1st Proof Pdf

CHAPTER
11

Anticipating Trustworthy GenAI in the Public Healthcare System: Co-Producing Human–AI Governance between Patients and GPs in the Basque Country through Living Lab Assemblages

Igor Calzada* **and Ana Garaikoetxea**

University of the Basque Country and Basque Government—Basque Foundation for Science (IKERBASQUE), Spain

Background: Public healthcare systems face complex challenges in integrating generative artificial intelligence (GenAI) while ensuring trust, accountability, and equity.

Aim: This chapter examines how human–AI governance (HAIG) frameworks can support the democratic and anticipatory integration of GenAI into the Basque public healthcare system (*Osakidetza*) through living lab experimentation.

Method: Using a qualitative action research design, the study combined co-design workshops, focus groups, and ethnographic observation with general practitioners (GPs) and patients in a primary care context, supported by *BioGipuzkoa*.

Results: Findings identified five interdependent factors shaping trustworthy GenAI adoption: epistemic uncertainty and clinical judgment, trust and explainability, accountability and error, data ownership and consent, and digital divides and access.

*Corresponding author: igor.calzada@ehu.eus

To cite this chapter:
Calzada, I., & Garaikoetxea, A. (2027).
Anticipating trustworthy GenAI in the public healthcare system:
Co-producing human–AI governance between patients and GPs in the Basque Country through living lab assemblages.
In S. Misra, S. Traymbak, S. Chockalingam, M. Kjølerbakken, & P. Ø. Braarud (Eds.),
Human-Centric Artificial Intelligence: Human–Technology Integration (pp. 288–319). Routledge.
https://doi.org/10.1201/9781003635871

1st Proof Pdf

Contribution: The chapter demonstrates how living labs can serve as a practical HAIG instrument—operationalizing anticipatory governance, enabling participatory oversight, and offering a replicable methodology for other regions seeking to integrate GenAI responsibly into public healthcare.

Conclusions: The study concludes that embedding GenAI within HAIG-informed living lab infrastructures in *Osakidetza* and *BioGipuzkoa* can strengthen augmentation of clinical judgment, multilayered explainability, shared accountability, participatory data governance, and inclusion—thereby providing a concrete pathway for the democratic and anticipatory integration of GenAI in public healthcare systems that is elaborated in Section 6.

1. Introduction: Trustworthy GenAI in the Context of Human–AI Governance (HAIG)

General Introduction: The emergence of generative artificial intelligence (GenAI) has catalyzed profound transformations in public governance, particularly in healthcare systems where algorithmic decision-making intersects directly with individual well-being, institutional trust, and democratic legitimacy (Borges do Nascimento et al., 2025; Coalition for Health AI, 2025; McKay et al., 2022; National Academy of Medicine (NAM), 2023; Schmidt et al., 2024; van Kessel et al., 2024a, 2024b; World Economic Forum (WEF), 2023, 2025; World Health Organization (WHO), 2021, 2024). For example, during the living lab, several general practitioners (GPs) explained that when GenAI proposes a differential diagnosis—for instance, distinguishing between musculoskeletal chest pain and a cardiac condition—they must understand which symptoms, vital signs, or historical factors the model weighted most heavily. As one GP noted, "If I cannot see why the system prioritized one diagnosis over another, I cannot justify that decision to the patient, nor can I rely on it under time pressure." This illustrates how explainability becomes a practical requirement for safe and trustworthy clinical use. Consequently, this chapter examines the evolving role of human–AI governance (HAIG) (Engin, 2025; Engin & Treleaven, 2019) in embedding trustworthiness into GenAI systems. It draws on innovation systems and institutional theory (Nelson, 1993; Lundvall, 1992; Mazzucato, 2013) and field-based insights from a participatory living lab assemblage within the Basque Country's public healthcare system (Beel et al., 2026; Calzada, 2019).

Context: The chapter emerges from the International Summer School UIK on Digital Inclusion & Generative AI (15–16 July 2025, Donostia-San Sebastián, Miramar Palace; https://www.uik.eus/en/activity/digital-inclusion-generative-artificial-intelligence-gipuzkoa-socially-cohesive-digitally), co-organized by the Basque Foundation for Science and the University of the Basque Country, and funded by the Directorate of Human Rights and Democratic Culture of the Gipuzkoa Provincial Council (Calzada, 2025a; Calzada & Eizaguirre,

AQ: Please define UIK at first occurrence in the text.

1st Proof Pdf

2025a, 2025b, 2025c). The event, dedicated to trustworthy innovation in public systems, convened interdisciplinary experts and practitioners, notably including frontline professionals such as general practitioners (GPs) and managers from *Osakidetza*—the Basque public healthcare system—and *BioGipuzkoa*, a biomedical research hub advancing precision medicine and translational research. Through co-production workshops, foresight exercises, and ethical deliberations, participants tested theoretical frameworks against institutional realities, setting the foundation for the intervention described in this chapter. Thus, the scientific direction of this summer school could be considered the trigger and the starting point of this chapter, based on the arrangements of the program and the scope back in October 2024. This chapter is a direct outcome of one extension of such an event, in particular involving healthcare sector staff who attended voluntarily and were attracted by the program. One patient participant asked explicitly whether they would be informed when GenAI was being used in their consultation. This question underscored that transparency is not merely a regulatory ideal but a core element of maintaining trust in the intimate context of primary care.

Summary of Existing Work and Gaps: Existing scholarship on AI in healthcare has emphasized the technical, regulatory, and ethical dimensions of algorithmic deployment but has often underexamined territorial, institutional, and participatory governance mechanisms (Buolamwini, 2024; Eubanks, 2017; Couldry & Mejias, 2024; Gangadharan, 2017, 2020; Galceran-Vercher & Vidal D'oelo, 2024). While initiatives exist to improve transparency, explainability, and accountability (Leslie et al., 2024; Ruppert et al., 2017; Ulnicane et al., 2022; van Dijck et al., 2025), fewer have embedded these aims into place-based strategies that integrate digital inclusion as a prerequisite for trustworthy AI. In public healthcare, the risks of exclusion are magnified for marginalized populations, making it imperative to adopt governance models that institutionalize participatory oversight, democratic accountability, and equity from the outset (Levi, 2024; Ferrie, 2023). Workshop participants also observed that a significant number of elderly patients in Donostia's Old Town—many of who manage chronic conditions—do not regularly use smartphones, online portals, or digital health tools. This means that any GenAI-enabled service that presumes digital engagement could unintentionally exclude precisely those populations with the greatest healthcare needs.

The institutional setting of the Basque Country—characterized by a decentralized welfare state, strong public service orientation, and growing investment in territorial innovation strategies—provides fertile ground to examine how GenAI can be embedded in existing infrastructures without reproducing algorithmic opacity or diminishing clinical agency (Calzada & Eizaguirre, 2025d; Calzada, 2025b; Breznitz, 2021; Morgan et al., 2020). In this respect, GenAI implementation is not merely a technological challenge but a political, institutional, and social negotiation. Accordingly, trust in GenAI cannot be

1st Proof Pdf

engineered solely through compliance checklists or technical transparency but must be co-produced through embedded, place-based governance processes. In this regard, some patients expressed interest in creating a Basque equivalent to Salus.Coop, asking whether they could collectively decide how their health data are shared and used for training GenAI models. This suggestion reflects a desire for data governance approaches rooted in local cooperative traditions, rather than external or opaque data infrastructures.

In this context, the Basque Country has a rare opportunity to avoid the dilemma posed by Nelson's (1977, 2011) "moon and ghetto" metaphor and recently reinterpreted by Fountain (2022): the persistent failure of advanced technologies to address entrenched social inequalities. Rather than reproducing this disjunction, the Basque Country's governance architecture and social fabric allow for experimental yet grounded interventions that strive for both technological excellence and social justice. European frameworks such as the AI Continent Action Plan (European Commission, 2025a, 2025b), the EuroStack initiative (European Commission, 2025c), and the sovereign and democratic digitalization proposal (European Economic and Social Committee (EESC), 2019) underscore the urgency of embedding socio-technical reflexivity and inclusive governance into AI transitions. As one of Europe's leading territories in socially cohesive policy innovation, the Basque Country must translate these principles into practice—embedding GenAI not just within public services, but in a wider project of democratic renewal and algorithmic accountability aligned with mission-oriented public policy (Mazzucato, 2022; Hallonsten, 2024). Although explainable AI frameworks exist, several GPs highlighted that they rarely address the realities of 5-minute consultations where clinicians must quickly translate AI-derived suggestions into language that reassures or guides patients. As one GP put it, "The guidelines don't help me when I am sitting in front of someone who is anxious." This illustrates a tangible gap between conceptual debates and the frontline realities of primary care.

These ambitions are supported by international benchmarks. According to the EU Regional Innovation Scoreboard (2025; https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en), the Basque Country is categorized as a "Strong Innovator," with above-EU-average indicators in human capital, sustainability, and firm-level investment. The OECD's regional well-being indicators highlight high performance in income equality, health outcomes, education access, and employment security. Furthermore, the European Committee of the Regions has recognized the Basque Country as a reference case in participatory governance and inclusive policy-making. Its Smart Specialisation Strategy (RIS3) demonstrates how technological development can be interwoven with social objectives. However, these strengths do not automatically translate into digital sustainability. Despite its leadership in innovation and cohesion, the Basque Country still faces unresolved challenges in digital inequality, particularly among elderly citizens, rural communities, and vulnerable social groups (Allen et al., 2024; Badawy, 2025; Bigo et al., 2019;

1st Proof Pdf

Breznitz, 2007; Buolamwini, 2024; Calzada, 2024). Generative AI risks amplifying these divides unless governed through territorially grounded, ethically robust, and democratically co-produced frameworks (Calzada et al., 2021; Cardullo et al., 2019; Clark, 2025; Helberger & Diakopoulos, 2023; Sieker et al., 2025).

This Chapter's Proposed Solution or Approach: The key insight here is that social cohesion cannot be presumed to seamlessly evolve into digital inclusion. Instead, it must be strategically cultivated through anticipatory governance approaches that align emerging technologies with societal needs, values, and rights. The Basque Country's policy ecosystem is well-positioned to pioneer such approaches, not by replicating abstract models of AI governance, but by innovating from within—through participatory processes that foreground trust, transparency, and human dignity (Calzada, 2020; Beel et al., 2026; Visvizi et al., 2025).

HAIG frameworks respond to this imperative (Engin, 2025). Rather than viewing AI governance as a top-down, regulatory fix, HAIG emphasizes hybrid, adaptive, and multi-scalar interactions between human actors and algorithmic systems (Engin & Treleaven, 2019; Calzada, Németh, & Al-Radhi, 2025). In the case of healthcare, this means developing governance mechanisms that are anticipatory, participatory, and reflective of ethical, clinical, and institutional concerns. The recent publication by Calzada, Németh, & Al-Radhi (2025) based on the Horizon Europe-funded project ENFIELD provides clear indication to operationalize and evaluate trustworthy AI through seven techniques.

In the context of this chapter, HAIG is defined as a socio-technical framework for governing GenAI that emphasizes the dynamic co-evolution of human agency, institutional accountability, and algorithmic capacity. HAIG is not merely a regulatory or technical arrangement; it is a form of anticipatory, participatory, and territorially grounded innovation governance that actively aligns AI development and deployment with democratic values, public sector missions, and situated knowledge. Rooted in the traditions of innovation systems and institutional economics (Nelson, 1993; Lundvall et al., 2009; Mazzucato, 2013), HAIG prioritizes inclusive co-production, ethical deliberation, and distributed decision-making among public servants, technologists, clinicians, patients, and communities. It assumes that trust in GenAI must be earned and sustained through transparent, contextual, and pluralistic processes of knowledge negotiation and value alignment (Engin, 2025; Engin & Treleaven, 2019; Calzada, Németh, & Al-Radhi, 2025). Thus, HAIG serves as a normative and operational guide for embedding GenAI into the fabric of public institutions—particularly healthcare systems—without compromising social justice, digital rights, or democratic legitimacy (Calzada & Cobo, 2015; Calzada & Cowie, 2017; Calzada & Almirall, 2020; Guggenberger et al., 2025).

Structure of the Chapter: Following this introduction, the chapter is structured into five additional sections: Section 2 outlines the framework of anticipatory governance within the Basque public healthcare system; Section 3 details

1st Proof Pdf

the qualitative fieldwork and living-lab-based action research design; Section 4 presents the fieldwork process and findings from co-producing a living lab with patients and GPs; Section 5 discusses preliminary policy recommendations and limitations; and Section 6 concludes with future directions for advancing human-centric AI that harmonizes human agency and technological capacity through HAIG.

Objectives/Research Questions

This chapter addresses the following objectives and guiding questions, with a focus on advancing human-centric AI in public healthcare:

1. To explore how GenAI can be integrated into healthcare governance in ways that augment, rather than replace, clinical judgment, and strengthen the relational dimensions of care.
2. To investigate how participatory, place-based governance models (HAIG) can establish and maintain trust between patients, practitioners, and institutions in GenAI-mediated healthcare.
3. To propose a replicable living-lab-based methodology for other regions aiming to harmonize AI technologies with human values in public service delivery.

Key Contributions of this Chapter:

1. Proposes a *HAIG* **framework** for integrating GenAI in public healthcare systems that is participatory, anticipatory, and territorially grounded.
2. Demonstrates how *living lab assemblages* can operationalize inclusive governance by embedding co-design, foresight, and ethical deliberation into AI adoption processes (Scholl et al., 2017).
3. Addresses the *human-centric AI challenge* by showing how GenAI can augment clinical judgment, enhance explainability, and strengthen trust between patients, practitioners, and institutions.
4. Provides *empirical insights from the Basque Country*, illustrating how territorial innovation systems can align AI governance with democratic values and collective well-being.
5. Outlines a *replicable methodology* for other regions aiming to integrate GenAI into public service delivery without exacerbating digital inequalities or undermining institutional legitimacy (Calzada, 2020).

To improve clarity for interdisciplinary readers, this chapter provides a concise explanation of two key concepts used throughout the analysis: HAIG and anticipatory governance. HAIG refers to a socio-technical governance framework that conceptualizes the interaction between human agency, institutional accountability, and algorithmic systems. It emerged from work by Engin and Treleaven (2019) and has since been developed as a practical approach to aligning GenAI deployment with democratic values, participatory oversight, and context-sensitive decision-making. Anticipatory governance, drawing from Jasanoff (2016)

1st Proof Pdf

and subsequent work in innovation studies, describes the institutional capacity to shape emerging technologies *before* widespread implementation through foresight, participatory deliberation, and reflexive learning. Both concepts are operationalized in this chapter through the living lab methodology, which provides a situated setting where GPs, patients, and researchers can jointly explore the institutional, ethical, and practical implications of GenAI in primary care.

To avoid abstraction, this chapter situates these debates within concrete primary-care settings in the Basque Country, where clinicians and patients encounter practical challenges related to explainability, data governance, and clinical autonomy. These real-world tensions provide the empirical focus around which the HAIG framework is developed.

During the living lab, GPs emphasized that anticipatory governance should involve testing GenAI systems with real (anonymized) cases before any deployment. They proposed simulation sessions where clinicians could compare GenAI recommendations with their own clinical reasoning, flag discrepancies, and document where additional explainability or safeguards would be needed.

2. Anticipatory Governance in the Basque Healthcare Public System

Anticipatory governance (Calzada & Eizaguirre, 2025d), as used here, refers to institutional practices that proactively engage clinicians, patients, and policymakers in shaping GenAI systems before their full deployment, ensuring ethical alignment and social legitimacy.

From the perspective of innovation systems and institutions, GenAI governance involves configuring novel pathways that span public R&D, regulatory infrastructures, digital public services, and civic engagement (Lundvall et al., 2009; Mazzucato, 2022). Territorial innovation systems theory is particularly helpful here. It highlights how regions develop unique constellations of actors, institutions, and norms that shape innovation trajectories (Breznitz & Zysman, 2013). In the Basque Country, this includes the alignment of public healthcare entities, AI research centers, policy bodies, and citizen organizations.

This chapter also contextualizes the Basque case internationally, drawing on comparative reflections from Norway and India—two countries deeply engaged in ethical and institutional debates around AI. In Norway, the welfare state's digital strategies have prioritized consent, explainability, and human-in-the-loop configurations in AI deployment. Meanwhile, India's Digital Public Infrastructure (DPI) model and open-source AI stack initiatives illustrate a high-scale, yet participatory model for institutional innovation. Both cases shed light on alternative pathways for aligning technological development with public values, reinforcing the claim that trust in GenAI must be territorially grounded and politically constructed (Calzada, 2026a).

These examples are included not as abstract references, but because they illustrate practical design choices—such as explainability requirements or

1st Proof Pdf

participatory data infrastructures—that informed how stakeholders in the Basque Country articulated their expectations for trustworthy GenAI.

The reference to India's DPI particularly resonated with Basque GPs, who asked whether a modular, open-source AI stack could allow Osakidetza to adapt GenAI tools locally without depending on proprietary systems. This grounded the international comparison in concrete institutional aspirations.

Trust, therefore, is not an outcome of better engineering but of deliberate institutional design. As Nelson and Winter (2006) argued in their evolutionary theory of economic change, the interaction between technology and institutions is recursive and path-dependent. Embedding GenAI in healthcare systems requires sustained investment in institutional reflexivity, cross-sector collaboration, and iterative learning processes—a point emphasized in recent discussions around anticipatory governance (Jasanoff, 2016; Ulnicane et al., 2022). One promising pathway to operationalize such anticipatory governance is through the development of *data cooperatives*—institutional arrangements where individuals collectively manage, share, and govern their personal data (Bühler et al., 2023; Calzada, 2018, 2021b; Monsees, 2019; Morozov, 2022; Nabben, 2022; Nabben et al., 2021; Nicole et al., 2025). This model resonates particularly well in the Basque Country, which has a deeply rooted cooperative tradition across sectors. Salus. Coop, a pioneering health data cooperative based in Barcelona but conceptually aligned with the Basque ethos, exemplifies how collective data stewardship can foster trust, agency, and ethical data use in healthcare contexts. By embedding GenAI within such democratic data infrastructures, regions like the Basque Country can move beyond extractive data paradigms toward inclusive, citizen-empowered digital health systems (Zuboff, 2019).

The Basque Country's institutional context—underpinned by a state with strong welfare roots, civic infrastructures, and participatory traditions—positions it as a "premium territory" for technologically driven but socially aware innovation (Porter, 1985, Schumpeter, 1943). As highlighted by Beel et al. (2026), the region now faces crossroads brought by intersecting global crises—from demographic shifts and climate stressors to digital disruption. This evolving context demands anticipatory governance not just as theory, but as necessary practice.

Anticipatory governance in this chapter refers to the capacity of institutions to collaboratively shape emerging technologies before their full-scale rollout—actively co-steering futures in a way that balances innovation with democratic values, public welfare, and institutional legitimacy (Jasanoff, 2016; Ulnicane 2022). From the lens of territorial innovation systems, anticipatory governance emerges as an iterative, inclusive, and localized practice. It aligns GenAI deployments with the region's unique social fabric, institutional networks, and civic expectations—in essence, translating abstract governance mandates into place-sensitive action (Beel et al., 2026; Lundvall, 2009; Yigitcanlar et al., 2025).

Two institutions exemplify this alignment:

1st Proof Pdf

- *Osakidetza*, the Basque health service, is deeply embedded in the public sector and trusted by citizens for its universal and territorially equitable primary and specialized care models.
- *BioGipuzkoa*, a biomedical research institute, functions as a translational and innovation hub—bringing scientific research into clinical and policy contexts.

By collaborating, *Osakidetza* and *BioGipuzkoa* create a governance ecosystem where GenAI can be developed and tested in ethically aware, socially grounded, and clinically relevant ways.

A recurring theme in the workshops was the gap between research outputs and clinical workflows. For example, although BioGipuzkoa increasingly uses GenAI to analyze genomic data, GPs noted that they often receive AI-assisted interpretations without clear insight into how the system reached its conclusions. This reflects a broader governance challenge: ensuring that translational research innovations remain clinically interpretable.

This institutional and territorial readiness sets the stage for deploying HAIG frameworks through experiential approaches like living labs—which will be unpacked in Section 3. In these spaces, trust, agency, and mutual accountability among AI developers, clinicians, patients, and policymakers can be cultivated together.

In one scenario exercise, GPs evaluated a GenAI-generated treatment pathway that recommended diagnostic procedures unavailable in their primary care center. They pointed out that such mismatches would undermine trust and place clinicians in difficult positions with patients—illustrating the importance of aligning AI recommendations with actual institutional capacities.

In the Basque Country, this anticipatory logic is embedded in a long-standing tradition of cooperative governance, participatory regional planning, and inclusive policy-making (González & Healey, 2005; Morgan et al., 2020). These structural features enable the region to act as a "premium territory" for socially cohesive innovation—recognized by European and international institutions for its above-average performance in human capital, institutional capacity, and territorial equity (Moulaert et al., 2005).

Participants linked the idea of health data cooperatives to the Basque Country's long-standing cooperative tradition, noting that collective decision-making about data sharing would feel culturally intuitive. They argued that a cooperative model for health data governance could reinforce legitimacy and strengthen public trust in GenAI-enabled services.

Yet, as Beel et al. (2026) argue, this model now stands at a crossroads. While historically effective, the Basque model faces new challenges posed by the global polycrisis: demographic shifts, digital divides, green transitions, and geopolitical instability. Within this landscape, anticipatory governance becomes a strategic imperative—not only to maintain the region's resilience, but to reconceptualize its development trajectory in the face of post-growth constraints and algorithmic disruption (Calzada, 2025c; Castells, 1996).

1st Proof Pdf

The deployment of GenAI in public healthcare represents a paradigmatic test case. Trustworthy GenAI cannot be guaranteed through technical fixes alone; it must be anchored in place-sensitive governance systems capable of reconciling innovation with inclusion (Gray et al., 2018). Through participatory foresight exercises, co-design workshops, and multi-actor experimentation, the Basque case illustrates how anticipatory governance can function as both a conceptual lens and a practical framework for aligning advanced technologies with democratic legitimacy, clinical relevance, and social justice.

Ultimately, this chapter argues that trustworthy GenAI in healthcare demands a rethinking of innovation governance. Rather than imposing generic principles, it requires localized, participatory, and iterative experimentation. The Basque experience, initiated through the summer school, demonstrates that living lab assemblages and HAIG frameworks can serve as both empirical settings and normative propositions for advancing responsible AI transitions.

The next sections elaborate the empirical findings from the living lab (Sections 3 and 4), and policy recommendations for embedding GenAI in healthcare systems in a way that prioritizes human dignity, institutional legitimacy, and collective well-being (Sections 5 and 6).

In order to translate these governance principles into concrete institutional practice, the living lab provided a structured environment where GPs and patients could express concerns, test assumptions, and articulate practical conditions for trustworthy GenAI adoption.

3. Research Design: A Qualitative Fieldwork Action Research through Living Lab Assemblages for Trustworthy GenAI in Primary Care

To date, the integration of GenAI within *Osakidetza* and *BioGipuzkoa* remains at a nascent stage, with initiatives largely confined to exploratory pilots in clinical diagnostics, imaging analysis, and biomedical research workflows. While *BioGipuzkoa* has begun experimenting with algorithmic tools to accelerate genomic sequencing, drug discovery, and predictive modelling for precision medicine, these efforts have been primarily siloed within biomedical and technical domains, with limited engagement from social scientists, policy experts, or patient advocacy groups. *Osakidetza*, for its part, has initiated cautious trials of AI-based triage systems and decision-support tools, yet these deployments have so far been restricted to controlled environments and lack comprehensive governance frameworks for ethical oversight, explainability, and participatory evaluation. The absence of a cross-disciplinary, territorially grounded strategy means that GenAI adoption is occurring without fully leveraging the potential for co-production with healthcare professionals, patients, and policymakers—leaving a critical gap that living lab methodologies are well-positioned to address (Calzada, 2019; Scholl et al., 2017).

1st Proof Pdf

Consequently, among those attending the summer school were two students who, beyond their academic participation, were also GPs at an *Osakidetza* healthcare center located in the old town of Donostia-San Sebastián. Deeply engaged with the content of the keynote and the broader discussions around HAIG, these professionals recognized the potential of GenAI (i.e., ChatGPT and DeepSeek) to transform their daily clinical routines—particularly in diagnostic support, X-ray, administrative workflows, and patient communication. Motivated by the possibilities presented during the sessions and aware of the contextual challenges in their practice, they approached the author of this chapter to explore the feasibility of deploying a living lab intervention in their own workplace (Calzada, 2019; Scholl et al., 2017). Their initiative, led and supervised by the author of this chapter, catalyzed the design of a participatory action research process, grounded in the real conditions of primary care, and served as a tangible starting point for a wider reflection on how GenAI could be integrated into the Basque public healthcare system through anticipatory, place-sensitive innovation pathways.

This initial configuration grounded the living lab as a dynamic space for socio-technical inquiry and co-production (Calzada, 2019; Scholl et al., 2017). Rather than being a one-off workshop, the living lab format was embraced as an ongoing, iterative, and situated mode of action research. It enabled these two students/postdocs (GPs in the institution) engaging with participants to collaboratively explore how GenAI might be integrated into existing health infrastructures in ways that respect human dignity, clinical agency, and democratic accountability. Although they recognized the lack of institutional settings and the importance of engaging with further organizational architecture beyond their marginal practice in the corner of the healthcare. The author of this chapter enhanced their vision by providing the innovation systems and institutions framework that is the object of this present chapter.

To enhance methodological transparency, this study followed a structured process for recruitment, facilitation, and analysis. GPs were recruited through direct collaboration with Osakidetza, and patients were selected using purposive sampling to capture variation in age, digital literacy, and primary care needs. Each workshop followed a predefined script that included a short framing presentation, scenario-based prompts, guided small-group discussions, and collective synthesis. Data were gathered through audio recordings, facilitator notes, and visual materials generated by participants. These materials were analyzed inductively and comparatively across GP and patient groups to identify convergent and divergent themes, which are summarized in Tables 1 and 2. The living lab thus functioned as an iterative action research cycle, aligning participatory engagement with the HAIG framework. Table 3 presents the integrative synthesis that informed the policy implications discussed in Section 5.

Framed by this orientation and equipped with a qualitative action research instrumentarium grounded in participatory co-production, dialogic engagement, and reflexivity (Bradbury, 2015), both students/postdocs from the summer school

1st Proof Pdf

started internal arrangements into a focused intervention team. This team was scientifically led, guided, and supervised by the author of this chapter, who also served as the Director of the Summer School and principal investigator (PI) of an ongoing collaborative intervention between *Osakidetza* and *BioGipuzkoa*, a regional biomedical research institute. Following ethical protocols and institutional permissions, the PI designed the research process and provided clear instructions to the team of students aimed at bringing together, on one hand, GPs working in public primary care, and, on the other, patients who regularly engage with such services (see Figure 1). Before the facilitation of each workshop, by 1st July 2025, the PI (and author of this chapter) provided the team of two postdocs from the summer school, with a clear script and questionnaire addressing key factors that could anticipatorily guide each of the workshops.



Figure 1. GPs workshop (3rd August 2025) and patients' workshop (14th August 2025). Photographs by the student/postdocs at the Summer School UIK on Digital Inclusion & GenAI (https://www.uik.eus/en/activity/digital-inclusion-generative-artificial-intelligence-gipuzkoa-socially-cohesive-digitally).

A living lab was subsequently designed and facilitated by two students (GPs at the healthcare center) of the summer school in close coordination with *Osakidetza* and *BioGipuzkoa* encompassing two workshops. These took place in August at a healthcare center of Osakidetza located in the old town of Donostia-San Sebastián. The workshops were organized in two phases: the first session engaged GPs in a structured dialogue on the institutional, ethical, and clinical implications of GenAI; the second session brought together a diverse group of patients to reflect on their expectations, concerns, and understandings of AI in

1st Proof Pdf

healthcare settings. Each session followed a participatory design format that included introductory framing by facilitators, breakout discussions, mapping of concerns and opportunities, and collective synthesis through visual facilitation and reflection rounds. The use of creative prompts and scenario-based thinking encouraged both groups to articulate how they envisioned the integration of GenAI into everyday healthcare interactions.

Rooted in action research traditions (Bradbury, 2015), the living lab facilitated co-design between GPs, patients, researchers, and technologists. Participants mapped out critical junctures of GenAI adoption in primary care: how diagnosis might shift, how professional authority might be challenged, and how new forms of accountability could be institutionalized. These deliberations echoed broader concerns around algorithmic sovereignty and democratic resilience (Badawy, 2025; Calzada, 2025c).

To enhance methodological transparency and strengthen the reproducibility of this qualitative action research design, this section concludes by detailing the procedures used for participant recruitment, data collection, and analytical integration. GPs were recruited through direct institutional collaboration with Osakidetza, while patients were selected via purposive sampling to ensure diversity across age, socioeconomic background, and frequency of primary care usage. Each workshop followed a predefined script and semi-structured questionnaire developed by the PI, ensuring consistency across sessions. Data were collected through audio-recorded discussions, facilitator notes, visual artifacts produced during co-design exercises, and post-workshop reflections. All materials were coded inductively and comparatively across GP and patient groups, enabling factor analysis reflected in Tables 1 and 2. The living lab thus operated as an iterative analytical cycle in which insights from one group informed subsequent interpretation of the other, culminating in the synthesis presented in Table 3. By explicitly structuring the process in this way, the methodology provides a clear, replicable blueprint for other regions or health systems seeking to implement HAIG-aligned living ab interventions for trustworthy GenAI integration in primary care.

GPs were recruited directly through *Osakidetza* based on their participation in the UIK Summer School and their interest in experimenting with GenAI in primary care. Patients were selected through purposive sampling at the same healthcare center to ensure variation in age, chronic condition status, digital literacy, and frequency of interaction with primary care services. The final sample included GPs aged 30–45 working in urban primary care, and patients aged 28–79 representing diverse socioeconomic backgrounds and differing levels of digital engagement.

The living lab combined co-design workshops. These methods were integrated through a sequential and iterative structure: (1) scripts and prompts were provided to the GP workshop to identify institutional, clinical, and ethical concerns; (2) these insights informed the design of the patient workshop to explore expectations and perceived risks; and (3) fieldnotes, audio recordings, and visual artifacts generated in both workshops were analyzed inductively and comparatively. This

1st Proof Pdf

mixed corpus allowed triangulation across professional and lay perspectives and produced the five-factor framework presented in Section 4 and synthesized in Table 3.

4. Fieldwork and Findings: Co-Producing a Living Lab with Patients and GPs

The intervention was designed to be iterative, participatory, and grounded in real-world clinical dynamics across different primary care contexts in the Basque Country. Rather than testing GenAI in abstract or laboratory-like settings, the project emphasized situated knowledge, relational agency, and multi-actor governance. Assemblage theory, particularly as developed by Kitchin et al. (2025), proved instrumental in understanding the complexity of these socio-technical encounters. The concept of "data assemblages" foregrounds how data systems, infrastructures, policies, and social actors co-produce realities—in this case, GenAI-enabled healthcare practices.

From this perspective, the living lab became a dynamic space where data assemblages were enacted, challenged, and reconfigured (Calzada, 2019). GenAI was not treated as a fixed tool but as a mutable component within a wider ecosystem of institutional norms, clinical workflows, ethical commitments, and patient experiences. This framing allowed for granular insights into how AI technologies become embedded, resisted, or reimagined in daily healthcare routines.

The PI was guiding students/postdocs iteratively through the institution. Both students at the summer school facilitated the process while asking how to proceed internally. These methods facilitated rich dialogue between stakeholders with differing forms of expertise: medical, technical, ethical, and experiential. The GPs brought frontline insights into patient care, diagnostic decision-making, and time pressures (Table 1). Patients contributed lived experiences, concerns about privacy, and expectations around digital health (Table 2). Researchers and technologists acted as translators across these domains, helping to surface tensions and co-develop guidelines for responsible GenAI use.

As findings (bringing together Table 1 and Table 2), key factors emerged from these action research engagements before, during, and after the fieldwork sessions. These findings are further related to timely literature on these topics as follows:

1. **Epistemic Uncertainty and Clinical Judgment:** GPs highlighted that while GenAI might offer efficiency gains or novel correlations, it cannot replace clinical judgment rooted in embodied knowledge and relational care (Clark, 2025). They stressed the need for GenAI to function as an augmentative—not substitutive—tool (David et al., 2025).

   GPs' concerns about epistemic uncertainty in GenAI stem from its reliance on probabilistic models that may not fully capture the nuanced, context-rich nature of medical decision-making. David et al. (2025) emphasize that while

1st Proof Pdf

Table 1. Factor analysis of GPs' workshop on GenAI in primary care

Factor	Key Findings	Supporting Quotes/Examples	Implications for HAIG
1. Epistemic Uncertainty and Clinical Judgment	GPs acknowledged that GenAI might enhance data interpretation, diagnostics, and patient management. However, they underscored its inability to replace tacit, contextual, and embodied clinical knowledge. Concerns were raised about deskilling, loss of professional agency, and AI undermining doctor–patient trust.	*"A machine cannot replace the accumulated experience of a doctor." "AI can help, but it should not decide for us."*	GenAI must be framed as an **augmentative support**, not a replacement. Need for a design that centers clinical autonomy and preserves relational care.
2. Trust and Explainability	The explainability of AI was a major concern and confusion. GPs expressed difficulty in validating GenAI decisions, especially under time pressure. Black-box models were viewed as barriers to both professional and patient trust.	*"I cannot defend a decision made by AI if I don't understand how it was reached."*	Embedding explainable AI (XAI) is essential. Regulatory frameworks must mandate transparency and provide accessible interpretability tools for clinicians.
3. Accountability and Error	Ambiguities around responsibility for GenAI-led decisions raised legal and ethical concerns. GPs were unclear about institutional liability, fearing blame in case of misdiagnosis or technical failure.	*"Who is responsible if the algorithm's diagnosis is wrong?" "We need a clear responsibility framework."*	HAIG must institutionalize **shared accountability models**, delineating roles of developers, providers, and institutions. Legal protections for professionals needed.
4. Data Ownership and Consent	GPs voiced concerns about patient data being used without clear consent or transparency. They stressed the ethical duty to inform patients about data use and AI involvement in care.	*"Patients must know how their data are used and give explicit consent."*	HAIG must integrate **data stewardship principles**, adopting models like **data cooperatives** (e.g., Salus.Coop). Consent practices need to be participatory and intelligible.
5. Digital Divides and Access	GPs identified generational and socioeconomic gaps affecting patient comprehension and engagement with digital tools. They feared exclusion of vulnerable populations.	*"Our older patients don't use smartphones—how are they supposed to interact with AI?"*	GenAI systems must be **designed for inclusivity**, tailored to primary care contexts and diverse user capabilities. Digital literacy initiatives are critical.

Table 2. Factor analysis of patients' workshop on GenAI in healthcare service delivery

Factor	Key Findings	Supporting Quotes/Examples	Implications for HAIG
1. Epistemic Uncertainty and Clinical Judgment	Patients trust their GP's judgment and emphasized human empathy, especially during illness. They feared GenAI would depersonalize care or lead to "robotic" interactions.	*"I trust my doctor, not a machine." "I'd rather have the doctor listen to me than a computer."*	HAIG must ensure GenAI preserves **relational aspects** of care. GPs should mediate AI input, not act as passive conduits of algorithmic decisions.
2. Trust and Explainability	Patients demanded clarity about when AI is used and how decisions are made. The opacity of algorithms generated suspicion. Many rejected AI-generated diagnoses without clear justification.	*"If I don't know how it reached that conclusion, I won't accept it." "Who controls the machine?"*	Transparent communication strategies must be part of HAIG. Patients must be explicitly informed when AI is involved and why its output is relevant.
3. Accountability and Error	Patients feared a "blame game" if GenAI fails. They expect human responsibility, not deflection to the system or vendor. Legal clarity and ethical responsibility were major demands.	*"If something goes wrong, I want to know who is responsible."*	Institutional HAIG must adopt **clear patient redress mechanisms** and ensure visible ethical oversight. Legal safeguards must accompany technological integration.
4. Data Ownership and Consent	Patients expressed distrust regarding how their health data is stored, shared, or monetized. There was a strong interest in collective data governance models and cooperative approaches.	*"My data belongs to me. I want to decide how it's used." "Why isn't there something like a data cooperative?"*	Public institutions must promote **data sovereignty** through **citizen-led data infrastructures** (e.g., Salus.Coop). Consent must be ongoing and dialogical, not one-off.
5. Digital Divides and Access	Participants emphasized inequalities in access to digital tools, with older, rural, and socioeconomically disadvantaged individuals at risk of being left behind.	*"My mother doesn't have internet. What happens to her if everything goes digital?"*	HAIG must actively work to **mitigate algorithmic exclusion**. GenAI deployment must consider universal design principles and include analog fallback mechanisms.

1st Proof Pdf

1st Proof Pdf

Table 3. Concluding table: Summary of the findings and six policy recommendations

Merged Factor (from GP and Patient Workshops)	Key Shared Insight	Policy Recommendation	Intended HAIG Outcome
1. Epistemic Uncertainty and Clinical Judgment	GenAI should augment—not replace—human expertise; preserve embodied, relational care.	**Recommendation 2:** Embed augmentative design principles in procurement to protect clinical autonomy.	Maintain GP agency; avoid deskilling; reinforce trust in human-led care.
2. Trust and Explainability	Explainability is central for both clinicians and patients; must be audience-specific.	**Recommendation 3:** Operationalize a dual-layer explainability standard (clinical + public).	Transparency at both professional and public levels; strengthen legitimacy and informed consent.
3. Accountability and Error	Clear, predefined liability and error-resolution frameworks are essential.	**Recommendation 4:** Establish a shared accountability charter across clinicians, institutions, and vendors.	Shared responsibility; reduce blame-shifting; increase adoption confidence.
4. Data Ownership and Consent	Desire for participatory, cooperative models of data governance.	**Recommendation 5:** Implement participatory health data cooperatives integrated into *Osakidetza* systems.	Democratic stewardship of health data; improved consent practices; stronger trust.
5. Digital Divides and Access	Risk of exclusion for elderly, rural, and socio-economically vulnerable groups.	**Recommendation 6:** Design for inclusion with universal standards and analog alternatives.	Equitable access; reduce algorithmic exclusion; uphold public service obligations.
(Cross-cutting) Participatory Co-Governance	Both groups value spaces for ongoing dialogue and testing.	**Recommendation 1:** Institutionalize the living lab as a permanent HAIG node in *Osakidetza*.	Continuous democratic oversight; adaptable governance; embedded public trust.

1st Proof Pdf

AQ: Please provide an in-text citation for Table 4, maintaining the numerical order in table citations.

Table 4. Overview of methods and application in the living lab

Method	How It was Applied	Purpose	Key Learnings for Replication
Co-design workshop (GPs)	Conducted in the *Osakidetza* primary care center; used structured prompts and scenario-based discussions	Identify clinical, ethical, and organizational concerns related to GenAI	Start with frontline clinicians; ensure institutional permission; use concrete case-based prompts
Focus group (patients)	Diverse patients recruited via purposive sampling; explored expectations, fears, and digital literacy barriers	Understand lived experiences and trust conditions	Capture diversity (age, digital skills); frame GenAI in language accessible to non-experts
Ethnographic observation	Observational notes from interactions within the living lab	Capture implicit norms, relational dynamics, and workflow realities	Helps reveal tacit practices; essential for contextualizing technical proposals
Participatory synthesis	Visual mapping and researcher triangulation across groups	Integrate professional and lay perspectives into HAIG factors	Enables identification of shared constraints and divergences across stakeholders

GenAI systems can process vast datasets to identify correlations or generate differential diagnoses at unprecedented speed, their outputs are contingent on training data quality, representativeness, and embedded biases. This introduces a layer of uncertainty that clinicians must navigate, particularly when recommendations conflict with experiential or relational knowledge gained through years of practice. In the context of primary care, where patient histories, subtle symptoms, and socio-environmental factors are integral to diagnosis and treatment, GPs argue that GenAI should act as a decision-support mechanism—augmenting human expertise rather than substituting it. David et al. further highlight that overreliance on automated outputs risks eroding the embodied, empathetic, and trust-based relationships at the heart of effective care, reinforcing the importance of positioning GenAI as an assistive tool embedded within broader frameworks of clinical judgment and ethical responsibi

1st Proof Pdf

2. **Trust and Explainability:** Patients consistently emphasized the importance of understanding how AI-generated outputs are derived. Explainability was not merely a technical issue but central to maintaining trust in clinical interactions (Ada Lovelace Institute, 2024).
   The Ada Lovelace Institute emphasizes that explainability in AI, particularly in healthcare contexts, is not solely a matter of technical transparency but a fundamental precondition for trust. Their analysis highlights that patients need clear, contextually relevant explanations about how AI systems generate outputs, including the data sources, reasoning processes, and limitations involved. This is especially critical in clinical settings, where opaque AI decisions can undermine patient confidence, hinder informed consent, and strain the clinician–patient relationship. The institute also stresses that explainability should be tailored to different audiences—clinicians may require detailed technical insights, while patients may benefit from plain-language narratives and visual aids. Ultimately, they argue that embedding explainability into AI systems is as much about governance and accountability as it is about model architecture, aligning directly with the HAIG model's emphasis on sustaining trust through transparency and dialogue.
3. **Accountability and Error:** Both workshops raised concerns about responsibility in cases of error. Would liability rest with the GP, the AI developer, or the institution? This pointed to the need for robust accountability frameworks within HAIG models (Hu & Singh, 2024).
   Data & Society's report highlights that unclear allocation of responsibility—whether to clinicians, AI developers, or the healthcare institution—can undermine trust, discourage adoption, and increase legal exposure. It calls for explicit accountability frameworks embedded in governance models like HAIG, including predefined error-resolution protocols, transparent documentation of AI decision pathways, and shared liability agreements. This aligns with the workshop concerns, as both sources stress that accountability in GenAI for healthcare must be proactively defined and operationalized, rather than left ambiguous.
4. **Data Ownership and Consent:** Discussions repeatedly returned to data governance. Participants voiced a desire for greater control over their health data and supported models such as data cooperatives that foreground democratic stewardship (Lauer et al., 2024).
   The *Data Cooperatives in Health and Social Care* report (Calzada, 2021b; Lauer et al., 2024; Nicole et al., 2025) expands the insight by framing data ownership and consent not simply as legal or technical compliance issues, but as questions of power, agency, and democratic governance. It argues that conventional health data management models—typically centralized and institution-controlled—leave patients with minimal influence over how their information is used. Data cooperatives (such as Salus.Coop), by contrast, enable collective decision-making structures where members can determine

1st Proof Pdf

access rights, usage purposes, and benefit-sharing mechanisms. This shifts the paradigm from extractive to participatory data governance, embedding consent into ongoing governance rather than one-off transactions. The report also stresses that democratic stewardship can enhance trust, incentivize data sharing, and better align health innovations—such as those using GenAI—with community needs and values.

5. **Digital Divides and Access:** There was broad recognition that not all patients benefit equally from digital innovations. Participants called for GenAI systems to be tailored to the needs of elderly, rural, and socioeconomically vulnerable populations (Kohli et al., 2024).
Kohli et al. (2024) argue that despite the rapid expansion of AI and digital health innovations, structural inequities—such as age-related barriers, geographic isolation, and socioeconomic disadvantage—significantly limit equitable access and benefit distribution. They note that elderly patients may struggle with digital literacy, rural populations often face inadequate broadband infrastructure, and economically vulnerable groups are less likely to have the devices or resources necessary to engage with digital healthcare platforms. In the context of GenAI, these disparities risk becoming more entrenched if systems are designed without explicit attention to inclusivity. The authors advocate for human-centered design principles, culturally and linguistically tailored interfaces, and targeted outreach programs, as well as policy measures that subsidize access to digital tools and ensure offline alternatives. For HAIG frameworks, this translates into embedding equity as a core design and governance criterion, ensuring that GenAI integration does not inadvertently widen health gaps but actively works to close them through participatory co-design with underserved communities.

AQ: This reference is not present in the reference list. Please check its citation here for correctness.

5. Discussion: Policy Recommendations and Limitations

Through the lens of assemblage theory, these themes can be interpreted not as discrete problems but as emergent properties of complex socio-technical systems. Governance, in this view, is not a top-down imposition but an ongoing negotiation of values, capabilities, and institutional capacities.

The five key factors identified in the living lab—*epistemic uncertainty, trust and explainability, accountability and error, data ownership and consent*, and *digital divides and access*—are not isolated issues but interdependent dimensions of HAIG in healthcare.

First, *epistemic uncertainty and clinical judgment* reflect broader concerns about GenAI's inability to replicate embodied knowledge, situational awareness, and the ethical nuance of human clinicians, echoing long-standing arguments in science and technology studies (STS) about the limits of algorithmic rationality (Jasanoff, 2016; Eubanks, 2017). GPs in the workshop viewed GenAI as an

1st Proof Pdf

augmentative tool rather than a substitute—aligning with HAIG's principle of *human-in-the-loop governance* (Engin & Treleaven, 2019; National Academy of Medicine (NAM), 2023).

Second, *trust and explainability* emerged as a precondition for meaningful clinical interaction. Both GPs and patients underscored that black-box systems undermine transparency, legitimacy, and relational care—findings that corroborate recent frameworks on explainable AI (XAI) in healthcare (Leslie et al., 2024; Coalition for Health AI, 2025).

Third, *accountability and error* raised legal and institutional dilemmas: if GenAI makes a mistake, who bears responsibility? This reflects a growing concern in GenAI governance literature about the fragmentation of liability across developers, institutions, and clinicians (Ruppert et al., 2017; Schmidt et al., 2024), underscoring the need for *multi-actor accountability architectures* within HAIG.

Fourth, *data ownership and consent* illuminated the ethical tensions in health data governance. Participants called for participatory models such as *data cooperatives* (Calzada, 2018, 2021b; Nabben et al., 2021; Nicole et al., 2025), which offer a counter-model to extractive and opaque data regimes.

Finally, *digital divides and access* underscored the socio-material barriers facing elderly, rural, and economically vulnerable groups—demonstrating that digital inclusion is not merely a technical fix, but a structural challenge embedded in wider socio-economic conditions (Couldry & Mejias, 2024; Gangadharan, 2020; Buolamwini, 2024).

These five themes illustrate how trustworthy GenAI cannot be guaranteed by technical safeguards alone but must be *co-produced through territorial, institutional, and democratic processes*, particularly in the context of healthcare systems tasked with protecting both human dignity and public health (Beel et al., 2026; Calzada, 2025c; Ulnicane et al., 2022).

The living lab process also revealed how anticipatory governance operates in practice. Rather than waiting for GenAI systems to be fully deployed and then retrofitting ethical safeguards, the project created a space for pre-figurative engagement—where potential futures could be imagined, contested, and recalibrated.

This proactive stance reflects a broader shift in innovation governance: from risk mitigation to capability-building. It aligns with recent calls in the anticipatory governance literature to empower public, democratize foresight, and institutionalize reflexivity (Jasanoff, 2016; Ulnicane et al., 2022). In the Basque context, this translates into using existing strengths—such as cooperative traditions, civic infrastructures, and public trust in healthcare institutions—to pioneer inclusive GenAI strategies.

Importantly, the project was not just about technological testing but about institutional learning. Participating organizations—including *Osakidetza* and *BioGipuzkoa*—used the insights to reflect on procurement policies, staff training, and patient communication strategies. This speaks to the recursive nature of HAIG: governance is both input and output of AI deployment.

1st Proof Pdf

In sum, the living lab assemblage in the Basque Country functioned as an experimental governance infrastructure—a microcosm where macrolevel challenges around trustworthy GenAI could be explored in context. By blending qualitative action research with assemblage thinking, the project offers a replicable model for other regions seeking to align digital health innovation with democratic values, institutional legitimacy, and collective care (Calzada, 2020).

The living lab intervention described in this chapter brought into sharp focus the multilayered governance, ethical, and practical challenges surrounding the deployment of GenAI in primary healthcare. By juxtaposing the perspectives of GPs (Table 1) and patients (Table 2), it becomes evident that trustworthiness in GenAI is not merely a matter of technical excellence but a complex socio-technical negotiation. Drawing on Arendt's (1966) insistence on the political importance of plurality and public spaces for debate, and Polanyi's (1944) argument that technological and economic innovations must be "re-embedded" into social institutions, this chapter interprets the living lab as both a methodological and normative template for scaling GenAI governance across *Osakidetza* via *BioGipuzkoa*.

Following Polanyi's (1944) notion of re-embedding technological and economic systems within social and institutional structures, and Arendt's (1966) emphasis on plurality and public spaces for collective deliberation, the findings of the living lab illuminate how GenAI adoption in healthcare must be anchored in democratic, relational, and socially embedded forms of governance.

5.1. Merging GP and Patient Workshops: Converging Themes

A comparative reading of Tables 1 and 2 reveals strong thematic convergence between professionals and patients. Five recurring factors emerge—epistemic uncertainty, trust and explainability, accountability and error, data ownership and consent, and digital divides—that cut across both workshops.

1. **Epistemic Uncertainty and Clinical Judgment:** Both GPs and patients resist framing GenAI as a substitute for human expertise. GPs stress that embodied clinical judgment, shaped by years of practice and patient relationships, cannot be reduced to probabilistic outputs. Patients, for their part, articulate an emotional and relational preference for human-mediated care. This alignment signals a clear policy imperative: any GenAI integration must explicitly position the technology as augmentative, reinforcing rather than supplanting human agency.
2. **Trust and Explainability:** Both groups frame explainability as central to legitimacy. For GPs, the inability to interpret AI outputs undermines their capacity to justify decisions. For patients, opacity fuels suspicion and rejection of AI-driven care. In Arendtian terms, explainability becomes a public "space of appearance," where technology must be made visible and comprehensible to sustain democratic trust.
3. **Accountability and Error:** GPs and patients alike demand clear delineations

1st Proof Pdf

of responsibility. This reflects Polanyi's emphasis on protecting social actors from the destabilizing effects of "disembedded" innovations—systems that operate without institutionalized safeguards. Here, HAIG's shared accountability frameworks are not optional add-ons but foundational requirements.

4. **Data Ownership and Consent:** Both groups advocate for participatory data governance, favoring cooperative models that align with Basque traditions of mutualism. This is a site where Polanyi's notion of "re-embedding" is especially relevant: returning control of data—the raw material of GenAI—to collective democratic stewardship.
5. **Digital Divides and Access:** Both groups warn of inequitable access, identifying elderly, rural, and economically vulnerable populations as particularly at risk. For Polanyi, such exclusion represents a failure to socially embed technological change; for Arendt, it risks silencing parts of the public sphere essential to democratic legitimacy.

AQ: Please check this word "disembedded" for correctness here in this context.

These shared priorities suggest that the living lab's approach—iterative, participatory, territorially grounded—offers a viable governance model that could be scaled throughout *Osakidetza* with *BioGipuzkoa* as a scientific and translational partner.

5.2. Policy Recommendations for Scaling/Replicating the HAIG Living Lab via Osakidetza and BioGipuzkoa

Recommendation 1: Institutionalize the Living Lab Model as a Permanent HAIG Node

Osakidetza, in partnership with *BioGipuzkoa* (and probably the University of the Basque Country, Faculty of Economics & Business, Public Policy & Economic History Department alongside the Basque Foundation for Science), should formalize living labs as standing infrastructures for co-design, testing, and evaluation of GenAI tools in primary care. These should not be time-limited pilots but ongoing "safe spaces" for participatory governance—spaces where GPs, patients (internal staff), technologists, ethicists, and policymakers can continuously deliberate on AI deployment.

- *Arendtian Rationale:* This creates a sustained space for plurality, preventing technological decisions from becoming opaque bureaucratic acts.
- *Polanyian Rationale:* It embeds innovation into existing healthcare institutions, preserving social protection, public ownership, and professional autonomy.

Recommendation 2: Embed Augmentative Design Principles in All GenAI Procurement

Procurement protocols across *Osakidetza* should mandate that GenAI systems be designed for augmentation, not replacement, of human judgment. Evaluation criteria should include safeguards for preserving clinical autonomy and relational care.

1st Proof Pdf

- *Implementation:* Require vendors to provide design documentation showing how AI outputs can be overridden or contextualized by clinicians.
- *Outcome:* Reinforces trust, mitigates deskilling, and aligns with the GP–patient consensus.

Recommendation 3: Operationalize Explainability as a Dual-Layer Standard

Adopt a two-tier explainability framework:

1. *Clinical Layer:* Technical interpretability tools for GPs to understand model reasoning.
2. *Public Layer:* Plain-language, culturally adapted explanations for patients. This dual structure recognizes the different informational needs of professional and lay audiences, as per the Ada Lovelace Institute (2024).
   - *Arendtian Rationale:* Ensures that AI decisions remain visible and contestable in the public realm.
   - *Polanyian Rationale:* Protects the social contract between healthcare providers and citizens, avoiding both extremes—privatization and the tragedy of commons.

Recommendation 4: Establish a Shared Accountability Charter

HAIG implementation in *Osakidetza* should include a formal accountability charter co-signed by clinicians, institutions, and technology providers. This charter should define:

- Error-resolution protocols.
- Liability distribution mechanisms.
- Documentation and audit requirements. Such measures preempt the "blame game" identified in both workshops and prevent the diffusion of responsibility that erodes trust.

Recommendation 5: Implement Participatory Data Cooperatives for Health Data Governance

Leverage *BioGipuzkoa's* research capacity to pilot health data cooperatives (e.g., stemming from the failures and lessons learned by Salus.Coop; Calzada, 2024) where patients collectively determine how their data is accessed and used. Integrate cooperative governance structures into *Osakidetza*'s digital health infrastructure.

- *Polanyian Rationale:* Restores control of critical resources to the community, reversing the "disembedding" of health data into purely commercial or bureaucratic systems.
- *Practical Benefit:* Enhances trust, increases data quality through voluntary sharing, and aligns with Basque cooperative traditions.

Recommendation 6: Design for Inclusion and Mitigate Digital Divides

GenAI systems deployed through *Osakidetza* must meet universal design

1st Proof Pdf

standards and offer non-digital access pathways. Outreach and training programs should be tailored for elderly, rural, and vulnerable populations, ideally in partnership with local municipalities and NGOs.

- *Implementation:* Mobile health units equipped with AI-assisted diagnostic tools; community workshops in rural centers; multilingual support.
- *Outcome:* Prevents structural inequities from hardening into digital exclusion.

5.3. Limitations

While the living lab produced rich qualitative insights, its scope was limited in three key respects:

plz chk three or four ??

1. **Geographic Scope:** The intervention was confined to specific primary care sites in the Basque Country. Broader regional variation within *Osakidetza*—especially in more remote or socio-economically deprived areas—was not fully represented.
2. **Temporal Scope:** As a short-term engagement, the living lab captured attitudes at a single point in time. Longitudinal research would be required to track evolving perceptions as GenAI systems mature.
3. **Technological Scope:** The GenAI applications discussed were largely hypothetical or early-stage; the findings may differ once fully operational tools are deployed in high-stakes environments.
4. **Quantitative Scope:** The study relied predominantly on qualitative methods—focus groups, co-design workshops, semi-structured interviews, and ethnographic observation—providing depth and contextual richness but limiting the statistical generalizability of findings. The absence of large-scale surveys or quantitative performance metrics means the prevalence of identified themes (e.g., trust concerns, accountability expectations) across the wider *Osakidetza* network cannot be precisely measured. Future work should integrate mixed-method approaches to triangulate qualitative insights with quantitative evidence, enabling stronger comparative analysis across demographics, regions, and clinical contexts.

These limitations underline the importance of iterative, adaptive governance. In Arendt's terms, democratic legitimacy in technological adoption is not a one-off achievement but an ongoing practice of public engagement. For Polanyi, the task is to continually re-embed innovation into evolving social and institutional contexts.

5.4. Implications for Replication

Scaling the living lab approach across *Osakidetza* through *BioGipuzkoa* is not simply a matter of technical replication but of *institutional translation*. Each primary care setting will require adaptation of the model to local demographics, clinical cultures, and infrastructural capacities. Critical success factors include:

1st Proof Pdf

- Sustained funding streams that treat participatory governance as an operational cost, not a project-based luxury.
- Strong cross-sector partnerships, ensuring that *BioGipuzkoa*'s biomedical research expertise is complemented by applied social science insights.
- Embedding HAIG principles in all stages of AI deployment, from procurement to patient interaction.

In sum, merging the voices of GPs and patients reveals a common set of priorities that resonate with both Arendt's vision of democratic plurality and Polanyi's insistence on socially embedded innovation. By institutionalizing the living lab model through *Osakidetza* and *BioGipuzkoa*, the Basque Country has an opportunity to operationalize HAIG in a way that not only delivers technological innovation but also strengthens democratic legitimacy, clinical integrity, and social cohesion.

6. Conclusions and Future Work Directions: Human-Centric AI, Harmonizing Humans and Technology through HAIG

This chapter has demonstrated how integrating GenAI into public healthcare systems requires more than technical optimization—it demands institutional reflexivity, participatory governance, and context-sensitive implementation. Stemming from and being directly inspired and led by the International Summer School UIK on Digital Inclusion & GenAI, the living lab intervention with *Osakidetza* and *BioGipuzkoa* generated a unique empirical setting in which GPs, patients, and researchers could jointly interrogate the socio-technical, ethical, and clinical implications of GenAI Five interrelated themes—*epistemic uncertainty, trust and explainability, accountability and error, data ownership and consent,* and *digital divides and access*—emerged as foundational to designing HAIG frameworks that safeguard relational care while enabling innovation. The significance of these findings lies in showing that trustworthy GenAI is not a static technical property but the outcome of sustained co-production across institutional, professional, and community domains. By embedding anticipatory governance into healthcare innovation pipelines, the project illustrated a scalable model for aligning AI deployment with democratic values, cooperative traditions, and the specificities of territorial innovation systems. From these findings, three practical recommendations follow:

- First, GenAI integration in healthcare should prioritize augmentation over substitution, embedding human clinical judgment at the core of decision-making processes to prevent deskilling and maintain trust.
- Second, explainability must be operationalized as a governance principle, with multilayered communication strategies adapted for clinicians, patients, and

1st Proof Pdf

institutional actors, thereby transforming transparency from a technical add-on into a relational practice.
- Third, data governance should transition toward participatory and democratic models, such as health data cooperatives, that grant patients agency over data access, use, and benefit-sharing.

These shifts should be institutionalized through HAIG frameworks that define shared accountability mechanisms between developers, healthcare providers, and public institutions, supported by policies that actively address digital divides through inclusive design and digital literacy initiatives. Scaling the living lab model across *Osakidetza* via *BioGipuzkoa* could anchor these principles in organizational routines, ensuring that GenAI adoption is iterative, participatory, and grounded in real-world primary care contexts. Future research should extend these insights in three key directions.

- First, longitudinal studies are needed to assess how GenAI impacts clinical judgment, patient trust, and health outcomes over time, especially in diverse socio-economic and geographic settings.
- Second, comparative studies across regional and national healthcare systems could illuminate how differing institutional cultures and governance structures mediate the success of HAIG frameworks.
- Third, methodological work is required to refine living lab assemblages as tools for anticipatory governance, exploring hybrid and mixed models that blend in situ experimentation, quantitative big data, simulation and policy foresight (Bradbury, 2015).

Persistent challenges—such as resolving liability in multi-actor AI systems, safeguarding equity amid rapid technological change, and institutionalizing reflexivity within bureaucratic structures—remain critical to address. By continuing to bridge technical design with democratic governance, future work can help ensure that GenAI becomes an enabler of human-centric healthcare transformation rather than a driver of technological determinism (Calzada & Cobo, 2015).

References

Ada Lovelace Institute. (2024). *Buying AI: Is the Public Sector Equipped to Procure Technology in the Public Interest?* London: ALI. https://adalovelaceinstitute.org/report/buying-ai-procurement/

Allen, D., Hubbard, S., Lim, W., Wagman, S., & Zalesne, K. (2024). *A Roadmap for Governing AI: Technology Governance and Power Sharing Liberalism*. Harvard University Allen Lab for Democracy Renovation.

Arendt, H. (1966). *The Origins of Totalitarianism*. Penguin.

Badawy, W. (2025). Algorithmic sovereignty and democratic resilience: Rethinking

1st Proof Pdf

AI governance in the age of generative AI. *AI and Ethics*. https://doi.org/10.1007/s43681-025-00739-z

Beel, D., Thompson, M., Calzada, I., Jones, I. R., Jones, M., & Morgan, K. (2026, UR), Anticipating regional futures? The promises, prospects and pitfalls of the Basque Model. Special Issue Rethinking Regional Development in Polarised Times: Towards New Regional Futures? *Cambridge Journal of Regions, Economy and Society.* vol n pp

Bigo, D., Isin, E., & Ruppert, E. (2019). *Data Politics*. Routledge.

Borges do Nascimento, I. J. et al. (2025). Transforming women's health, empowerment, and gender equality with digital health: Evidence-based policy practice. *Health Policy*. https://doi.org/10.1016/ j.landig.2025.01.014

Bradbury, H. (2015). *The SAGE Handbook of Action Research*. SAGE Publications Ltd, https://doi.org/10.4135/9781473921290

Breznitz, D. (2007). *Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland*. Yale University Press.

Breznitz, D. (2021). *Innovation in Real Places*. Oxford University Press.

Breznitz, D., & Zysman, J. (2013). *The Third Globalization: Can Wealthy Nations Stay Rich in the Twenty-First Century?* Oxford University Press.

Bühler, M. M., Cane, I., Jelinek, T., Kapoor, A., Mannan, M., Mehta, S. et al. (2023). Unlocking the power of digital commons: Data cooperatives as a pathway for data sovereign, innovative and equitable digital communities. *Digital*, 3(3), 146–171. https://doi.org/10.3390/digital3030011

Buolamwini, J. (2024). *Unmasking AI*. Random House.

Calzada, I., & Cobo, C. (2015). Unplugging: Deconstructing the smart city. *Journal of Urban Technology,* 22(1), 23–43. https://doi.org/10.1080/10630732.2014.971535

Calzada, I., & Cowie, P. (2017). Beyond smart and data-driven city-regions? Rethinking stakeholder-helixes strategies. *Regions Magazine*, 308(4), 25–28. https://doi.org/10.1080/13673882.2017.11958675

Calzada, I. (2020). Replicating smart cities: The city-to-city learning programme in the replicate EC-H2020-SCC project. *Smart Cities*, 3(3), 978–1003. https://doi.org/10.3390/smartcities3030049

Calzada, I. (2021a). *Smart City Citizenship*. Elsevier. https://doi.org/10.1016/c2017-0-02973-7

Calzada, I. (2021b). Data co-operatives through data sovereignty. *Smart Cities*, 4(3), 1158–1172. https://doi.org/10.3390/smartcities4030062

Calzada, I., & Almirall, E. (2020). Data ecosystems for protecting European citizens' digital rights. *Transforming Government: People, Process and Policy*, 14(2), 133–147. https://doi.org/10.1108/TG-03-2020-0047

Calzada, I., Pérez-Batlle, M., & Batlle-Montserrat, J. (2021). People-centered smart cities: An exploratory action research on the cities' coalition for digital rights. *Journal of Urban Affairs*, 45(9), 1537–1562. https://doi.org/10.1080/07352166.2021.1994861

Calzada, I. (2025a). Digital inclusion & Generative AI: Towards a socially cohesive and digitally sovereign Gipuzkoa. *International Summer School Keynote, Donostia-San Sebastián*. https://doi.org/10.5281/zenodo.15873570

Calzada, I. (2025b). *Datafied Democracies & AI Economics Unplugged*. Springer Nature.

Calzada, I. (2025c). From data-opolies to decentralization? The AI disruption amid the Web3 promiseland at stake in datafied democracies. *In:* Visvizi, A., Troisi, O., Corvello, V., & Grimaldi, M. (Eds.), *Research and Innovation Forum 2024* (pp. xxx–xxx). Springer. https://doi.org/10.1007/978-3-031-78623-5_26

1st Proof Pdf

Calzada, I. (2019), Local entrepreneurship through a multistakeholders' tourism living lab in the post-violence/peripheral era in the Basque Country. *Regional Science, Policy and Practice*, 11(3), 451–466. In the Special Issue 'Local Entrepreneurship and Tourism: Oolicies and Practices in Peripheral Areas'. DOI: 10.1111/rsp3.12130.

Calzada, I., Németh, G., & Al-Radhi, M. S. (2025). Trustworthy AI for whom? GenAI detection techniques of trust through decentralized Web3 ecosystems. *Big Data and Cognitive Computing*, 9, 62. https://doi.org/10.3390/bdcc9030062

Calzada, I., & Eizaguirre, I. (2025a). Digital inclusion & GenAI. *Discover Cities*, 2(73), 1–14. DOI: 10.1007/s44327-025-00116-9. Editorial Introduction. Summer School, 15–16 July 2025. https://www.uik.eus/en/activity/digital-inclusion-generative-artificial-intelligence-gipuzkoa-socially-cohesive-digitally

Calzada, I., & Eizaguirre, I. (2025b). Gipuzkoa: Sozialki kohesionatua, baina digitalki jasangarria al da? *Berria*. https://www.berria.eus/iritzia/artikuluak/gipuzkoa-sozialki-kohesionatua-baina-digitalki-jasangarria-da_2143482_102.html

Calzada, I., & Eizaguirre, I. (2025c). Gipuzkoa, socialmente cohesionada, digitalmente sostenible? *Noticias de Gipuzkoa*. https://www.noticiasdegipuzkoa.eus/opinion/2025/07/13/gipuzkoa-socialmente-cohesionada-digitalmente-sostenible-9873647.html

Calzada, I. & Eizaguirre, I. (2025d), Anticipatory AI governance in practice: Data sovereignty, urban AI, and trustworthy GenAI in the Basque Country. *2025 IEEE International Conference on Agentic AI* (*ICA*). Wuhan (China), 5–7 December. Data for Policy CIC—Zenodo. https://lnkd.in/dXdK-M8C Accessed online: https://lnkd.in/da5UJX43

Calzada, I. (2026a). *Understanding AI Economics: Applied Economics, Public Policy and Digital Citizenship*. Edward Elgar.

Calzada, I. (2026b). *Benchmarking City-Regions*. Routledge.

Cardullo, P., Di Feliciantonio, C., & Kitchin, R. (2019). *The Right to the Smart City*. Emerald.

Castells, M. (1996). *The Rise of the Network Society*. Blackwell.

Clark, A. (2025). Extending minds with generative AI. *Nature Communications*. https://doi.org/10.1038/S41467-025-59906-9

Coalition for Health AI (CHAI). (2025). *The CHAI Guide: Implementing Responsible AI in Health*. https://lnkd.in/e2MHTYWB

Couldry, N., & Mejias, U. (2024). *Data Grab*. University of Chicago Press.

David, A., Yigitcanlar, T., Desouza, K., Mossberger, K., Cheong, P. H., Corchado, J. et al. (2025). Public perceptions of responsible AI in local government: A multi-country study using the theory of planned behaviour. *Government Information Quarterly*, 42, 3, 102054, ISSN 0740-624X, https://doi.org/10.1016/j.giq.2025.102054.

Engin, Z., & Treleaven, P. (2019). Algorithmic government: Automating public services and supporting civil servants in using data science technologies. *The Computer Journal*, 62, 448–460. https://doi.org/10.1093/comjnl/bxy082

Engin, Z. (2025, July 16). Symbiotic public systems: When neither humans nor AI can govern alone. *Data for Policy CIC – Zenodo*. https://doi.org/10.5281/zenodo.16264090

Eubanks, V. (2017). *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*. St. Martin's Press.

European Commission. (2025a). *The Impact of Human–AI Interaction on Discrimination* (JRC139127). Publications Office of the European Union. https://data.europa.eu/doi/10.2760/0189570

1st Proof Pdf

European Commission. (2025b). *AI Continent: Action Plan*. Publications Office of the European Union. https://doi.org/10.2759/5570267

European Commission. (2025c). *EuroStack: An EU Stack for Trustworthy AI and Algorithmic Systems – Towards a European Ecosystem for Socio-Technical AI Innovation* [Pitch document]. Publications Office of the European Union.

European Economic and Social Committee (EESC). (2019). *Proposal for a Sovereign and Democratic Digitalisation*. Publications Office of the European Union. https://doi.org/10.2864/314066

Ferrie, C. (2023). *Quantum Bullshit*: *How to Ruin Your Life with Advice from Quantum Physics*. Sourcebooks.

Fountain, J. E. (2022). The moon, the ghetto and artificial intelligence: Reducing systemic racism in computational algorithms. *Government Information Quarterly*, 39(2), 101645. https://doi.org/10.1016/j.giq.2021.101645

Galceran-Vercher, M., & Vidal D'oelo, A. (2024). *IA urbana ética en la práctica: Mecanismos de política para establecer marcos de gobernanza local* (Monografías CIDOB 89). CIDOB. https://www.cidob.org/sites/default/files/2025-02/MONOGRAFIA%2089_CAST_2.pdf

Gangadharan, S. P. (2017). The downside of digital inclusion: Expectations and experiences of privacy and surveillance among marginal internet users. *New Media & Society*, 19(4), 597–615. https://doi.org/10.1177/1461444815614053

Gangadharan, S. P. (2020). *Digital Exclusion: A Politics of Refusal*. LSE Research Online. https://eprints.lse.ac.uk/103076/

González, S., & Healey, P. (2005). A sociological institutionalist approach to the study of innovation in governance capacity. *Urban Studies*, 42(11), 2055–2069. https://doi.org/10.1080/00420980500279778

Gray, J., Gerlitz, C., & Bournegru, L. (2018). Data infrastructures literacy. *Big Data & Society*, 5(2), 1–13. https://doi.org/10.1177/2053951718786316

Guggenberger, T. M., Schlueter Langdon, C., & Otto, B. (2025). Data spaces as meta-organisations. *European Journal of Information Systems*. https://doi.org/10.1080/0960085X.2025.2451250

Hallonsten, O. (2024). Innovationism and the new public intellectuals. *In:* M. Henrekson, C. Sandström, & M. Stenkula (Eds.), *Moonshots and the New Industrial Policy*. Springer. https://doi.org/10.1007/978-3-031-49196-2_5

Helberger, N., & Diakopoulos, N. (2023). ChatGPT and the AI Act. *Internet Policy Review*, 12(1). https://doi.org/10.14763/2023.1.1682

Hu, W. & Singh, R. (2024). *Enrolling Citizens: A Primer on Archetypes of Democratic Engagement with AI.* NYC: Data & Society.

Jasanoff, S. (2016). *The Ethics of Invention: Technology and the Human Future*. Norton.

Kitchin, R., Davret, J., Kayanan, C. M., & Mutter, S. (2025). Assemblage theory, data systems and data ecosystems: The data assemblages of the Irish planning system. *Big Data & Society*, 12(3). https://doi.org/10.1177/20539517251352822

Lauer, R., Merkel, S., Bosompem, J. et al. (2024). (Data-) Cooperatives in health and social care: A scoping review. *J Public Health (Berl.).* https://doi.org/10.1007/s10389-024-02226-x

Leslie, D., Rincón, C., Briggs, M., Perini, A., Jayadeva, S., Borda, A. et al. (2024). *AI Explainability in Practice*. The Alan Turing Institute.

Levi, S. (2024). *Digitalización Democrática*. Rayo Verde.

Lundvall, B.-Å. (1992). *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. Pinter.

1st Proof Pdf

Lundvall, B.-Å., Joseph, K. J., Chaminade, C., & Vang, J. (2009). *Handbook of Innovation Systems and Developing Countries: Building Domestic Capabilities in a Global Setting*. Edward Elgar.

Mazzucato, M. (2013). *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. Anthem Press.

Mazzucato, M. (2022). *Mission Economy: A Moonshot Guide to Changing Capitalism*. Penguin.

McKay, F., Williams, B. J., Prestwich, G., Treanor, D., & Hallowell, N. (2022). Public governance of medical artificial intelligence research in the UK: An integrated multi-scale model. *Research Involvement and Engagement*, 8(21). https://doi.org/10.1186/s40900-022-00357-7

Monsees, L. (2019). *Crypto-Politics: Encryption and Democratic Practices in the Digital Era*. Routledge.

Morgan, K., Navarro, M., & Valdaliso, J. M. (2020). Economic governance in the Basque Country: Balancing continuity and novelty. *Ekonomiaz. Revista Vasca de Economía*, 35A(3), 170–201. https://doi.org/10.69810/ekz.1355

Morozov, E. (2022). Critique of techno-feudal reason. *New Left Review*, 133–134, 89–126.

Moulaert, F., Martinelli, F., Swyngedouw, E., & González, S. (2005). Towards alternative model(s) of local innovation. *Urban Studies*, 42(11), 1969–1990.

Nabben, K., Puspasari, N., Kelleher, M., & Sanjay, S. (2021). Grounding decentralised technologies in cooperative principles: What can 'Decentralised Autonomous Organisations' (DAOs) and platform cooperatives learn from each other? *In: Alternatives Data Futures: Cooperative Principles, Data Trusts, and the Digital Economy*. Platform Cooperativism Consortium/Harvard Berkman Klein.

Nabben, K. (2022). A political history of DAOs. *FWB: WIP*. https://www.fwb.help/wip/cypherpunks-to-social-daos

National Academy of Medicine (NAM). (2023). *An Artificial Intelligence Code of Conduct for Health and Medicine: Essential Guidance for Aligned Action*. https://nam.edu/artificial-intelligence-code-of-conduct/

Nelson, R. R. (1977). *The Moon and the Ghetto: An Essay on Public Policy Analysis*. W.W. Norton & Company.

Nelson, R. R. (1993). *National Innovation Systems: A Comparative Analysis*. Oxford University Press.

Nelson, R. R., & Winter, S. G. (2006). *An Evolutionary Theory of Economic Change*. Belknap Press.

Nelson, R. R. (2011). The moon and the ghetto revisited. *Science and Public Policy*, 38(9), 681–690. https://doi.org/10.3152/030234211X13070021633404

Nicole, S., Vance-Law, S., Spelliscy, C., & Bell, J. (2025, January). *Towards Data Cooperatives for a Sustainable Digital Economy*. Project Liberty Institute & Decentralization Research Center.

Polanyi, K. (1944). *The Great Transformation: The Political and Economic Origins of Our Time*. Beacon Press.

Porter, M. (1985). *The Competitive Advantage of Nations*. Free Press.

Ruppert, E., Isin, E., & Bigo, D. (2017). Data politics. *Big Data & Society*, 1–7. https://doi.org/10.1177/2053951717717749

Schmidt, J., Schutte, N. M., Buttigieg, S., Novillo-Ortiz, D., Sutherland, E., Anderson, M. et al. (2024). Mapping the regulatory landscape for artificial intelligence in health

1st Proof Pdf

within the European Union. *NPJ Digital Medicine*, 7, 229. https://doi.org/10.1038/s41746-024-01221-6

Scholl, C. et al. (2017). *Guidelines for Urban Labs*. URB@Exp project 2014–2017, JPI Urban Europe. Available at: https://adk.elsevierpure.com/en/publications/guidelines-for-urban-labs (accessed: 1 August 2025).

Schumpeter, J. A. (1943). *Capitalism, Socialism and Democracy*. Routledge.

Sieker, F., Tarkowski, A., Gimpel, L., & Osborne, C. (2025). *Public AI – White Paper*. Bertelsmann Stiftung.

Ulnicane, I., Knight, W., Leach, T., Stahl, B. C., & Wanjiku, W.-G. (2022). Governance of artificial intelligence: Emerging international trends and policy frames. *In:* M. Tinnirello (Ed.), *The Global Politics of Artificial Intelligence* (pp. 29–48). Routledge. https://doi.org/10.1201/9780429446726-2

van Dijck, J., van Es, K., Helmond, A., & van der Vlist, F. (Eds.). (2025). *Governing the Digital Society: Platforms, Artificial Intelligence, and Public Values*. Amsterdam University Press. https://doi.org/10.5117/9789048562718

van Kessel, R., Ranganathan, S., Anderson, M., McMillan, B., & Mossialos, E. (2024a). Exploring potential drivers of patient engagement with their health data through digital platforms: A scoping review. *International Journal of Medical Informatics*, 189, 105513. https://doi.org/10.1016/j.ijmedinf.2024.105513

van Kessel et al. (2024b). A scoping review and expert consensus on digital determinants of health. *Bulletin of the World Health Organization.* vol n pp

Visvizi, A., Kozlowski, K., Calzada, I., & Troisi, O. (2025). *Multidisciplinary Movements in AI and Generative AI: Society, Business, Education*. Edward Elgar. https://www.e-elgar.com/shop/gbp/multidisciplinary-movements-in-ai-and-generative-ai-9781035358656.html

World Economic Forum (WEF). (2023). *Earning Trust for AI in Health: A Collaborative Path Forward*. https://www.weforum.org/reports/earning-trust-for-ai-in-health-a-collaborative-path-forward/

World Health Organization (WHO). (2021). *Ethics and Governance of Artificial Intelligence for Health: WHO Guidance*. https://www.who.int/publications/i/item/9789240029200

World Health Organization (WHO). (2024). Addressing health determinants in a digital age: Project report. Copenhagen: WHO Regional Office for Europe. Licence: CC BY-NC-SA 3.0 IGO.

Yigitcanlar, T., Desouza, K. C., Mossberger, K., Cheong, P. H., Li, R. Y. M., Mehmood, R. et al. (2025). Artificial intelligence and the city: An editorial perspective. *Journal of Urban Technology*. https://doi.org/10.1080/10630732.2025.2500822

Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. Profile.

vol n pp missing plz chk