided prompts encouraging participants to identify experiences of digital exclusion, algorithmic discrimination, governance gaps, and desirable digital futures.

Validation occurred iteratively throughout the action research cycle through repeated interaction with institutional actors and stakeholders during workshops, dissemination events, and follow-up discussions. Rather than seeking statistical generalisation, the methodological objective was to generate

reflexive institutional learning and territorially grounded governance interpretation consistent with participatory action research traditions.

3.1. *Eight methodological action research steps*

This research adopts an action research methodology structured around iterative cycles of intervention, observation, and reflection conducted between 2024 and 2026 within the Provincial Council of Gipuzkoa. Action research is particularly appropriate for studying governance innovation processes where research and policy experimentation evolve simultaneously [22,30]. Rather than analysing policy outcomes retrospectively, this approach embeds the research process within institutional decision-making environments, enabling researchers and policymakers to co-produce knowledge in response to emerging challenges in digital transformation and AI governance [89].

The methodological design responds to the growing recognition that algorithmic governance reshapes public administration, requiring new organisational capabilities, oversight mechanisms, and participatory arrangements [90]. Responsible AI scholarship further emphasises that ethical principles must be translated into concrete organisational practices, including stakeholder engagement, policy experimentation, and institutional learning [91]. In this context, action research provides a suitable framework for iterative feedback between research and implementation.

The study is framed through a Science-for-Policy approach, integrating academic inquiry with institutional experimentation and public dissemination [92,93]. This is particularly relevant in AI governance, where rapid diffusion of generative AI systems challenges static regulatory approaches and requires adaptive, practice-based governance responses [94,95].

The research design follows a multi-actor action research methodological architecture comprising three interrelated dimensions: (i) knowledge exchange, (ii) stakeholder engagement, and (iii) open-science dissemination. These dimensions structure interactions between institutional learning, participatory co-production, and public communication, consistent with multi-actor governance approaches in AI policy contexts [96].

The empirical research is organised through an eight-step action research roadmap. While all steps contribute to the research process, primary data collection is concentrated in three stages: (i) participatory workshops with CSOs (March–July 2025), (ii) semi-structured interviews across seven directorates (October–November 2025), and (iii) a structured inter-municipal workshop involving eleven municipalities (30 January 2026). The remaining steps support institutional embedding, validation, and dissemination, consistent with action research practice.

Data collection instruments were derived from the four thematic blocks and ten dimensions of the Digital Inclusion and Generative AI Decalogue, which served as a common analytical framework. Interviews were semi-structured, audio-recorded, and complemented by structured notes. Workshops followed guided discussion protocols aligned with the Decalogue dimensions, and outputs were documented through facilitator notes and synthesis reports. In the municipal workshop, participants contributed structured inputs directly into comparative tables with facilitation support.

The research also accounts for territorial inequalities and infrastructural conditions shaping AI governance. Evidence indicates that AI systems can reproduce spatial disparities due to uneven data representation and institutional capacity [97,98]. These dynamics are linked to broader debates on DPI and governance, which emphasise the role of foundational systems in enabling inclusive and accountable

digital transformation [99–102]. Geopolitical and political economy perspectives further highlight how AI infrastructures and capabilities shape regional development trajectories and strategic autonomy [103,104].

Finally, the research design incorporates socio-ecological and participatory governance perspectives. Technological innovation is evaluated in relation to its broader societal and environmental implications [105,106], while participatory governance frameworks stress the importance of inclusive decision-making and institutional accountability in digital policy processes [107–110].

Together, the eight-step action research roadmap integrates empirical data collection, institutional engagement, and dissemination, positioning the research process itself as a governance instrument for anticipatory AI within territorial public administration.

3.1.1. II Diversity plan of the province council

The research followed an eight-step action research roadmap. First, the project was aligned with the II Diversity Plan of the Provincial Council of Gipuzkoa, embedding anticipatory AI governance within a rights-based digital inclusion framework. Second, the *dako Ikastaroak* (UIK) International Summer School on Digital Inclusion and Generative AI functioned as a knowledge exchange platform bringing together policymakers, researchers, and civil society actors. Third, collaboration with the Non-Governmental Organization (NGO) network *Aniztasunaren Sarea* enabled the co-production of a Digital Inclusion and Generative AI Decalogue addressing algorithmic bias, data governance, and inclusion. Fourth and fifth steps focused on dissemination through local media (e.g., *Noticias de Gipuzkoa*, *Berria*) and academic engagement, including contributions to *Discover Cities* (Springer Nature) and ICA2025 initiatives.

The sixth step involved empirical fieldwork through semi-structured interviews across seven directorates (October–November 2025). Seventh, the research extended to the municipal level via the ElkarBizi inter-municipal network, involving eleven municipalities. The eighth step consisted of international dissemination at the AAG 2026 Annual Meeting.

This sequence (2024–2026) provides a structured and replicable framework for studying anticipatory AI governance in territorial public administrations.

3.1.2. II UIK International summer school on digital inclusion and generative AI

The second step involved organising the UIK International Summer School on Digital Inclusion and Generative AI, which functioned as a knowledge exchange platform bringing together policymakers, researchers, CSOs, and practitioners. The Summer School facilitated interdisciplinary dialogue on the implications of generative AI for territorial governance and digital inclusion strategies (Figure 2).

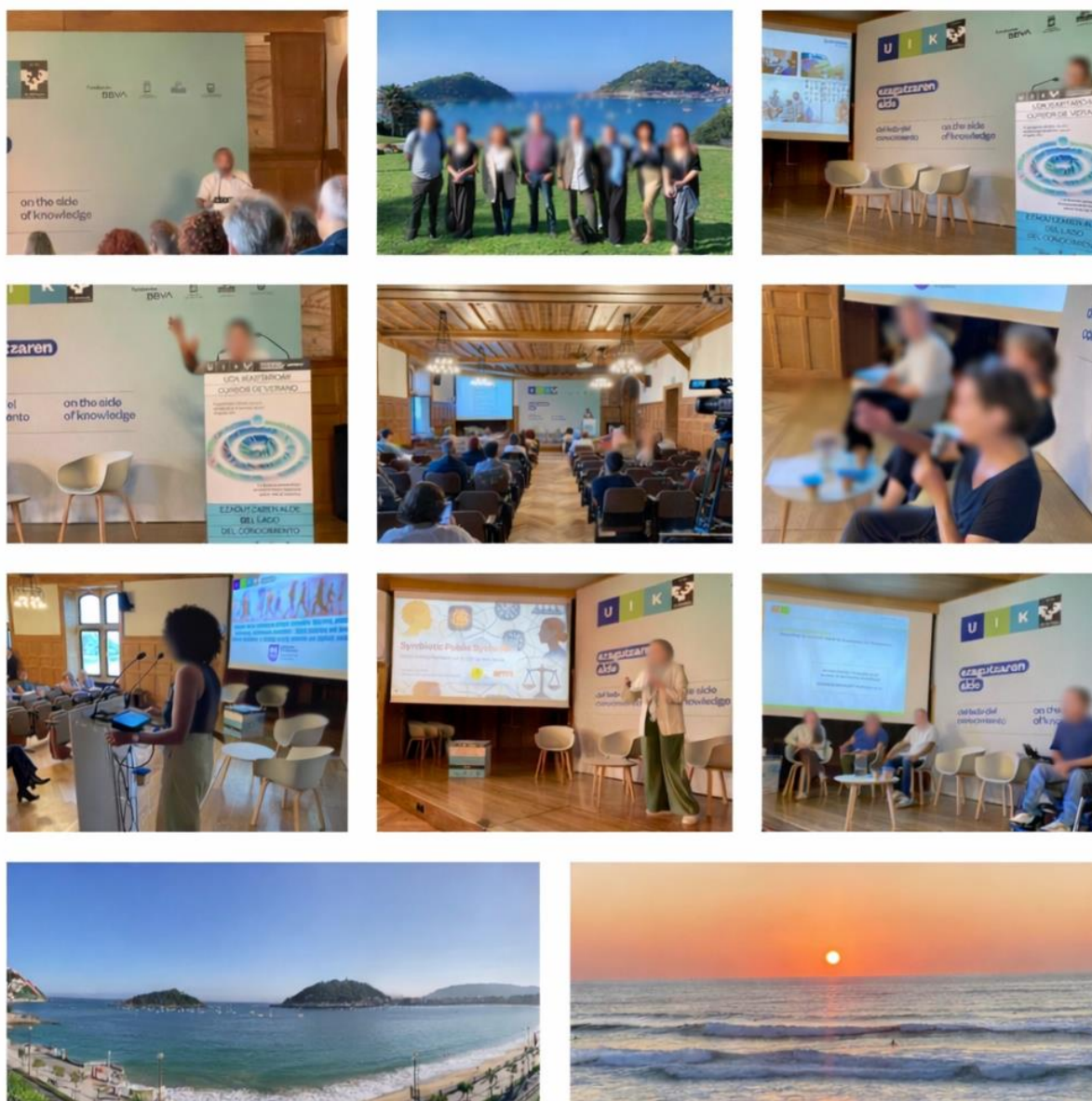


Figure 2. UIK summer school on digital inclusion and generative AI [24]. Copyright 2025 Calzada & Eizaguirre.

3.1.3. Six NGOs part of *Aniztasunaren Sarea* (Network of Diversity)

The third step consisted of collaboration with the NGO network *Aniztasunaren Sarea*, representing organisations working with diverse and structurally excluded groups across Gipuzkoa, including migrants, women, people with disabilities, Roma communities, and asylum seekers. Through workshops and consultations conducted between March and July 2025, the project co-produced a Digital Inclusion and Generative AI Decalogue, outlining ten principles and policy priorities for addressing algorithmic risks, data governance challenges, and digital inequalities in territorial governance contexts. The co-production of this framework draws on traditions of participatory governance and collaborative public innovation, where knowledge and policy solutions are developed through interaction between institutions and civil society actors rather than imposed through top-down policy design [111] (Figures 3 and 4).



Figure 3. Preparation workshop with CSOs/NGOs representing vulnerable communities [24].

4 BLOCKS	10 DIMENSIONS
1. Digital Divide	1. Access & Obstacles
	2. Digital Literacy & Autonomy
	3. Devices, Mobile & Connectivity
2. Algorithmic Bias	4. Experience of Digital/Algorithmic Discrimination
	5. Representation in Digital Spaces
	6. GenAI (Use & Perception)
3. Data Divide	7. Data & Control
	8. Statistical Invisibility
	9. Digital Rights Incidents/Policies
4. Digital Futures	10. Vision: Just Digital Futures

Figure 4. Digital inclusion and generative AI decalogue.

The Decalogue, co-produced between March–July 2025 with six CSOs (Jatorkin, AgiFugi, BidezBide, Elkartu, Haurralde, and Emigrados Sin Fronteras) as acknowledged in *Discover Cities* [24], is structured around four thematic blocks—Digital Divide, Algorithmic Bias, Data Divide, and Digital Futures—comprising ten dimensions that capture the layered nature of digital inclusion in the age of generative AI. These include access barriers, digital literacy, device dependency, algorithmic discrimination, representation, generative AI use, data governance, statistical invisibility, digital rights gaps, and visions of just digital futures. The framework reflects ongoing debates on democratising AI ecosystems, while simultaneously translating digital inclusion concerns into operational governance and legal-administrative implications concerning accountability, transparency, contestability, and rights protection [112–114].

Conceptually, the Decalogue engages with broader discussions on digital sovereignty, DPI, and inclusive innovation systems, emphasising governance arrangements that support public interest,

accountability, and social justice [115–118]. Research on algorithmic bias and inequality highlights the importance of incorporating lived experiences of marginalised communities [113], while scholarship on generative AI governance stresses the need to anticipate new forms of exclusion and integrate societal perspectives [119].

The Decalogue thus functions as both a diagnostic tool and an action research roadmap, identifying structural gaps while co-producing territorially grounded solutions. It aligns with mission-oriented and place-based policy debates, supporting collaborative approaches to digital transformation and inclusive development [120]. By embedding civil society knowledge, it contributes to a territorial grammar of digital inclusion and data sustainability grounded in everyday experience and oriented toward inclusive digital futures [118–121] (Tables 1 and 2).

Table 1. Decalogue.

Block	Dimension	Description	Policy Relevance
1. Digital Divide	1. Access & Obstacles	Persistent connectivity barriers affecting migrants, rural residents, and precarious users when accessing digital public services.	Highlights infrastructure and accessibility gaps requiring targeted territorial policies.
	2. Digital Literacy & Autonomy	Digital inclusion requires cognitive capacity to navigate, interpret, and critically assess digital systems and online information.	Emphasises training, empowerment, and algorithmic literacy as central components of inclusion strategies.
	3. Devices, Mobile & Connectivity	High dependence on mobile devices among vulnerable users due to affordability constraints and limited access to alternative infrastructures.	Demonstrates the importance of device accessibility and affordable connectivity policies.
	4. Experiences of Digital/Algorithmic Discrimination	Cases of automated refusals, discriminatory content filtering, and opaque algorithmic processes affecting marginalised communities.	Signals risks in automated public services and the need for algorithmic accountability mechanisms.
2. Algorithmic Bias	5. Representation in Digital Spaces	Communities report stereotypes or invisibility within institutional digital platforms and algorithmic systems.	Points to the need for inclusive design and culturally responsive digital governance.
	6. Generative AI (Use & Perception)	CSOs/NGOs express interest in generative AI tools but lack training and institutional support for safe and ethical usage.	Suggests the need for public sector guidance and digital capacity-building around generative AI.
	7. Data & Control	CSOs/NGOs question who controls data infrastructures and under what governance frameworks.	Connects territorial policy with debates on data sovereignty and public data governance.
3. Data Divide	8. Statistical Invisibility	Marginalised groups are frequently absent from official datasets, leading to under-representation in policy design.	Demonstrates the need for inclusive data infrastructures and improved statistical representation.
	9. Digital Rights Incidents/Policy Gaps	Experiences of data breaches, harmful chatbots, and automated decisions often lack clear complaint or redress mechanisms.	Indicates the need for stronger digital rights protections and oversight frameworks.
4. Digital Futures	10. Vision: Just Digital Futures	CSOs/NGOs envision inclusive digital ecosystems characterised by multilingual tools, community platforms, and ethical AI.	Provides normative direction for democratic and inclusive digital governance.

Table 2. Legal-operational interpretation of the digital inclusion and generative AI Decalogue.

Decalogue Dimension	Governance Risk	Legal/Administrative Implication	Governance Mechanism
1. Access & Obstacles	Exclusion from digital public services	Equality of access obligations	Inclusive service design
2. Digital Literacy & Autonomy	Unequal capacity to navigate AI systems	Rights-awareness and accessibility duties	Public training and literacy programmes
3. Devices, Mobile & Connectivity	Infrastructure dependency	Territorial accessibility obligations	Connectivity and device support policies
4. Experiences of Digital/Algorithmic Discrimination	Biased or discriminatory outcomes	Anti-discrimination compliance	Human oversight and algorithmic auditing
5. Representation in Digital Spaces	Cultural invisibility and exclusion	Inclusion and equality obligations	Participatory design mechanisms
6. Generative AI (Use & Perception)	Unsafe or opaque AI use	Transparency and accountability duties	AI governance protocols and training
7. Data & Control	Misuse or concentration of data power	GDPR and data governance compliance	Data stewardship and accountability
8. Statistical Invisibility	Underrepresentation in datasets	Fairness and equality obligations	Inclusive data infrastructures
9. Digital Rights Incidents/Policy Gaps	Lack of redress mechanisms	Complaint and contestability obligations	Human review and remediation pathways
10. Vision: Just Digital Futures	Weak democratic legitimacy	Public accountability and participation	Participatory anticipatory governance

The Decalogue increasingly evolved from a diagnostic and participatory framework into what may be described as a “Decalogue-in-action,” linking digital inclusion concerns with concrete governance, legal, and administrative adaptation processes. This operational dimension will become particularly visible during the institutional event “Reviewing Digital Ethics: Assessment and Updating of the Ethical Code for the Use of Data and Artificial Intelligence within the Provincial Council of Gipuzkoa,” organised by the Governance Department of the Provincial Council for the 8 June 2026. The event might function as a participatory institutional reflection space to evaluate the implementation trajectory of the Ethical Code, assess accumulated institutional learning, and discuss proposed updates aligned with evolving legal and governance frameworks regarding data and AI systems. Importantly, the initiative might connect ethical principles with practical administrative concerns, including accountability mechanisms, transparency obligations, human oversight, complaint procedures, and legal adaptation to emerging European AI governance frameworks. The discussions can involve actors from academia, public administration, technological organisations, and civil society, illustrating how anticipatory AI governance in Gipuzkoa increasingly operates through multi-actor institutional reflexivity rather than through static ethical principles alone. In this context, the Decalogue functioned not only as a conceptual framework but also as a governance interface informing the ongoing revision of ethical and legal-administrative practices concerning data governance, algorithmic accountability, digital rights protection, and trustworthy AI deployment within the Provincial Council of Gipuzkoa.

The Digital Inclusion and Generative AI Decalogue constitutes the conceptual and empirical backbone of the action research conducted with the CSOs of Aniztasunaren Sarea. Developed through participatory workshops between March and July 2025, it organises key challenges of digital inclusion

and AI governance into four interconnected blocks: Digital Divide, Algorithmic Bias, Data Divide, and Digital Futures.

These blocks capture distinct but interrelated dimensions of digital transformation affecting vulnerable communities. The Digital Divide addresses structural barriers such as connectivity, device dependency, and digital literacy. Algorithmic Bias highlights discriminatory outcomes and issues of representation in automated systems, consistent with broader findings on systemic inequality in AI [113]. The Data Divide reflects concerns over data governance, control, and statistical invisibility, linking to debates on digital sovereignty and DPI [115–118]. The Digital Futures block introduces prospective dimensions, including digital rights gaps and collective visions for inclusive, ethical digital ecosystems.

Overall, the Decalogue provides a territorially grounded grammar of digital inclusion, functioning both as a diagnostic tool and as a roadmap for action research. It supports institutional dialogue and policy experimentation while embedding civil society knowledge into anticipatory AI governance, contributing to democratic accountability and inclusive digital transformation [118–121].

3.1.4. Local media dissemination

The fourth step focused on public dissemination of research findings through local media, including *El Diario Vasco*, *Diario Noticias de Gipuzkoa* and *Berria*. Media engagement allowed the research to reach wider audiences and contributed to public debate on the implications of AI and digital transformation for democratic governance.

3.1.5. Academic engagement

The fifth step involved academic engagement and knowledge dissemination, including the development of an editorial and call for papers in the journal *Discover Cities* (Springer Nature) as well as participation in ICA2025 open-access academic initiatives. These activities connected the Gipuzkoa case study with broader international debates on digital governance and urban AI.

3.1.6. Seven directorates' interviews within the province council of Gipuzkoa

The sixth step consisted of empirical fieldwork across seven departments and directorates of the Provincial Council, including semi-structured interviews conducted between October and November 2025 [122]. The interviews examined how different administrative units perceive AI adoption, digital inclusion challenges, and governance responsibilities within their respective policy areas. These interviews also served to position the Human Rights and Democratic Culture Directorate within the transversal role of Gipuzkoa Province Council.

3.1.7. Inter-municipal network preliminary engagement

The seventh step extended the research to the municipal level through inter-municipal cooperation within the *ElkarBizi network*, which connects eleven municipalities across Gipuzkoa. Engagement, which took place in a workshop on 30th January 2026 in the premises of the Province Council of Gipuzkoa with local administrations represented by diversity officers enabled the research to capture territorial variations in digital governance challenges and institutional capacities [123] (Figure 5).



Figure 5. Inter-municipal network: *ElkarBizi*.

3.1.8. International dissemination: AAG 2026 annual meeting

The eighth and final step involved international dissemination of the research findings at the AAG 2026 Annual Meeting in San Francisco, including a paper presentation and the organisation of a thematic session. This stage situated the Gipuzkoa case within broader international debates on digital geography, anticipatory governance, and territorial innovation policies.

Together, these eight steps constitute a structured action research cycle linking institutional alignment, stakeholder co-production, empirical investigation, and knowledge dissemination. The temporal sequence of the research activities followed a clear implementation timeline from 2024 to 2026, enabling the methodological framework to be replicated by other researchers interested in studying anticipatory AI governance within territorial public administrations (Table 3 and 4).

Table 3. Eight methodological action research steps through three science for policy functions.

Step	Step Description	Timeline
Step 1	Alignment with the II Diversity Plan to address digital divides and integrate AI governance into the territorial digital inclusion strategy	Until December 2024
Step 2	UIK International Summer School on <i>Digital Inclusion & Generative AI</i>	Preparation January–July 2025; Event July 2025
Step 3	Collaboration with the NGO network <i>Aniztasunaren Sarea</i> to co-produce the Digital Inclusion & Generative AI Decalogue: <u>6 Stakeholders</u>	March–July 2025
Step 4	Dissemination of findings through local media (<i>El Diario Vasco</i> , <i>Noticias de Gipuzkoa</i> and <i>Berria</i>)	July 2025 + March 2026
Step 5	Academic engagement through editorial and call for papers in <i>Discover Cities</i> (Springer Nature) [24] and <i>ICA2025</i> Open Access journals [21]	September–December 2025
Step 6	Fieldwork across seven departments and directorates of the Provincial Council (semi-structured interviews): <u>7 Stakeholders</u>	October–November 2025
Step 7	Inter-municipal cooperation through the ElkarBizi network (11 municipalities): <u>11 Stakeholders</u>	January 2026
Step 8	International dissemination at the AAG 2026 Annual Meeting (San Francisco): paper presentation, panel curation on international digital inclusion, and book presentation [25]	March 2026

Table 4. Eight methodological action research steps: gantt diagram.

Activity	2024	2025 January–March	2025 April–June	2025 July	2025 September–December	2026 January	2026 March
Step 1—II Diversity Plan Alignment	■ ■ ■ ■						
Step 2—Summer School Preparation & Event		■ ■ ■	■ ■ ■	■			
Step 3—NGO Co-production (Decalogue): 6 stakeholders		■	■ ■ ■	■			
Step 4—Media Dissemination				■			■
Step 5—Academic Dissemination					■ ■ ■		
Step 6—Institutional Departmental Interviews: 7 stakeholders					■ ■		
Step 7—Municipal Engagement: 11 stakeholders						■	
Step 8—AAG International Dissemination							■

4. Results: science for policy governance architecture through eight methodological steps

4.1. Eight methodological action research steps through three science for policy functions

Table 5 provides the analytical backbone linking Methods and Results by showing how the eight-step action research roadmap operationalises Science-for-Policy through three functions: (A) Knowledge Exchange, (B) Stakeholder Engagement, and (C) Open-Science Dissemination. Rather than a simple chronology, each step is designed to perform one or more of these functions, turning the research process into a governance instrument for anticipatory AI within a territorial administration.

The table is read horizontally: for each step (i–viii), the cells specify the type of knowledge produced, interactions enabled, and outputs generated across the three functions. For instance, the UIK Summer School (ii) operates simultaneously as a knowledge interface (A), a multi-actor engagement platform (B), and a dissemination mechanism (C). Likewise, the co-production with Aniztasunaren Sarea (iii) generates governance knowledge (A), anchors it in civil society deliberation (B), and translates it into the Decalogue (C). Each step thus contributes to both institutional learning and external legitimacy.

Table 5 also reframes multi-actor governance as functional rather than purely data-driven: (A) actionable knowledge production, (B) embedded participation, and (C) transparent dissemination. Steps (vi)–(vii) are particularly significant, combining internal learning across seven directorates with multi-level

engagement across 11 municipalities, thereby enabling comparison of capacities and constraints across administrative scales.

Methodologically, the table enhances replicability by offering a transferable template: define action-research steps and align each with knowledge exchange, stakeholder engagement, and dissemination functions. Positioned at the Methods–Empirics juncture, it clarifies that the project not only studies anticipatory AI governance but actively constructs it through structured engagement and iterative learning.

Finally, while the roadmap spans 2024–2026, several components—especially dissemination and institutional learning—are iterative. Table 5 therefore functions both as a record of implementation and as a governance framework for the ongoing consolidation of anticipatory capacity within the Provincial Council.

Table 5. Eight methodological action research steps through three science for policy functions.

ACTION RESEARCH:		SCIENCE4POLICY:		
Eight Methodological Steps (2024–2026)	3 Functions			
	A. Knowledge Exchange	B. Stakeholder Engagement	C. Open-Science Dissemination	
(i) Alignment with II Diversity Plan	Policy learning within institutional framework	Coordination with General Directorate	Strategic integration into public policy documents	
(ii) UIK International Summer School	Academic-policy interface on Digital Inclusion & GenAI ***DECALOGUE***	Multi-actor dialogue (scholars, policymakers, civil society)	Public programme and online visibility	
(iii) Collaboration with six NGOs (Aniztasunaren Sarea)	Co-production of Digital Inclusion & GenAI Decalogue	> Civil society participation and deliberation	Public-facing Decalogue document	
(iv) Dissemination via local media	Translation of research into accessible knowledge	Engagement with broader citizen audience	Media coverage (regional newspapers)	
(v) Academic engagement (Discover Cities; ICA2025)	Theoretical positioning within AI governance literature	International scholarly community interaction	Open-access publication and conference proceedings	
(vi) Fieldwork across seven departments	Cross-departmental institutional learning	> Internal administrative engagement	Documentation of governance practices [124]	
(vii) Engagement with 11 municipalities (ElkarBizi)	Inter-municipal policy exchange	> Local government collaboration	Shared territorial learning outputs	
(viii) International dissemination (AAG2026)	Comparative dialogue on territorial AI governance	Global research-policy networks	Conference presentation and session organization	

4.2. Multi-actor science-for-policy governance architecture

The multi-actor action research design operationalises the Science-for-Policy approach through three interrelated governance functions: Knowledge Exchange, Stakeholder Engagement, and Open-Science Dissemination. These functions do not constitute methodological triangulation in the strict positivist sense. Rather, they represent interconnected institutional and governance processes that generate iterative feedback between institutional learning, stakeholder participation, and public dissemination throughout the action research cycle.

Figure 6 visualises this architecture in which each vertex represents one function, while the eight methodological steps are positioned along its edges according to their dominant contribution. This configuration shows how the research process simultaneously produces policy learning, multi-level engagement, and dissemination outputs.

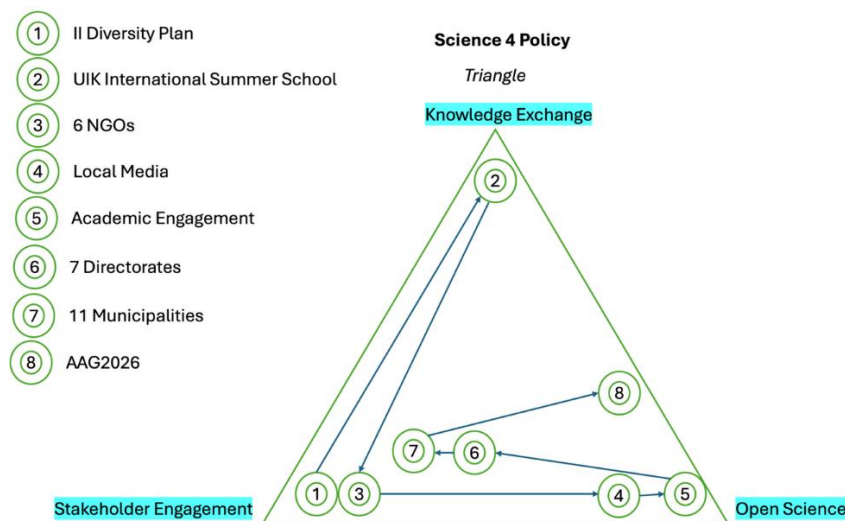


Figure 6. Multi-actor science-for-policy governance architecture through eight action research steps.

The Knowledge Exchange dimension centres on institutional learning and academic–policy interaction, including alignment with the II Diversity Plan, the UIK Summer School, and interviews across seven directorates. The Stakeholder Engagement dimension captures co-production processes with civil society and municipalities, notably through Aniztasunaren Sarea and the ElkarBizi network, integrating situated knowledge into governance design. The Open-Science Dissemination dimension ensures transparency and transferability through outputs such as media engagement, open-access publications, and international presentations.

Taken together, this architecture positions action research not only as a methodological approach but as a governance instrument. By linking knowledge production, participation, and dissemination, the S4P framework supports anticipatory governance while reinforcing institutional accountability and public trust in AI-related policy processes.

4.3. Research findings

The findings are presented as interpretive analytical syntheses. They do not claim universal causal effects, nor do they simply restate established literature. Rather, they identify how general concerns in AI governance—digital exclusion, algorithmic bias, data gaps, and institutional accountability—are translated into a territorially specific governance framework in Gipuzkoa.

Descriptive claims refer to stakeholder inputs collected through workshops and interviews. Interpretive claims refer to the authors’ synthesis of recurring patterns across empirical materials. Normative claims are reserved for the discussion and policy implications, where the article reflects on how the Gipuzkoa experience may inform democratic and rights-based AI governance.

The Gipuzkoa case reveals that anticipatory AI governance at subnational scale depends less on adopting abstract AI principles than on constructing interfaces between civil society knowledge, administrative coordination, and municipal implementation. The Decalogue is therefore treated not as a generic list of values, but as a governance mechanism through which stakeholder engagement becomes institutionally actionable and contributes to democratic legitimacy.

The tables below (Tables 5–8) present the authors’ interpretive synthesis of empirical material collected through interviews and workshops, structured according to the Decalogue framework.

The empirical findings presented in this section derive from the Stakeholder Engagement function of the Science-for-Policy (S4P) framework, which constitutes the second pillar of the methodological architecture outlined in Section 4.2. Within this function, the action research involved three groups of stakeholders operating at different levels of the territorial governance ecosystem: (i) six CSOs representing vulnerable communities, (ii) seven directorates of the Provincial Council of Gipuzkoa, and (iii) eleven municipalities participating in the ElkarBizi inter-municipal network.

Tables 5–7 apply the Digital Inclusion and Generative AI Decalogue to these three stakeholder groups, enabling a systematic comparison of how actors positioned across societal, institutional, and territorial levels interpret digital transformation challenges. Cells represent the authors' interpretive synthesis of empirical material collected through interviews (Table 7) and workshops (Tables 6 and 8), structured according to the Decalogue framework.

The comparative analysis across these three groups reveals several consistent patterns across the four Decalogue dimensions—Digital Divide, Algorithmic Bias, Data Divide, and Digital Futures—highlighting the institutional complexity of embedding anticipatory AI governance within territorial public administration.

Four main findings emerge from the stakeholder engagement analysis:

F1. Digital inclusion remains a structural governance challenge rather than a purely technological issue.

Across CSOs, provincial directorates, and municipalities, digital exclusion is consistently associated with linguistic barriers, socio-economic inequalities, device dependency, and institutional service design limitations.

F2. Algorithmic risks are recognised across governance levels but interpreted differently depending on institutional position.

CSOs report experiences of discrimination and exclusion within automated systems, while public administrations focus on governance safeguards such as audits, oversight mechanisms, and ethical frameworks.

F3. A persistent “data divide” undermines evidence-based policymaking.

Stakeholders repeatedly emphasise the statistical invisibility of vulnerable populations within institutional datasets, which limits the capacity of public administrations to design inclusive policies.

F4. Visions of just digital futures converge around inclusive governance principles.

Despite institutional differences, stakeholders broadly converge around the need for ethical AI governance, inclusive digital infrastructures, and stronger institutional accountability mechanisms.

Together, these findings reveal that anticipatory AI governance is not produced by a single institutional actor but emerges through multi-actor governance processes linking civil society knowledge, provincial policy capacity, and municipal implementation realities.

Importantly, these findings should not be interpreted as evidence of uniform anticipatory governance capacity across the territorial governance ecosystem. Instead, the empirical analysis demonstrates substantial asymmetries between stakeholder groups regarding institutional resources, governance literacy, operational readiness, and perceptions of AI-related risks. CSOs primarily frame AI governance through lived experiences of exclusion and discrimination, provincial directorates emphasise institutional coordination and compliance mechanisms, while municipalities focus on practical implementation constraints and territorial inequalities. Anticipatory AI governance therefore emerges as a differentiated and uneven territorial capability rather than a homogeneous administrative condition.

4.3.1. Decalogue: 6 stakeholders, civil society organizations (NGOs)

The six CSOs participating in the Decalogue workshops represent communities experiencing structural vulnerabilities in digital environments, including migrants, refugees, women in vulnerable contexts, disabled persons, Roma communities, and transnational migrant networks. Their contributions provide experiential knowledge regarding how digital governance systems affect everyday interactions with public services.

- Block 1: Digital divide

CSOs consistently frame digital inclusion as a structural socio-institutional issue rather than a question of simple connectivity. Migrant organisations emphasise linguistic barriers in digital public services, while refugee organisations report dependency on NGOs themselves to access administrative procedures. Women's organisations highlight the intersection of digital exclusion with gender inequalities, including limited autonomy over devices and unequal participation in digital governance processes. Similarly, disability organisations point to persistent accessibility barriers in digital public services and the limited compatibility of assistive technologies with institutional platforms.

A recurrent theme across organisations is the mobile-first reality of vulnerable populations. Smartphones frequently constitute the only available digital access device due to affordability constraints, unstable housing conditions, or limited access to broadband infrastructures.

- Block 2: Algorithmic bias

CSOs identify multiple experiences of algorithmic discrimination affecting vulnerable communities. Migrant and refugee organisations report automated administrative refusals linked to identity verification or documentation mismatches. Roma organisations express concerns regarding algorithmic suspicion triggered by automated identity checks, while women's organisations emphasise online harassment and discriminatory content in digital platforms.

Across organisations, algorithmic bias is understood not only as a technical issue but as a reflection of broader structural inequalities embedded in datasets and institutional systems.

- Block 3: Data divide

The analysis reveals a strong perception of statistical invisibility among vulnerable populations. Migrants, refugees, Roma communities, and women are frequently absent from official datasets used in public policy design. CSOs also express concerns regarding data governance practices, particularly the collection and reuse of sensitive personal information such as migration status or biometric data.

- Block 4: Digital futures

Despite identifying numerous challenges, CSOs articulate normative visions for inclusive digital futures. These visions include multilingual digital services, universal accessibility standards, feminist digital infrastructures, and community-centred digital ecosystems. Generative AI is perceived simultaneously as a potential tool for empowerment—particularly in translation, education, and administrative navigation—and as a technology requiring ethical governance safeguards.

Overall, civil society perspectives frame digital inclusion as a human-rights-based governance challenge requiring institutional accountability and participatory policy design (Table 6).

Table 6. Decalogue: 6 stakeholders, civil society organizations (NGOs).

	DIGITAL DIVIDE		ALGORITHMIC BIAS			DATA DIVIDE			DIGITAL FUTURES	
NGO	1. Access & Obstacles	2. Digital Literacy & Autonomy	3. Devices, Mobile & Connectivity	4. Experience of Algorithmic Discrimination	5. Representation in Digital Spaces	6. GenAI (Use & Perception)	7. Data & Control	8. Statistical Invisibility	9. Digital Rights Incidents /Policies	10. Vision: Just Digital Futures
Jatorkin	Migrants face language barriers in digital public services.	Need for multilingual digital training and support.	Strong reliance on smartphones due to affordability constraints.	Automated systems sometimes reject documents or identity verification.	Migrants often invisible in institutional digital interfaces, <i>i.e.</i> women.	Interest in GenAI for translation and administrative help.	Concerns about how migration data are used.	Migrant communities underrepresented in official statistics.	Few mechanisms to contest automated decisions.	Multilingual inclusive public digital services.
BidezBide	Refugees depend on NGOs to access digital administrative services.	Limited autonomy due to legal and documentation barriers.	Shared devices and unstable connectivity common.	Administrative algorithms may produce automatic rejections.	Refugees rarely represented in digital governance narratives.	GenAI perceived useful for translation and orientation.	Concerns about data surveillance and personal records.	Refugees frequently absent from policy datasets.	Lack of legal clarity around digital rights protections.	Rights-based digital services ensuring dignity and accessibility.
Haurralde	Women in vulnerable contexts face multiple barriers to digital access.	Digital literacy linked to empowerment and participation.	Household device sharing limits autonomy.	Online harassment and gender discrimination occur in digital platforms.	Women underrepresented in digital governance debates.	Interest in GenAI for education and employment opportunities.	Concerns regarding gender data gaps.	Limited gender-disaggregated data in digital policy.	Weak institutional responses to online harassment.	Feminist digital infrastructures prioritising safety and empowerment.
Elkartu	Accessibility barriers remain in digital public services.	Need for accessible training and assistive technologies.	Assistive technologies often expensive or incompatible.	Automated systems sometimes ignore accessibility needs.	Disabled users excluded from digital design processes.	GenAI may enhance accessibility but also risk bias.	Need for accessible data governance frameworks.	Disability statistics often incomplete.	Social media content containing hate speech.	Universal design embedded in digital public services.
Agifugi	Gypsy community seekers face connectivity barriers due to unstable housing.	Literacy challenges linked to disrupted education trajectories.	Dependence on low-cost mobile connectivity.	Automated identity checks may trigger suspicion.	Roma community invisible in digital policy debates.	GenAI useful for legal information and translation.	Concerns about biometric data governance.	Gypsy community often absent in official datasets.	Limited ways to report digital harms.	Transparent digital governance and rights protection.
Emigrados Sin Fronteras (ESF)	Infrastructure inequalities drive digital exclusion. Digital identity as key element through BakQ.	Community-based digital literacy programmes needed.	Territorial connectivity gaps persist.	Algorithmic bias reflects structural inequalities in datasets.	Global South and marginalised perspectives underrepresented.	GenAI requires ethical governance frameworks.	Data governance should prioritise public interest.	Structural invisibility of vulnerable groups in official data.	Need for accountability frameworks for digital harms.	Community-centred digital ecosystems based on social justice.

4.3.2. Decalogue: 7 stakeholders, Gipuzkoa province council of Gipuzkoa, directorates

Table 7 captures the perspectives of seven directorates within the Provincial Council of Gipuzkoa, illustrating how institutional actors interpret digital inclusion and AI governance within their respective policy domains. Compared to CSOs, directorates frame these challenges primarily in terms of institutional capability, governance frameworks, and administrative responsibilities.

- Block 1: Digital divide

Across directorates, digital inclusion is interpreted as a service design and institutional accessibility issue. Departments emphasise the need to simplify digital administrative procedures, adopt multilingual and plain-language interfaces, and develop assistance tools enabling citizens to navigate complex bureaucratic systems. The widespread reliance on smartphones among users is recognised as a design constraint requiring mobile-first public service architectures.

- Block 2: Algorithmic bias

Directorates demonstrate strong awareness of potential algorithmic risks associated with automated decision systems. In sectors such as taxation, mobility management, and administrative modernisation, officials emphasise the importance of preventing discriminatory outcomes in algorithmic classification or risk-profiling systems.

Institutional responses include governance instruments such as algorithmic impact assessments, ethical audits, transparency mechanisms, and human oversight frameworks. These measures illustrate the emergence of anticipatory governance practices within public administration.

- Block 3: Data divide

Data governance emerges as a critical institutional concern. Directorates emphasise the need for clear governance frameworks regulating data ownership, access permissions, and institutional accountability. Several departments highlight that incomplete datasets or territorial blind spots may undermine policy design and generate unintended exclusion.

Environmental and territorial governance actors additionally emphasise data stewardship and collaborative governance models, including the potential development of data cooperatives and shared data infrastructures.

- Block 4: Digital futures

Directorates articulate visions of digital transformation grounded in institutional responsibility and democratic accountability. Examples include the concept of “AI for Tax Justice,” transparent communication regarding AI-assisted decision systems, and governance frameworks integrating sustainability and public value objectives.

These perspectives reflect an emerging understanding of anticipatory AI governance as a cross-departmental institutional capability rather than a purely technological innovation agenda.

Table 7. Decalogue: 7 stakeholders, gipuzkoa province council of Gipuzkoa, directorates.

	DIGITAL DIVIDE		ALGORITHMIC BIAS			DATA DIVIDE			DIGITAL FUTURES	
Directorate	1. Access & Obstacles	2. Digital Literacy & Autonomy	3. Devices, Mobile & Connectivity	4. Algorithmic Discrimination	5. Representation in Digital Spaces	6. GenAI (Use & Perception)	7. Data & Control	8. Statistical Invisibility	9. Digital Rights Incidents/Policies	10. Vision: Just Digital Futures
Tax Directorate	Reduce barriers to digital tax services (language/age/low skills) via assistance tools.	Plain-language explanations + training to improve “fiscal autonomy.”	Design GenAI services mobile-first and universally accessible.	Avoid automated “risk profiling” that stigmatizes groups; independent ethical audits.	Diversify internal teams (gender/language/origin) to reduce bias in design/data. 1Million invoices delivered through TikeBai system being assisted by Multiverse Computing	Communicate clearly: “AI assists, does not decide”; manage perceptions of AI use.	Data sovereignty architecture; no secondary use without clear authorization.	Expand/repair representativeness (e.g. migrants/older adults) in datasets.	Use Algorithmic Impact Assessments + AI Ethics Charter in taxation domain.	“AI for Tax Justice”: efficiency plus rights plus social trust.
Road Directorate: Cross-border/Data Spaces & Sensing	Access barriers framed around cross-border service interoperability and “usable” interfaces for citizens in the border context.	Need for literacy/autonomy to understand data-driven services and cross-border digital processes.	Connectivity & device constraints matter where sensing infrastructures (IoT) and services meet citizens. Ps: MUGI data availability could be a boost, an opportunity.	Risk that automated classifications in border/security/mobility contexts reproduce bias if not governed.	Who is “seen” by border data infrastructures; representation risks for cross-border users.	GenAI seen as useful (support/automation), but requires governance and bounded use cases.	Data spaces governance is central: roles, ownership, permissions across institutions.	“Invisible” populations can be missed if cross-border data standards/datasets exclude them.	Need formal channels/protocols for incidents in sensor/data-space environments.	“Trusted cross-border data spaces” that remain rights-based and inclusion-oriented.
Mobility/MUBIL–Landago	Inclusion depends on ensuring mobility-related digital services don’t exclude low-access users.	Literacy/autonomy needed for users and staff to navigate mobility platforms and data-driven services.	Reliance on mobile access is treated as a design constraint in mobility/service delivery.	Automated decisions in mobility/logistics require safeguards against biased routing/priority outcomes.	Representation concerns in how mobility data reflects different communities/territories.	GenAI potential for internal knowledge/support functions; needs clear boundaries.	Strong emphasis on data governance arrangements across partners/ecosystem. Ps: key question, what to do and who should do what with this date. Multistakeholder arrangement is required	Territorial “blind spots” in mobility data can undermine policy design.	Governance routines needed for harms/complaints when systems affect rights/access.	Place-based, sustainable mobility innovation aligned with inclusion and public value considering multistakeholder frameworks.
Open Governance	Digital access barriers framed as democratic/participation obstacles in public services.	Literacy as civic capability: understanding , navigating, contesting digital procedures.	Device/connectivity constraints treated as structural inequalities affecting participation.	Concern with institutional accountability if automated processes reduce contestability.	Representation as democratic legitimacy: whose voices/data shape institutional systems.	GenAI adoption should be aligned with transparency and public accountability norms.	Data control linked to governance-by-design and institutional responsibility.	Missing data on excluded groups undermines evidence-based public policy.	Need clear accountability/oversight mechanisms for digital harms and failures.	Democratic innovation agenda: digital transformation that strengthens legitimacy and trust.

Table 7. Cont.

	DIGITAL DIVIDE			ALGORITHMIC BIAS				DATA DIVIDE		DIGITAL FUTURES	
Environment/ Territorial governance: <i>EcoTechnoPolitical</i> challenge	Access obstacles understood via service design and territorial heterogeneity (who can actually use digital channels).	Literacy/autonomy relevant for understanding complex environmental info/services and procedures.	Connectivity/device dependence matters in territorial/environmental service contexts.	Algorithmic bias risks in classification/assessment tools if datasets or proxies are skewed.	Representation issues: which territories/groups are made visible in environmental data.	GenAI usefulness acknowledged, but needs governance, constraints, and verification.		Data governance stressed (sharing, stewardship, legality) in environmental data ecosystems: Data Cooperatives as an opportunity	“Invisibility” arises when monitoring/data collection under-captures some areas/groups.	Need policies for incident response and safeguards where automated outputs affect rights/services.	Anticipatory, rights-aware digital futures integrated with sustainability aims.
Gender Equality	Women constitute a structurally vulnerable population in increasingly digitised private and public spheres, including exposure in social media environments.	Digital literacy and autonomy are essential for women to access services independently and participate in digital governance processes.	Mobile-first digital realities require services that do not assume access to high-end devices or stable infrastructures.	Algorithmic bias in AI systems may reproduce gender stereotypes and structural inequalities if governance mechanisms are not implemented.	Persistent concerns regarding the representation and visibility of women in digital interfaces, technological sectors, and AI datasets.	Generative AI is perceived as a promising tool but requires guidance, ethical safeguards, and gender-sensitive governance frameworks.		Data governance must ensure control, privacy, and responsible reuse of gender-related datasets.	Lack of gender-disaggregated data limits the ability of institutions to design inclusive and evidence-based policies.	Online harassment and gender-based digital violence (including social media behaviour) remain significant governance challenges.	A feminist and inclusive digital transition where AI governance integrates equality, transparency, and democratic accountability.
Administration Modernization	Access improved through conversational interfaces that reduce friction (if designed for inclusion).	Literacy support: chatbots can guide procedures, but must avoid over-reliance and provide alternatives. Human-AI Governance (HAIG)	Works well on mobile; must be accessibility-compliant and multilingual where relevant.	Chatbot outputs can discriminate or mislead; requires monitoring, testing, and guardrails.	Representation: language, disability access, and cultural fit in conversational design.	Chatbot as high-impact GenAI use case; needs bounded scope and human oversight.		Governance over training data, logs, retention, and vendor dependencies.	Interaction logs can reveal “who is missing” and where services fail—if ethically governed.	Incident protocols needed (hallucinations, harmful advice, privacy failures).	“Trustworthy admin chatbot”: transparency + oversight + inclusion by design.

4.3.3. Decalogue: 11 stakeholders, municipalities

Data were collected through structured templates completed during the workshop, enabling differentiation across municipalities and supporting comparative analysis.

Table 8 presents the perspectives of eleven municipalities across Gipuzkoa, providing insights into how digital inclusion and AI governance challenges manifest within local public administration. Compared to provincial directorates, municipal actors emphasise operational constraints, territorial inequalities, and limited administrative resources.

- Block 1: Digital divide

Municipal evidence confirms persistent digital exclusion across various social groups, particularly older populations, migrants, and residents with limited digital skills. Many municipalities report that citizens continue to rely on in-person administrative assistance when navigating digital procedures. Community infrastructures such as libraries, cultural centres, and civic hubs play a crucial role in enabling citizens to access digital services, illustrating the importance of local social infrastructures in mitigating digital divides.

- Block 2: Algorithmic bias

Municipalities report more limited direct experience with algorithmic decision systems. Nevertheless, concerns emerge regarding discriminatory narratives in digital environments, online hate speech, and the potential for automated administrative procedures to reinforce structural inequalities.

- Block 3: Data divide

Municipal actors frequently emphasise the lack of reliable datasets capturing the realities of vulnerable communities. This statistical invisibility complicates evidence-based policymaking and limits the capacity of local administrations to design targeted digital inclusion policies.

Municipalities also report limited institutional capacity for managing complex data governance challenges, highlighting the need for coordination with provincial and regional administrations.

- Block 4: Digital futures

Municipal visions of digital futures emphasise citizen empowerment, digital literacy initiatives, and inclusive governance frameworks. Several municipalities highlight the importance of strengthening digital rights awareness and improving transparency in digital public services. Others emphasise emerging debates around digital sovereignty and community-centred digital infrastructures.

Overall, the municipal perspective highlights the territorial implementation dimension of anticipatory AI governance, demonstrating that digital inclusion policies must account for local institutional capacities and socio-territorial inequalities (Figure 7).

Table 8. Decalogue: 11 stakeholders, municipalities.

Municipality	1. Access & Obstacles	2. Digital Literacy & Autonomy	3. Devices, Mobile & Connectivity	4. Algorithmic Discrimination	5. Representation in Digital Spaces	6. GenAI (Use & Perception)	7. Data & Control	8. Statistical Invisibility	9. Digital Rights Incident/Policies	10. Vision: Just Digital Futures
Hernani	Many residents struggle with digital procedures and often need to visit the town hall in person for assistance.	Citizens frequently require support to complete digital processes, indicating limited autonomy.	Older devices and slow internet connections remain common among vulnerable groups.	Public digital services are often perceived as not designed for disadvantaged users.	Vulnerable populations rarely appear in digital platforms or public communication channels.	Generative AI is sometimes perceived as a control tool rather than a support mechanism.	Data governance issues are considered secondary within local service priorities. Hernani is pushing ahead a municipalistic agenda called <i>Hernani Burujabe</i> based digital sovereignty principles [125].	Some communities remain absent from official administrative registers.	Limited local guidance exists for handling digital rights issues.	Future governance in Hernani will be established a municipalistic agenda imitating Barcelona in 2015–2018.
Zarautz	Many citizens still lack basic digital access to public services.	Informal mutual support networks help residents navigate digital procedures.	Smartphones represent the dominant form of access to digital services.	Hate speech and discriminatory discourse appear frequently on digital platforms.	Some communities are represented through stigmatizing narratives online.	Generative AI adoption remains limited and is often viewed with distrust.	Data infrastructures are perceived as distant and difficult for citizens to influence.	Certain social groups remain statistically invisible within administrative datasets.	Municipal competences regarding digital rights remain unclear. Is this competence of ICT department or Inclusion department?	Digital inclusion should guide future digital policy development.
Ordizia	Digital access varies significantly between neighbourhoods.	Low levels of digital literacy hinder effective participation in digital services.	Mobile phones constitute the only digital access point for many residents.	Structural discrimination may emerge through automated systems and administrative procedures.	Persistent stereotypes shape the digital representation of certain communities.	Generative AI remains perceived as distant and unfamiliar.	Limited knowledge exists regarding how municipal data infrastructures function.	Some communities remain outside digital governance processes.	Municipal digital rights policies remain insufficiently defined.	Ethical reflection should guide future digital governance.

Table 8. *Cont.*

Municipality	1. Access & Obstacles	2. Digital Literacy & Autonomy	3. Devices, Mobile & Connectivity	4. Algorithmic Discrimination	5. Representation in Digital Spaces	6. GenAI (Use & Perception)	7. Data & Control	8. Statistical Invisibility	9. Digital Rights Incident/Policies	10. Vision: Just Digital Futures
Urretxu	Digital services exist but often require support or mediation to be effectively used.	Digital literacy varies strongly depending on education level.	Connectivity infrastructure is relatively functional but unevenly used.	Digital environments are sometimes perceived as potentially risky spaces.	Municipal communication campaigns attempt to ensure inclusive representation.	Safe and responsible use of AI technologies still requires institutional development.	Risks associated with data governance are not always clearly understood.	Some groups attempt to increase visibility through community data initiatives.	Follow-up mechanisms for digital harms remain limited.	Transparency should guide future digital transformation policies.
Arrasate	Cultural and community centres function as key access points to digital services.	Citizens' digital autonomy remains very limited without institutional support.	Access frequently depends on shared community infrastructures.	Algorithmic bias is sometimes perceived in automated systems.	Digital infrastructures are not considered neutral by users.	Fear and uncertainty dominate perceptions of generative AI technologies.	Data governance is rarely prioritised within municipal decision-making.	Digital representations of communities may project inaccurate images.	Institutional roles in protecting digital rights remain unclear.	Policies should aim at fair and inclusive digital governance.
Donostia	Inclusion department has not conducted such observation so far. Who should be in charge of digital inclusion?	Public awareness of digital risks and rights remains relatively low.	Public innovation spaces (e.g., Tabakalera) provide alternative access infrastructures.	Online narratives may criminalise vulnerable groups.	Negative digital narratives often shape public perceptions.	Generative AI is seen as having strong potential but also generating confusion.	Data governance sometimes evokes “Big Brother” concerns among citizens.	Risks of data manipulation are frequently discussed.	Lack of training limits understanding of digital rights.	Digital empowerment should guide the development of future governance models.
Errenteria	Digital access depends heavily on public spaces and shared infrastructures.	Citizens' autonomy in digital environments remains very limited.	Women in particular often rely on outdated devices.	Online discourse may reinforce social roles and criminalisation narratives.	Hate speech is frequently present in digital spaces.	Generative AI is sometimes perceived as exclusionary.	Citizens often feel subject to surveillance and control.	Lack of integrated data systems limits understanding of social realities.	Protection mechanisms for digital harms remain insufficient.	More institutional resources are required to ensure inclusive digital governance.
Eibar	Many citizens still rely on in-person administrative procedures.	Basic digital skills are lacking among parts of the population.	Mobile phones represent the only digital access channel for many residents.	Online environments are sometimes perceived as spaces of hostility.	Some groups remain difficult to identify or represent in digital datasets.	Adoption of generative AI is conditional and cautious.	Citizens sometimes perceive increasing digital restrictions.	Disabilities and accessibility needs are often underrepresented in datasets.	Municipal competences regarding digital rights protection are limited.	Policies should prioritise digital empowerment.

Table 8. Cont.

Municipality	1. Access & Obstacles	2. Digital Literacy & Autonomy	3. Devices, Mobile & Connectivity	4. Algorithmic Discrimination	5. Representation in Digital Spaces	6. GenAI (Use & Perception)	7. Data & Control	8. Statistical Invisibility	9. Digital Rights Incident/Policies	10. Vision: Just Digital Futures
Pasaia	A significant generational digital divide persists.	Limited critical engagement with digital systems among some residents.	Moderate smartphone usage represents the main access channel.	Digital systems may fail to support social integration.	Digital representations often fail to reflect local realities.	Generative AI remains largely unknown among many citizens.	Data use is often perceived as restrictive rather than empowering.	Increased visibility may sometimes generate harmful stereotyping.	Training on digital rights remains insufficient.	Inclusive public spaces should guide digital futures.
Tolosaldea	Small municipalities face resource constraints that affect digital inclusion policies. Ps. Although it contrasts with landago.eus in Goiherri county.	Citizens' use of digital services remains very limited.	Digital connectivity often occurs collectively through shared infrastructures.	Housing and employment barriers intersect with digital exclusion.	Representation of vulnerable groups remains weak.	Generative AI governance is often framed through a logic of institutional control.	Citizens often perceive data governance as risky.	Rural territories remain statistically invisible in many datasets.	Lack of resources limits digital rights policies.	A comprehensive territorial digital inclusion policy is needed.
Irun	Public libraries play a key role as digital access points.	Citizens' digital autonomy remains limited.	Community infrastructures facilitate connectivity.	Experiences with digital systems are often mixed.	Representation of some communities remains weak.	Generative AI is sometimes discussed from a care and social-support perspective.	Awareness of digital rights remains low.	Experimental initiatives attempt to increase visibility through local data.	Concerns about freedom and privacy occasionally arise.	Digital coexistence and social cohesion should guide future governance.

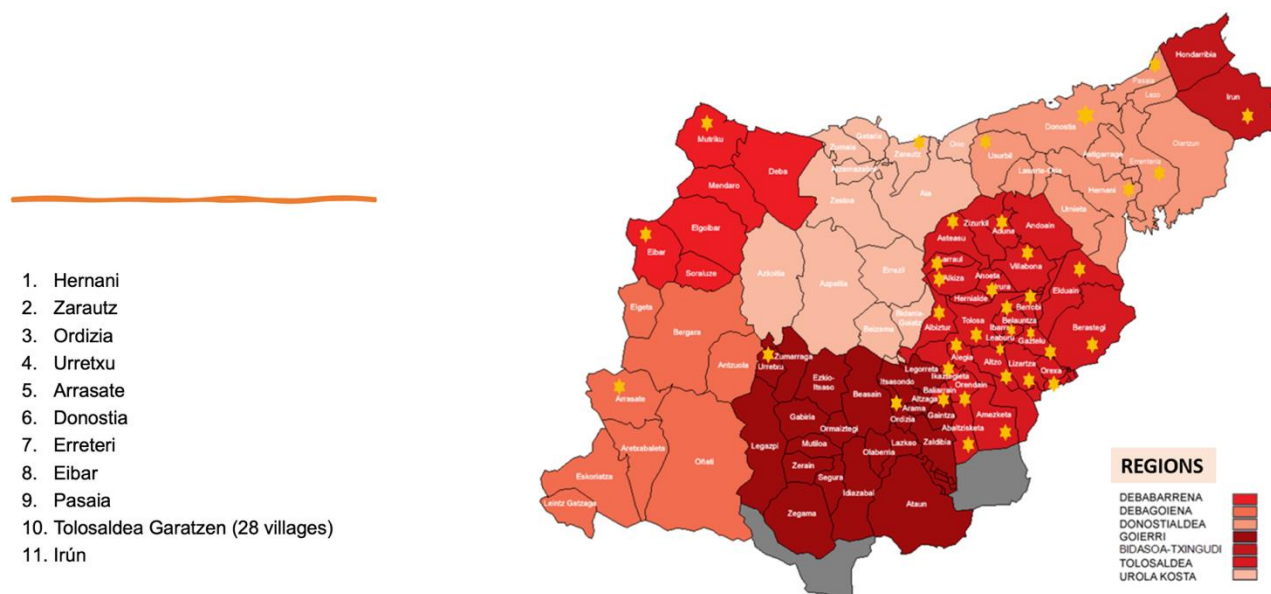


Figure 7. Gipuzkoa: municipalities participating in this preliminary action research workshop
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Table 8 reveals substantial territorial variation in how municipalities perceive digital inclusion challenges and AI governance risks. While urban municipalities such as Donostia highlight concerns related to data governance, surveillance perceptions, and generative AI adoption, smaller municipalities emphasize infrastructural constraints, limited institutional capacity, and persistent digital literacy gaps. Across the eleven cases, three cross-cutting patterns emerge: reliance on mobile access, unclear departmental responsibility of digital inclusion as an emerging topic, statistical invisibility of vulnerable communities in municipal datasets, and uncertainty regarding institutional responsibilities for digital rights protection. These findings confirm that anticipatory AI governance requires multi-level coordination between provincial and municipal administrations.

Together, the three stakeholder perspectives demonstrate that anticipatory AI governance in Gipuzkoa emerges through multi-level stakeholder engagement, where civil society experience, provincial governance capacity, and municipal implementation realities interact within the Science-for-Policy framework to shape a territorial digital inclusion strategy.

A first point of divergence concerns how digital inclusion and AI governance problems are framed across stakeholder groups. CSOs articulate these challenges as structural and rights-based, grounded in lived experiences of exclusion and discrimination. In contrast, provincial directorates frame them in terms of institutional capability, risk management, and governance instruments. Municipalities occupy an intermediate position, translating both perspectives into operational constraints shaped by limited resources and territorial inequalities.

A second cross-cutting dimension concerns the production of (in)visibility within digital governance systems. CSOs emphasise statistical invisibility as a core mechanism of exclusion, highlighting the absence of vulnerable groups from datasets and policy design. Directorates recognise this issue as a data governance problem affecting policy accuracy, while municipalities experience it as an operational limitation in evidence-based decision-making. This reveals a multi-level governance gap in which invisibility is simultaneously experienced, recognised, and yet insufficiently resolved institutionally.

A third analytical dimension concerns anticipatory capacity. Civil society actors anticipate risks through experiential knowledge (e.g., discrimination, exclusion), while directorates translate anticipation into formal governance instruments such as audits, oversight frameworks, and data governance models. Municipalities, however, display limited anticipatory capacity due to resource constraints and fragmented institutional responsibilities. This uneven distribution of anticipatory capacity across governance levels constitutes a key empirical contribution of the Gipuzkoa case.

The contrast between provincial capacity and municipal constraints suggests that anticipatory AI governance does not scale linearly, but requires differentiated implementation strategies adapted to institutional capacity and resource availability.

Generative AI is interpreted differently across levels: as a tool of empowerment (CSOs), a governed innovation (directorates), and a source of uncertainty (municipalities). This divergence highlights the importance of institutional mediation in shaping how emerging technologies are integrated into public governance (Table 9).

Table 9. Cross-stakeholder analytical synthesis.

Dimension	CSOs (6)	Directorates (7)	Municipalities (11)
Problem framing	Rights-based	Institutional	Operational
Data visibility	Experiential invisibility	Governance issue	Data limitation
Anticipatory capacity	Experiential foresight	Formal instruments	Limited capacity
GenAI perception	Empowerment + risk	Governed tool	Uncertainty

Together, the three stakeholder perspectives reveal that anticipatory AI governance is not uniformly distributed but emerges through differentiated capacities across governance levels. Civil society contributes experiential foresight, directorates institutionalise governance mechanisms, and municipalities mediate implementation under constraint. This multi-level asymmetry constitutes a central empirical finding of the study, demonstrating that anticipatory AI governance is a relational and unevenly constructed institutional capability rather than a pre-existing condition [125].

These findings also reveal a structural gap between legal frameworks and institutional practice. While regulatory instruments such as the EU AI Act establish formal requirements for transparency, accountability, and risk management, empirical evidence from Gipuzkoa shows that subnational administrations and civil society actors often lack the operational mechanisms to implement these obligations effectively. This gap reinforces the need for anticipatory governance approaches that integrate legal compliance into institutional design rather than treating it as an *ex post* requirement.

4.4. Ten policy recommendations for anticipatory AI governance

Drawing on the findings from stakeholder engagement and the institutional context of Gipuzkoa, this article proposes a policy decalogue outlining strategic recommendations for implementing anticipatory AI governance in territorial public administrations. These recommendations emphasise the integration of digital inclusion, responsible data governance, and open innovation ecosystems to ensure that AI-driven transformations support democratic accountability and social cohesion. While grounded in the specific institutional and geographical context of Gipuzkoa in the Basque Country

(Spain), the recommendations aim to provide insights relevant to other territorial governments seeking to develop inclusive and anticipatory approaches to AI governance.

4.4.1. Embed AI governance within a territorial digital inclusion strategy

AI governance should be embedded within broader territorial digital inclusion strategies that address structural inequalities in access to digital infrastructures, technological literacy, language accessibility, and participation in digital public services. In Gipuzkoa, this approach is particularly relevant because digital transformation is being implemented within the framework of the Provincial Council's Diversity and Social Cohesion policies, which explicitly recognise digital inclusion as a component of democratic governance.

The Basque Country provides a distinctive governance environment characterised by strong devolved institutions and high levels of social cohesion. Provincial governments such as the Provincial Council of Gipuzkoa possess substantial policy autonomy due to the region's fiscal and administrative self-government. This allows local institutions to integrate digital governance initiatives within broader social policy frameworks. Embedding AI governance within digital inclusion strategies ensures that technological innovation supports public value creation rather than exacerbating existing inequalities.

4.4.2. Use existing administrative data infrastructures as strategic governance assets

Territorial administrations increasingly generate large volumes of digital administrative data that can support anticipatory governance and evidence-based policymaking. In Gipuzkoa, one of the most significant examples is the TikeTbai fiscal system, a digital tax compliance platform implemented across businesses and economic activities in the territory.

The TikeTbai system generates approximately one million digital invoices daily (Gipuzkoa's population 727,000), creating a real-time dataset that provides insights into economic activity, business transactions, and territorial economic dynamics. When analysed responsibly, such datasets can help policymakers understand consumption patterns, monitor economic fluctuations, and design targeted economic policies. However, leveraging these datasets for governance purposes requires robust data governance frameworks that ensure privacy protection, transparency, and accountability.

In addition, collaborative initiatives involving research actors—such as the work undertaken with Multiverse Computing, which explores quantum-inspired computational techniques—illustrate how emerging technological infrastructures could enable more advanced data analysis capacities. The presence of the IBM Quantum System Two infrastructure in Donostia–San Sebastián further reinforces the potential for Gipuzkoa to experiment with advanced computational approaches to public data analysis [104].

4.4.3. Map territorial needs through integrated datafication strategies

Territorial digital governance requires systematic mapping of social, economic, and infrastructural needs through integrated data strategies. In a territory such as Gipuzkoa—characterised by a dense network of municipalities, strong industrial clusters, and complex commuting patterns—data-driven analysis can provide critical insights into regional inequalities and development opportunities.

Combining fiscal datasets (TiketBai), mobility data generated through smart mobility infrastructures (such as MUBIL), environmental monitoring initiatives related to the emerging *EcoTechnoPolitical* agenda, and social indicators can help identify infrastructure gaps, public service accessibility challenges, and emerging societal risks. Such integrated data analysis enables policymakers to move beyond fragmented governance approaches and develop coordinated territorial development strategies.

This recommendation reflects broader debates about data-driven territorial governance, where local governments increasingly rely on digital infrastructures to understand and manage complex socio-technical systems.

4.4.4. Develop well-governed data spaces for public value creation

The creation of territorial data spaces should be prioritised to ensure that public, private, and civic actors can collaborate in the responsible use of data resources. Data spaces represent governance frameworks where datasets generated by different sectors—public administrations, businesses, research institutions, and CSOs—can be shared under clearly defined ethical and legal conditions.

In the European policy context, the development of data spaces is aligned with broader initiatives such as the European Data Strategy, which promotes sectoral data ecosystems in areas including mobility, health, and energy. For territories such as Gipuzkoa, well-governed data spaces can enable collaborative innovation while ensuring that data resources remain aligned with public interest objectives.

This action research, stemming from the interviews with directorates (General Directorate for Road Infrastructures, particularly) found that instead of an absence of data spaces, there was an abundance, and particularly, more prominently, an overlapping of data spaces, which in itself generates confusion rather than clarity and effectiveness. Effective governance arrangements must define rules regarding data ownership, access permissions, interoperability standards, ethical oversight, and accountability mechanisms, ensuring that data ecosystems do not reinforce asymmetrical power relations between institutional and corporate actors.

4.4.5. Integrate smart mobility data into territorial governance

Mobility infrastructures generate increasingly valuable datasets that can support anticipatory governance and evidence-based policymaking at the territorial scale. In Gipuzkoa—a compact province of approximately 720,000 inhabitants located within the Basque Autonomous Community in northern Spain—daily mobility flows are shaped by a dense network of municipalities connected through short interurban distances and strong commuting patterns.

Within this context, the MUGI public transport card system operates as a unified ticketing infrastructure integrating buses, commuter trains, and regional rail services across the territory. MUGI generates continuous streams of anonymised mobility data reflecting patterns of daily commuting, inter-municipal travel flows, and peak demand periods. When responsibly analysed, these datasets can support urban planning, improve multimodal connectivity, and reduce environmental impacts associated with private car dependency.

Moreover, Spanish labour regulations increasingly require large companies to adopt corporate mobility plans, particularly for organisations with more than 200 employees. These policies aim to promote sustainable commuting practices, including public transport usage and shared mobility

solutions. Integrating corporate mobility strategies with public mobility datasets—such as those generated by MUGI—could therefore enable more coordinated territorial mobility planning.

Recent research also indicates that approximately 74% of Gipuzkoa's residents use generative AI tools either daily or weekly [126], suggesting that citizens' expectations regarding digital public services are evolving rapidly. AI-enabled analytical tools could therefore assist public administrations in analysing mobility datasets, modelling transport demand, and designing adaptive transport policies.

However, mobility data must be governed through robust ethical frameworks that protect privacy, ensure transparency, and avoid surveillance risks. Integrating mobility datasets into well-governed territorial data spaces can help ensure that these data resources contribute to inclusive and sustainable mobility policies.

4.4.6. Design public policies based on open innovation ecosystems

AI governance should be embedded within open innovation ecosystems that connect public institutions, research organisations, technology companies, and civil society actors. In Gipuzkoa, innovation ecosystems are strongly linked to regional industrial clusters, advanced manufacturing sectors, and research infrastructures.

Public policy design should explicitly consider both the hardware and software dimensions of algorithmic disruption. Hardware infrastructures include data centres, computational facilities, sensors, and mobility infrastructures, while software infrastructures include digital platforms, AI algorithms, and data governance frameworks. Anticipatory governance requires coordinated policy strategies addressing both dimensions simultaneously.

This recommendation reflects the importance of developing institutional capabilities capable of steering technological innovation toward societal missions rather than relying exclusively on market-driven technological diffusion.

4.4.7. Establish living labs and co-production spaces for AI governance

Living labs and participatory innovation environments should be developed to facilitate collaboration between citizens, CSOs, public administrations, and technological actors. These spaces function as experimentation environments where digital governance tools, AI systems, and data governance frameworks can be tested and refined through real-world applications.

In the Gipuzkoa context, such spaces are particularly relevant due to the strong tradition of participatory governance and civic engagement in Basque institutional culture. Co-production spaces can help ensure that digital governance initiatives incorporate the perspectives of vulnerable populations, including migrants, elderly citizens, and digitally excluded groups.

Living labs also provide an institutional mechanism for translating abstract governance principles—such as transparency, accountability, and inclusion—into concrete policy experimentation processes.

4.4.8. Strengthen territorial innovation infrastructures

The development of anticipatory AI governance requires robust territorial innovation infrastructures capable of supporting experimentation, research collaboration, and technological development.

In Gipuzkoa, several initiatives already contribute to this innovation ecosystem. The City Science Lab Gipuzkoa, developed in collaboration with international research networks, provides a platform for exploring data-driven urban governance. In addition, the MUBIL innovation centre focuses on smart mobility technologies, while ZIUR specialises in cybersecurity and digital resilience [127,128].

Together, these institutions form a territorial innovation ecosystem capable of supporting responsible experimentation with AI-driven governance tools. Strengthening collaboration between these infrastructures can help position territorial administrations as active participants in the governance of emerging technologies

4.4.9. Promote cross-sector collaboration across the data economy

Effective AI governance requires collaboration across institutional and sectoral boundaries. Universities, research centres, public administrations, private technology companies, and CSOs all play essential roles in shaping digital governance ecosystems.

In territories such as Gipuzkoa—where strong industrial clusters coexist with advanced research institutions—cross-sector collaboration can facilitate the development of responsible AI applications aligned with territorial development goals. Collaborative governance arrangements can help ensure that technological innovation contributes to inclusive economic development and democratic governance. Such collaboration also enables the development of interdisciplinary expertise combining technological knowledge, legal frameworks, public policy design, and ethical oversight.

4.4.10. Institutionalise anticipatory governance within public administration

Finally, anticipatory AI governance must become a permanent institutional capability within public administration through an observatory pivoted from Human Rights and Democratic Culture Directorate, which is *de facto* functioning as an internal strategic provider on anticipatory AI governance. This involves developing longitudinal online surveys [126,127], foresight mechanisms, ethical oversight frameworks, and interdisciplinary policy teams capable of assessing the societal implications of emerging digital technologies.

Public institutions must cultivate organisational cultures that support policy experimentation, iterative learning, and adaptive governance. In the context of rapidly evolving technologies such as generative AI, static regulatory approaches are unlikely to remain effective over time. Instead, anticipatory governance frameworks enable institutions to monitor technological developments, assess risks, and adjust policy strategies accordingly.

For territorial governments worldwide, developing such anticipatory governance capacities will be essential for ensuring that AI-driven transformations remain aligned with democratic values, human rights protections, and inclusive societal development.

Together, these recommendations outline a governance model in which AI adoption is embedded within territorial innovation systems, democratic accountability frameworks, and participatory digital governance practices. Rather than focusing solely on technological deployment, anticipatory governance emphasizes the institutional capacity required to guide AI-driven transformations toward inclusive and sustainable societal outcomes.

5. Conclusion

This article examined how anticipatory AI governance can be operationalised within a subnational public administration through a *Science-for-Policy* action research framework. The case of the Provincial Council of Gipuzkoa demonstrates that embedding AI governance within a territorial digital inclusion strategy provides a practical pathway for linking technological innovation with democratic accountability, digital rights protection, and inclusive public service design.

The findings show that anticipatory AI governance is not primarily a technological challenge but an institutional and socio-political one. Across the three stakeholder groups analysed—CSOs, provincial directorates, and municipalities—digital transformation is perceived through the lens of structural inequalities, institutional capability constraints, and the need for inclusive governance frameworks. These results align with recent scholarship emphasising that AI adoption in the public sector must be understood as a governance capacity issue rather than a purely technical implementation challenge [1,4,11].

The action research reveals four cross-cutting dynamics. First, digital inclusion remains a structural governance challenge shaped by socio-economic inequality, language barriers, and institutional service design. Second, algorithmic bias is widely recognised across governance levels, although it is interpreted differently depending on institutional position. Third, the persistent “data divide” limits evidence-based policymaking by rendering vulnerable communities statistically invisible. Fourth, stakeholders converge around the need for inclusive digital futures grounded in transparency, accountability, and democratic oversight.

These findings resonate with wider debates on algorithmic governance and public value creation. Scholars have repeatedly warned that AI systems can reinforce structural inequalities when deployed without adequate governance safeguards [6,8,41]. At the same time, mission-oriented public policy research highlights that public institutions must actively shape technological trajectories toward societal missions such as inclusion and democratic accountability [17,18]. The Gipuzkoa case contributes to this discussion by demonstrating how anticipatory governance can be institutionalised through a territorial *Science-for-Policy* architecture that combines stakeholder engagement, institutional learning, and open dissemination.

Furthermore, the case illustrates the importance of place-based governance arrangements. Territorial institutions are not merely implementers of national AI regulations; they can function as laboratories for democratic innovation in algorithmic governance. This insight resonates with recent research on regional development and anticipatory governance in the Basque Country, which highlights the capacity of devolved institutions to experiment with novel governance approaches under conditions of uncertainty. In this sense, anticipatory AI governance can be understood as part of a broader trajectory of institutional innovation within territorial development strategies.

The Gipuzkoa case demonstrates that anticipatory AI governance must be understood not only as an institutional or participatory process but also as a legal capability. The alignment between co-produced frameworks such as the Decalogue and emerging regulatory instruments (e.g., the EU AI Act) is essential for ensuring that digital inclusion strategies are enforceable, accountable, and rights-based. Future research should therefore further examine how subnational administrations can operationalise legal

compliance in practice, particularly in relation to grievance mechanisms, algorithmic accountability, and procedural safeguards [21,125].

The Gipuzkoa case should therefore not be interpreted as a universally replicable governance model. Its contribution lies instead in identifying conditionally transferable governance principles whose implementation depends on institutional capacity, fiscal autonomy, cross-departmental coordination, and stakeholder participation. Anticipatory AI governance is thus best understood as a territorially differentiated governance capability emerging through iterative institutional learning rather than as a standardised administrative template.

5.1. Limitations

This action research presents several limitations that should be acknowledged.

First, the empirical research focuses on a single territorial case study within the Basque Country. Although Gipuzkoa represents an analytically distinctive governance setting due to its devolved institutional capacity, the findings may not be directly generalisable to other regional or national contexts.

Second, the action research process remains ongoing (2024–2026). Some policy experiments and institutional learning processes described in this article are still evolving, meaning that the long-term governance impacts of the Digital Inclusion Strategy cannot yet be fully assessed.

Third, the stakeholder engagement dimension prioritised qualitative insights derived from workshops and interviews rather than quantitative evaluation of policy outcomes. Future research could complement this qualitative analysis with quantitative assessments of digital inclusion indicators or AI governance impacts as it has been the case with an online survey conducted in January 2026 with $N = 911$ [126,127]. These results will be published in another publication.

Fourth, the study primarily examines governance processes rather than the technical architecture of specific AI systems. Although this institutional perspective is central to anticipatory governance research, future studies could integrate more detailed technical analysis of algorithmic systems deployed within public administration. The participation of IZFE (IT Department of the Province Council of Gipuzkoa) seems compulsory.

5.2. Future research directions

The findings presented in this article open several avenues for further research.

First, comparative research across regions and cities could explore how different territorial administrations operationalise anticipatory AI governance and digital inclusion strategies. Such comparative work would contribute to building a broader political geography of AI governance.

Second, future studies should examine the relationship between AI governance and DPI, particularly how data infrastructures, identity systems, and service delivery platforms shape the governability of algorithmic systems.

Third, more research is needed on the political economy of AI adoption in territorial governance contexts, including labour market impacts, regional innovation ecosystems, and digital sovereignty strategies.

Fourth, interdisciplinary research combining law, public administration, and science and technology studies could further examine the interaction between regulatory frameworks—such as the EU AI Act—and local governance practices.

Finally, longitudinal analysis of ongoing action research initiatives could provide valuable insights into how anticipatory governance capacities evolve over time within public institutions.

5.3. Concluding remarks

In conclusion, the case of Gipuzkoa demonstrates that anticipatory AI governance can be operationalised within territorial public administrations through a *Science-for-Policy* approach combining institutional learning, stakeholder engagement, and open dissemination.

Rather than treating AI governance as a purely regulatory or technological challenge, the findings suggest that it should be understood as a democratic governance capability requiring coordination across institutional levels and societal actors. By embedding AI governance within a territorial digital inclusion strategy, the Provincial Council of Gipuzkoa has developed a governance framework that prioritises inclusion, transparency, and public trust.

As AI technologies continue to reshape public administration and democratic institutions, anticipatory governance approaches such as the one examined in this article may become increasingly important for ensuring that digital transformation contributes to socially inclusive and democratically accountable futures.

Declaration of generative AI and AI-assisted technologies

No generative AI or AI-assisted technologies (including ChatGPT, Grammarly, or similar tools) were used in the preparation of this manuscript. The intellectual content of the manuscript, including its ideas, analysis, writing, and conclusions, is entirely the original work of the authors. The manuscript complies with academic integrity and publication ethics standards.

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Authors' contribution

Conceptualization, I C; methodology, I C; software, I C; validation, I C; formal analysis, I C; investigation, I C and I E; resources, I C; data curation, I C; writing—original draft preparation, I C; writing—review and editing, I C; visualization, I C; supervision, I C; project administration, I C and I E; funding acquisition, I C and I E. All authors have read and agreed to the published version of the manuscript.

Conflicts of interest

Igor Calzada holds the position of Associate Editor for *Law, Ethics & Technology* and has not peer reviewed or made any editorial decisions for this paper. The authors declare no conflicts of interest.

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