

# Anticipatory AI Governance in Practice: Data Sovereignty, Urban AI, and Trustworthy GenAI in the Basque Country

Igor Calzada  
Public Policy & Economic History  
University of the Basque  
Country/Ikerbasque  
St Sebastián, Basque Country, Spain  
[igor.calzada@ehu.eus](mailto:igor.calzada@ehu.eus)

Itziar Eizaguirre  
Human Rights & Democratic Culture  
Province Council of Gipuzkoa  
St Sebastian, Basque Country, Spain  
[ieizaguirre01@gipuzkoa.eus](mailto:ieizaguirre01@gipuzkoa.eus)

**Abstract**—*Agentic and Generative AI (GenAI) confront public administrations with the joint imperatives of innovation, legitimacy, and trust. This paper operationalizes anticipatory governance in the Basque Country (Spain) across four interlinked domains: (i) regional foresight under polycrisis; (ii) data sovereignty countering “data-opolies” through civic data cooperatives; (iii) Urban AI—exemplified by the MUBIL smart mobility centre (Basque mobility innovation hub; [www.mubil.eus/en/](http://www.mubil.eus/en/)) prototyping autonomous mobility in rural areas ([www.landago.eus/en/](http://www.landago.eus/en/))—advancing digital inclusion and mission-oriented public services; and (iv) trustworthy GenAI in Living-Lab assemblages with patients and general practitioners in the Basque Public Healthcare System ([www.osakidetza.eus](http://www.osakidetza.eus)). Drawing on qualitative fieldwork, action research, and institutional analysis, this paper shows how AI is embedded in welfare traditions, cooperative infrastructures, and territorially grounded innovation systems. This paper argues that anticipatory AI governance must align technical design with societal values, embedding trust, accountability, and inclusion in digital infrastructures. This paper discusses implications for translocal federated city-regions pursuing digitally sovereign and socially cohesive AI and shows how place-based, agentic approaches can mitigate algorithmic exclusion while enabling democratic renewal.*

**Keywords**—*Agentic AI, Anticipatory Governance, Data Sovereignty, Digital Inclusion, Urban AI, Trustworthy AI, Generative AI, Human-AI Governance, Policy Innovation, Data Cooperatives, Basque Country, Science for Policy*

## I. INTRODUCTION

AI is reshaping how institutions govern, deliver services, and engage with citizens [1]. From predictive analytics to generative diagnostics, promises of efficiency and personalization meet a broader *polycrisis* of democratic backsliding, climate disruption, digital inequality, and geopolitical fragmentation [2–4].

This paper situates the debate in the Basque Country, noted for anticipatory governance and inclusive innovation [5]. The “Basque Model” combines cooperative traditions, fiscal autonomy, and mission-oriented strategies [6], yet faces digital disruption, demographic transitions, and uncertainty [7]. Examining how anticipatory governance is applied to AI offers lessons for e-government and public administration broadly [8–11].

## A. AI, Innovation Systems and Democratic Tensions

Transitions from “smart cities” to *Urban AI* mark a shift from efficiency/competitiveness toward digital inclusion, rights, and resilience [12]. Nelson’s *Moon and the Ghetto* metaphor asks why sophisticated systems coexist with persistent inequalities [13–18]. *Problem*: how can administrations balance innovation, trust, and legitimacy in AI integration [19–21]?

## B. Anticipatory Governance in the Basque Country

Building on territorial solidarity, cooperative institutions, and long-term planning, Basque policymakers deploy anticipatory governance to navigate uncertainty [22–29]. Fieldwork conducted for 2024 by Calzada, Thompson, and Beel [30] and for 2025 by Calzada and Eizaguirre [20], both shows selective adaptation of foundational-economy, community-wealth, and circular-innovation frameworks, producing hybrid strategies [31–36].

## C. Data Sovereignty as a Democratic Imperative

*Data sovereignty* must be engineered into infrastructures, protocols, and governance models [37–48]. Alternatives—data cooperatives, public-interest commons, Web3—reclaim agency via participation and collective ownership [41], resonating with Basque cooperative legacies [5]. Absent federated/interoperable designs with accountability, public-sector AI risks deepening asymmetries [49–52].

## D. Urban AI and Digital Inclusion: The Case of MUBIL

Urban AI moves beyond proprietary smart-city logics, centering inclusion and rights [53]. MUBIL aligns mobility innovation with social goals, addressing digital divides (elderly, rural, migrants) demand equity-by-design and governance focused on inclusion [20,26,27].

## E. Anticipatory Trustworthy GenAI in Healthcare

In *Osakidetza*, Living-Lab assemblages with patients and GPs surface five factors for trust [54]: (i) epistemic uncertainty/clinical judgment; (ii) trust/explainability; (iii) accountability/error; (iv) data ownership/consent; (v) digital divides. Trust must be *co-produced* through participatory

governance, not technical fixes alone [55]. These lessons inform EU efforts (AI Action Plan, EuroStack) to keep AI human-centric and democratically grounded [50,51].

### F. Research Questions

- RQ1: How can anticipatory governance support democratic AI integration under polycrisis [28]?
- RQ2: How can data sovereignty and cooperatives counter “data-opolies” and enable accountable AI infrastructures [41]?
- RQ3: How can Urban AI (e.g., MUBIL via Landago) operationalize digital inclusion and safeguard civic agency in public services [20,31,53]?
- RQ4: How can healthcare Living Labs anticipate trustworthy GenAI while balancing innovation with institutional trust and legitimacy [54]?

## II. CONCEPTUAL FRAMEWORK

### A. Anticipatory Governance and Regional Futures

Anticipatory governance provides a lens for understanding how public administrations can act under conditions of uncertainty. In the Basque Country, this orientation is visible in what scholars have termed the “Basque Model” of governance: a hybrid strategy that combines fiscal autonomy, cooperative traditions, and territorial solidarity with mission-oriented innovation policies [30].

### B. Data Sovereignty and Civic Data Infrastructures

The concentration of data power in “data-opolies” poses major risks for democratic governance [40]. Without sovereignty over data, public administrations risk dependency on opaque infrastructures that weaken accountability and erode trust. Data sovereignty reframes these challenges as questions of infrastructure design, democratic accountability, and civic empowerment [41,50,52].

### C. Urban AI and Digital Inclusion

Urban AI extends digital governance debates beyond the smart city paradigm. Whereas smart cities often relied on proprietary platforms and corporate procurement, Urban AI emphasizes digital inclusion, human rights, and public value [20,21]. In the Basque Country, the MUBIL hub demonstrates how mission-oriented approaches can align AI with regional goals of (rural) sustainable mobility and social cohesion.

Urban AI strategies emphasize inclusiveness in three ways: (i) co-design processes that bring municipalities, civil society, and citizens into AI system design; (ii) participatory data governance models that enhance transparency and accountability; and (iii) targeted strategies to close digital divides. These efforts are essential in preventing algorithmic exclusion, particularly among vulnerable groups such as the elderly, migrants, and rural communities. As AI becomes integral to urban mobility, planning, and service delivery,

ensuring equitable participation in design and oversight becomes a matter of democratic legitimacy [18,36].

### D. Trustworthy GenAI in Healthcare

Healthcare provides a critical testing ground for AI governance, as algorithmic systems intersect directly with well-being, consent, and institutional trust. In the Basque Country, experiments with GenAI have been conducted through Living Lab assemblages within Osakidetza, the regional public healthcare system [54]. These initiatives highlight five governance challenges: (i) epistemic uncertainty and clinical judgment; (ii) trust and explainability; (iii) accountability and error; (iv) data ownership and consent; and (v) digital divides in access. Addressing these requires Human–AI Governance (HAIG) frameworks that embed democratic accountability and participatory oversight into AI deployment.

## III. METHODOLOGY

The study frames an empirical governance contribution and adopts a *qualitative, comparative, and participatory methodology* tailored to the governance context. Three complementary approaches structure the research:

1. *Qualitative Action Research* [55]: Action research allows the integration of scholarly analysis with practice-based interventions. By engaging directly with policymakers, healthcare professionals, and urban practitioners, the study co-produces insights that are both analytically robust and contextually grounded.
2. *Living Labs*: In both healthcare and urban mobility, Living Labs served as governance infrastructures that enabled experimentation with AI applications in real-world but controlled environments.
3. *Comparative Case Analysis*: The four cases—anticipatory governance, data sovereignty, Urban AI, and healthcare—were analyzed comparatively within the Basque innovation system [5,6].

Triangulation drew on 22 interviews, 3 focus groups, and ethnographic observations in healthcare and urban labs. Participants (n=65) were selected based on their institutional role in AI policy or practice across healthcare, mobility, and regional foresight.

#### IV. EMPIRICAL INSIGHTS

- A. *Case 1: Anticipatory governance.* Foresight is integrated into regional planning amid contested futures [28]. AI adoption is tied to legitimacy via deliberation, limiting technocratic drift.
- B. *Case 2: Data sovereignty.* Cooperative models supply transparent, accountable inputs to AI and recast sovereignty as a civic practice [41–48].
- C. *Case 3: Urban AI (MUBIL & inclusion).* Mission-oriented mobility pilots co-design AI with municipalities and civil society; monitoring divides is essential to prevent exclusion of elderly/rural users [53].
- D. *Case 4: Healthcare & Trustworthy GenAI.* Living Labs with GPs/patients show trust and accountability cannot be achieved by transparency alone [54].

#### V. DISCUSSION: CROSS-CASE ANALYSIS

The four empirical cases—anticipatory governance in the Basque Country, data sovereignty and cooperatives, Urban AI and digital inclusion strategies, and trustworthy GenAI in healthcare—offer complementary insights into how AI can be embedded in public administration in ways that balance innovation with democratic legitimacy. Each demonstrates the value of *anticipatory governance* as a proactive, reflexive mode of engaging with technological futures, while also revealing the tensions between inclusion, sovereignty, and institutional capacity.

The Basque Model exemplifies a long-standing tradition of regional foresight and cooperative governance, shaped by a strong welfare orientation and civic solidarity [30]. By deploying anticipatory mechanisms—ranging from participatory foresight exercises to multi-scalar policy experimentation—the Basque case demonstrates how governance systems can pre-emptively align AI deployment with social cohesion and territorial equity. Yet, as Nelson’s [14–17] “moon and ghetto” metaphor suggests, advanced technical capability does not automatically resolve entrenched inequalities.

The second case, data sovereignty, reframes sovereignty not as an abstract political claim but as an infrastructural and institutional design challenge. Here, data cooperatives and civic data infrastructures emerge as innovative tools to democratize control over data and mitigate the extractive logics of “data-opolies.”

The third case on Urban AI and digital inclusion illustrates how the transition from “smart cities” to “Urban AI” demands an epistemological shift. Rather than treating citizens as data points within corporate dashboards, Urban AI requires embedding human rights, digital inclusion, and participatory agency into algorithmic governance. This resonates Polanyi’s warning that market logics left unchecked dissembled technologies from their social purpose [24].

The healthcare case highlights the stakes of (*HAIG*) [11]. Here, qualitative action research and Living Labs demonstrate that trust in GenAI cannot be engineered through compliance checklists alone. Instead, governance must be co-produced with patients and practitioners, embedding transparency, accountability, and consent within clinical workflows. This aligns with Mazzucato’s [25–27] mission-oriented innovation approach: technologies must be steered toward public value, not merely technical efficiency. The cross-case insights converge on several implications for anticipatory AI governance in public administration:

1. *Governance as infrastructure:* Sovereignty, inclusion, and trust must be embedded not only in policy frameworks but also in the infrastructures—data architectures, participatory platforms, Living Labs—through which AI systems operate.
2. *Territorial innovation systems:* Following Nelson [14], city-regions remain critical arenas for shaping innovation. Territorial contexts provide distinctive capacities—cooperatives in the Basque Country, municipal strategies in Urban AI—that allow for experimentation beyond nation-state or corporate frameworks.
3. *Mission orientation:* As Mazzucato argues, innovation must be directed toward public missions such as equity, inclusion, and sustainability [26]. Public administration has a central role in aligning AI innovation trajectories with democratic goals.
4. *Preventing capture:* Both Polanyi’s double movement and Schumpeter’s disruptive cycles highlight the risk of capture—by elites, corporations, or technocratic institutions [24,25]. Anticipatory governance must institutionalize countervailing powers, such as data cooperatives, to avoid enclosure of public value [5].
5. *Experimentalist democracy:* Living Labs and foresight exercises illustrate how experimentation can serve as democratic infrastructure, enabling reflexivity, and iterative adaptation in AI governance [9].

#### VI. CONCLUSION: CROSS-CASE INSIGHTS

AI performance in e-government should be judged by public value and democratic renewal—not efficiency alone. *Table I* distills cross-case insights for broader contexts.

TABLE I. CROSS-CASE INSIGHTS FOR ANTICIPATORY AI GOVERNANCE

| Case Study                                | Focus Area                   | Governance Challenge                        | Key Insight  | Policy Implication  |
|---|------------------------------|---|--|---|
| 1) Anticipatory Governance (Basque Model) | Regional futures & foresight | Balancing tradition with digital disruption | Hybrid strategies sustain resilience but risk technocratic drift | Institutionalize participatory foresight and deliberation |
| 2) Data Sovereignty & Cooperatives        | Civic data infrastructures   | Overcoming “data-opolies”                   | Data sovereignty must be infrastructural, not abstract           | Invest in data cooperatives and federated architectures   |

| Case Study                        | Focus Area                    | Governance Challenge                           | Key Insight   | Policy Implication  |
|-----------------------------------|-------------------------------|--|---|---|
| 3) Urban AI (MUBIL & Inclusion)   | Digital inclusion in mobility | Avoiding reproduction of smart city exclusions | Urban AI reframes citizens as co-designers, not data points | Embed inclusion and equity audits in AI urban services              |
| 4) Healthcare & Trustworthy GenAI | Human-AI Governance (HAIG)    | Trust, accountability, digital divides         | Trust in GenAI is co-produced through Living Labs           | Institutionalize participatory oversight before large-scale rollout |

*Lessons for global e-government contexts:* (i) *Polycentric strategies:* AI governance must operate across local, regional, national, and global scales. (ii) *Place-based innovation:* Territorial innovation systems are critical for embedding AI in context. (iii) *Mission orientation:* Public value, not efficiency, should drive AI adoption. (iv) *Democratic reflexivity:* Institutions must evolve through iterative learning and co-production. (v) *Global solidarity:* Lessons from strong innovators such as the Basque Country can inform inclusive digital governance worldwide.

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