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Digital Health Governance in Iran: A Situational Analysis and Future Scenarios

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ABSTRACT

Despite extensive technological investments, the transition to digital health governance in developing systems is often trapped in institutional inertia. Existing literature largely suffers from a retrospective bias, overlooking how emerging legal mandates reshape future trajectories. This study critically examines the contested field of digital health governance in Iran, specifically focusing on the structural tensions introduces by the 7th National Development Plan (2024–2029). Adopting a Hybrid Prospective Qualitative Design, this research integrates Adele Clarke's Situational Analysis with a Scenario Planning framework. Empirical data were drawn from 18 in-depth interviews with elite stakeholders and a critical analysis of key policy documents. Based on the identified governance logics and data regimes, a matrix was constructed to map plausible futures for the 2035 horizon. The analysis reveals a governance deadlock where the state's drive for data centralization—codified through the Regulator-Operator model—clashes with the needs of an innovation ecosystem. Four divergent future paths are identified: 1.Digital Stagnation (a path-dependent outcome of current bureaucratic silos), 2.The Digital Panopticon (efficient technical integration under strict authoritarian surveillance), 3.Innovation Islands (fragmented private success without national scaling), and 4.The Dynamic Ecosystem (participatory governance treating data as a public good). Findings suggest that current legal mandates are actively steering the system toward the first two scenarios. The transition to a sustainable digital health ecosystem is not merely a technical challenge but a political one. Avoiding the trap of a Digital Panopticon requires a fundamental institutional reconfiguration: shifting from the sovereign asset framing of health data toward a participatory governance model that balances state stewardship with ecosystem agency.

Keywords: Digital Health Governance, Situational Analysis, Scenario Planning, Health Data Policy, Iran; Horizon 2035.

Introduction

The contemporary health sector is no longer merely a domain of service delivery; it stands as a foundational pillar for sustainable development and social welfare (Frenk et al., 2014; Kickbusch & Gleicher, 2012). The global landscape of digital health is characterized by a diversity of governance arrangements, ranging from highly centralized state models to decentralized, market-driven approaches. Understanding these international benchmarks is crucial for contextualizing the challenges faced by transitional systems. Recent systematic evidence from developed nations suggests that effective health

governance increasingly relies on the strategic alignment of institutional mandates with flexible digital ecosystems to ensure public value (Ghalibaf et al., 2025). This global trend underscores that digital health is not merely a technical upgrade but a fundamental shift in how state stewardship interacts with technological agency. Over the last two decades, health systems have become the focal point of global digital transformation initiatives (Carnicero & Serra, 2020; World Health, 2023). However, scholarly consensus suggests that the success of such a profound shift is less about the mere deployment of information technologies and more about the fundamental reconfiguration of governance structures (Dunleavy & Margetts, 2013; Kohnke, 2017).

This digital transformation entails a radical reordering of the relationships between the state, the private sector, and the citizenry—a process that unfolds under conditions of deep uncertainty and unpredictable policy trajectories (Janowski, 2015; Luna-Reyes & Gil-Garcia, 2014). Consequently, the need for foresight-oriented and anticipatory governance has never been more salient (Gotsadze et al., 2024; Taghaddosi, 2020). Yet, within the current body of health governance studies, foresight is frequently invoked as an abstract recommendation rather than an operationalized research logic.

As conceptualized by the OECD (2015, 2022), digital health governance requires a robust set of institutional, legal, and organizational frameworks to ensure transparency, accountability, and meaningful participation (Organisation for Economic & Development, 2015, 2022). This represents a paradigmatic shift from traditional e-government—often rooted in the automation of bureaucratic processes under New Public Management—to a digital governance model centered on platform-based structures and data-driven ecosystems (Cordella & Bonina, 2012; Dunleavy et al., 2006; Janowski, 2015; Nambisan et al., 2019). Within this framework, technology acts as a structuring force that actively reshapes interactions among all health system actors (Janssen et al., 2009; Mittelstadt et al., 2016).

Despite this conceptual clarity, empirical reality remains uneven. Extensive investments in ICT have often failed to produce meaningful transformation, leaving many systems trapped in basic automation and structural constraints (Beikzad & Jalilinejad, 2021; Organisation for Economic & Development, 2016; Pollitt & Bouckaert, 2017). International surveys by the WHO (2021, 2023) corroborate this, revealing that while national strategies are common, effective frameworks for data stewardship and cross-sectoral coordination are dangerously absent (World Health, 2021, 2023). This underscores the fact that strategic documents alone cannot substitute for the quality of governance arrangements (Gotsadze et al., 2024; Organisation for Economic & Development, 2022).

Iran's health system vividly reflects these global tensions, currently grappling with a governance deadlock between traditional bureaucratic control and the needs of a digital ecosystem (Abbasi et al., 2019; Beikzad & Zare Dizaj, 2018). Beyond the digital sphere, the Iranian health system faces broader structural hurdles; for instance, qualitative evidence suggests that even the development of decentralized care models is often constrained by a complex set of institutional and professional barriers (Kianian et al., 2022). From an institutionalist lens, this condition is a classic case of path dependency, where entrenched historical arrangements stifle adaptive change (North, 1990; Pierson, 2000). In this context, health data is predominantly framed as a sovereign asset and an instrument of administrative control, leading to pervasive information silos (Abdolhosseinzadeh et al., 2017; Organisation for Economic & Development, 2015). Although public institutions generate vast amounts of data, their institutional monopolization has constrained innovation and public value creation (Carnicero & Serra, 2020; Organisation for Economic & Development, 2022). These gaps are further exacerbated by legal ambiguities that slow the transition toward smart government (Mohammadi et al., 2019; Nabovati et al., 2019).

A review of Iranian literature highlights three primary analytical streams: networked and participatory models (Jalali Khanabadi et al., 2020; Salarianzadeh & Latifi Jelyseh, 2020), structuralist and decentralization-oriented models (Ghalibaf et al., 2024; Janssen et al., 2009; Organisation for Economic & Development, 2022), and normative, merit-based models focusing on ethics (Bagherzadeh Khodashahri et al., 2023; Shamsi Davood et al., 2025; World Health, 2021). However, these streams often suffer from technological reductionism, overlooking the agency of non-human actors like algorithms and platforms (Janssen & van der Voort, 2016; Mittelstadt et al., 2016), or failing to move beyond a retrospective bias (Abbasi et al., 2019; Taghaddosi, 2020). Consequently, the capacity to anticipate future governance pathways remains limited (Gotsadze et al., 2024; Pollitt & Bouckaert, 2017).

In response, this study adopts a hybrid prospective design, integrating Adele Clarke's Situational Analysis with scenario-building. By examining Iran's digital health ecosystem as a contested field of human and non-human actors, we seek to address two critical questions:

1. How is the field of digital health governance in Iran currently configured in terms of actor constellations, discursive conflicts, and power relations?
2. Based on the identified critical uncertainties, what are the plausible future scenarios for the trajectory of digital health governance in Iran?

Methodology

Research Design and Analytical Strategy

This study employs a hybrid prospective qualitative design, integrating Adele Clarke's Situational Analysis (SA) with Scenario Planning methodology. The overarching objective is to move beyond viewing governance as a static administrative routine, instead conceptualizing it as a contested socio-technical field. While Situational Analysis (Clarke, 2005, 2021; Clarke et al., 2018) provides the diagnostic tools to map the current ecosystem's complexity, the Intuitive Logics approach (Schwartz, 1996; Wright et al., 2013) is utilized to project future trajectories. This integration is crucial for capturing digital health governance not just as it exists today, but as a dynamic arena of critical uncertainties where today's structural tensions become tomorrow's outcomes (Cairns & Wright, 2017).

Epistemological Foundations and Rationale for Situational Analysis

The research is anchored in social constructivist epistemology, which posits that governance outcomes are emergent effects of interactions between actors, discourses, and material infrastructures. Unlike traditional grounded theory that seeks a core process, Situational Analysis treats the situation itself as the primary unit of analysis (Clarke, 2005). This is particularly appropriate for Iran, where digital health transitions are embedded in enduring bureaucratic legacies and centralized regulatory traditions. By employing SA mapping tools, we make visible the silences and unresolved tensions—elements vital for understanding incomplete governance transitions.

Data Collection and Sampling Strategy

Primary empirical data were generated through 18 in-depth, semi-structured interviews with elite experts strategically positioned within Iran's digital health landscape. To ensure both the relevance of expertise and a broad diversity of

perspectives, the study employed a dual sampling approach: purposive sampling to target key informants and snowball sampling to navigate the informal networks of the governance arena (Patton, 2015).

Initial participants were identified and recruited based on three rigorous inclusion criteria:

1. Professional Longevity: A minimum of ten years of direct experience in the health or technology sectors;
2. Functional Engagement: Active involvement in the policymaking, regulation, or large-scale implementation of digital health initiatives;
3. Institutional Standing: A recognized academic, managerial, or professional authority within the field.

To mitigate the risk of homogeneity bias often associated with snowball sampling, we intentionally established multiple entry points across five distinct Social Worlds. This strategy ensured the inclusion of actors from the state regulatory apparatus, clinical service providers, the burgeoning technology and innovation ecosystem, academia, and civil society. By navigating these diverse arenas, the study captured the voices of both dominant institutional gatekeepers and peripheral innovators.

The sampling process was conducted iteratively, guided by the principle of Map Sufficiency (Clarke, 2005). Data collection was discontinued only when additional interviews ceased to introduce novel situational elements or alter the existing relational configuration of the maps. Notably, two targeted interviews were added in the final stages to amplify perspectives often marginalized in formal digital governance—specifically those representing patient rights and civil society interests.

A comprehensive profile of the participants' demographic and professional backgrounds is detailed in Table 1. Given the study's macro-level focus on governance structures rather than individual clinical experiences, individual patients were not interviewed. Instead, high-level representatives from patient advocacy groups and civil society organizations were engaged to reflect the collective interests of the public without shifting the analytical lens toward micro-level service encounters.

Table 1. Demographic and Professional Characteristics of the Study Participants (n = 18)

Variable	Category	Number	Percentage (%)
Gender	Male	12	66.7
	Female	6	33.3
Age (years)	Less than 40	4	22.2
	40 - 55	9	50.0
	Above 55	5	27.8
Education	PhD	18	100
Organizational position (based on the social world)	World of Governance and State Regulation	5	27.8
	World of Clinical Service Providers	4	22.2
	World of Technology and Innovation Ecosystem	3	16.7
	Academic and Research World	3	16.7
	World of Civil Society and Patients	3	16.7
Work Experience (Years)	10 to 20	8	44.4
	More than 20	10	55.6

Document Analysis: Interrogating the 7th Development Plan

To triangulate the interviews, a systematic analysis of key policy documents was conducted, treating them as active institutional actors (Prior, 2008). A central pillar of this analysis was the 7th National Development Plan (2024–2029). Specifically, Articles 69 and 70 of this plan were scrutinized as they mandate a Smart Health Information System and a National Health Database. These mandates were analyzed not merely as technical specifications, but as powerful

classification infrastructures with deep social and political consequences (Bowker & Star, 1999). The plan's requirement for Regulator-Operator models and the linking of medical license renewals to real-time data sharing (Article 69) were identified as critical forces shaping the State-Centric versus Participatory governance logic.

Inclusion of Non-Human Actors

In line with Clarke (2009), this study explicitly grants agency to non-human actors (Clarke, 2009). Technologies such as Electronic Health Records (EHRs), interoperability protocols (SHAMS), and the 7th Development Plan itself are not treated as neutral tools but as actants that redistribute power and stabilize specific governance logics. Their inclusion allows for a deeper understanding of how digital health in Iran is produced through complex socio-technical assemblages.

Data Analysis and Scenario Construction

The entire corpus of interview transcripts and policy documents was systematically managed and analyzed using MAXQDA 2022. The analytical process was structured as a four-phase methodological sequence, designed to bridge the diagnostic focus of Situational Analysis with the prospective orientation of Scenario Planning.

Phase 1: Situational Mapping

The initial phase involved the construction of Situational Maps (both messy and ordered versions). The primary objective of this phase was to create an exhaustive inventory of all human, non-human, and discursive elements relevant to the digital health governance landscape in Iran, without imposing any a priori theoretical constraints.

Phase 2: Relational Analysis

Following the initial mapping, a Relational Map was developed. This phase aimed to examine the connections, relationships, and lines of tension between the elements identified in Phase 1. Special analytical attention was devoted to identifying the central nodes around which conflicts and contestations were organized.

Phase 3: Social Worlds/Arenas Mapping

The analysis then progressed to a macro-level by constructing a Social Worlds/Arenas Map. The purpose of this phase was to map the collective actors (Social Worlds) and the discursive sites of interaction (Arenas) where these actors negotiate power and institutional commitments. This map served as a tool to visualize the overall structure of the field and identify the loci of structural conflict.

Phase 4: Prospective Scenario Construction

The final phase explicitly translated the outputs of the Situational Analysis into a foresight framework. Drawing on the Intuitive Logics approach (Cairns & Wright, 2017; Schwartz, 1996; Wright et al., 2013), the structural conflicts identified in the Arenas Map from Phase 3 were analyzed to distinguish between predetermined elements and critical uncertainties. The two most polarized and impactful uncertainties were then selected to serve as the primary axes for a 2x2 scenario matrix, generating four divergent but plausible future trajectories for the year 2035. This step provided a systematic method for converting structural analysis into dynamic foresight.

Trustworthiness and Analytical Rigor

Rigor was ensured through strategies aligned with Lincoln and Guba's (1985) criteria. Credibility was enhanced via member checking, where preliminary maps were validated by participants (Lincoln & Guba, 1985). Confirmability was

strengthened by an independent audit of the coding process by two external qualitative research experts, ensuring that the findings were grounded strictly in the empirical data and the mandates of the 7th Development Plan.

Research Findings

This section presents the empirical findings derived from the hybrid analytical design. Drawing on 18 in-depth interviews and iterative mapping procedures, the findings first deconstruct the current configuration of digital health governance in Iran and then reconstruct its plausible future trajectories.

Following the integrated Situational Analysis and Foresight framework, the findings are organized in four analytical steps:

1. Situational Inventory: Mapping the human and non-human elements (The Messy and Ordered Maps).
2. Relational Analysis: Examining the struggle over health data (The Relational Map).
3. Power Analysis: Mapping social worlds and arenas (The Arenas Map).
4. Prospective Scenarios: Constructing future trajectories based on critical uncertainties identified in the previous steps.

Step One: Situational Inventory (Deconstructing the Elements of the Situation)

The first analytical step involved constructing a messy situational map (Figure 1) to capture the full range of human and non-human elements identified by participants as relevant to digital health governance in Iran. This map was developed based on 18 semi-structured interviews and more than 230 extracted elements and key signifiers.

The messy map provides a deliberately non-hierarchical and inclusive representation of the situation, reflecting the complexity and fragmentation of the field rather than imposing analytical order at the outset. As shown in Figure 1, the resulting configuration appears dense and entangled, consisting of actors, technologies, institutions, discourses, and contextual conditions that intersect across multiple levels.

Figure1. Messy Situational Map

Closer examination of the messy situational map reveals four empirical findings.

A highly complex and multi-layered field

The diversity and volume of elements identified indicate that digital health governance in Iran is not perceived by actors as a narrowly technical or managerial project. Instead, it emerges as a multi-layered social, political, and economic field involving heterogeneous actors with divergent interests, capacities, and power resources. The co-presence of regulatory institutions, healthcare providers, technology firms, civil society actors, legal frameworks, and socio-cultural factors underscores the absence of a unified governance domain.

Structural centrality of state actors

State institutions—particularly the Ministry of Health and associated regulatory bodies—appear repeatedly across the situational map. Their frequent recurrence highlights the central position of state actors in shaping rules, access, and coordination mechanisms within the field. This empirical pattern indicates the predominance of hierarchical and centralized modes of governance, as opposed to distributed or network-based arrangements. This centralized stewardship is no longer just a bureaucratic norm but has been explicitly codified in Article 70 of the 7th Development Plan, which legally mandates that all digital health actors—public or private—must operate within the restrictive policy lines defined by the Ministry of Health**.**

Active role of non-human elements

Non-human elements such as electronic health records, data standards, platforms, and legal voids are not represented merely as technical tools. Instead, they function as active elements that shape interactions, enable or constrain access, and mediate power relations among actors. In particular, data infrastructures and regulatory ambiguities appear as structuring conditions that influence both decision-making and patterns of inclusion and exclusion within the field.

Empirically observable tensions within the situation

The juxtaposition of elements such as startup innovation and state bureaucracy, data transparency and privacy, or centralized control and ecosystem collaboration points to persistent tensions embedded in the configuration of the field. These tensions are not isolated conflicts between individual actors but recur systematically across the map, indicating structural fault lines rather than episodic disagreements.

Taken together, these findings indicate that digital health governance in Iran constitutes a contested situation characterized by overlapping actors, competing priorities, and unresolved tensions. To organize and systematize this complexity, an ordered situational map was subsequently developed.

Ordered Situational Map

Based on Clarke's ten-element framework, an ordered situational map (Table 2) was constructed to classify the elements identified in the messy map. This step did not reduce complexity but reorganized it into analytically meaningful categories, including individual and collective human actors, non-human actors, discursive constructions, political–economic conditions, temporal and spatial elements, and silent or marginalized actors.

Table2. Ordered Situational Map of Elements in Digital Health Governance in Iran

3. Non-Human Actors	2. Collective Human Actors	1. Individual Human Actors
Systems and Platforms	Governmental and Regulatory Institutions	Senior Policymakers
Key Technologies	Service Provider Organizations	Middle and Executive Managers
Data (as an Actor)	Professional and Trade Associations	Clinical Service Providers
Standards and Protocols	Technology and Innovation Ecosystem Actors	Technology Actors
Algorithms	Civil Society Organizations and Media	Experts and Analysts
6.Discursive Constructions of Non-Human Actors	5. Discursive Constructions of Human Actors	Citizens / Patients
Electronic Health Record Discourse	Transparency	4. Silent, Marginalized, or Suspicious Actors
Artificial Intelligence Discourse	Privacy	Patients Deprived of Digital Access
Health Data Discourse	Justice	International Technology Companies
9. Temporal Elements	Innovation	Health Data Black Markets
Path Dependency	Resistance to Change	Traditional and Influential Government Contractors
Bureaucratic Legacy		Security Agencies
Window of Opportunity	8. Cultural–Social / Symbolic Elements	7. Political–Economic Elements
Policy Time Horizon	Social Capital	Legal Mandates (specifically Articles 69 & 70 of the 7th Development Plan)
10. Spatial Elements	Digital Health Literacy	
Center–Periphery Gap	Organizational Culture	Power Structure
Physical Space versus Cyberspace	Social Acceptance	Political Economy
Global / Local Dynamics		Macroeconomic Environment

The ordered map serves as an analytical inventory that provides the empirical foundation for subsequent relational and social worlds/arenas mappings, enabling a more focused examination of conflicts, power relations, and governance dynamics.

Mechanisms Reproducing Institutional Stability

Analysis of interview data and situational elements indicates that the observed configuration of the field is actively reproduced through several empirically identifiable mechanisms:

- ***Entrenched economic interests:***

Long-standing contractual relationships between public institutions and traditional hospital IT contractors create resistance to interoperability and open standards, as "business models depend on data silos" (Participant 4).

- ***Control-oriented organizational culture:***

Public-sector narratives frequently frame health data as assets requiring protection and guardianship. Expressions such as "data are sovereign assets" (Participant 8) or "data are the honor of the system" (Participant 10) reflect a dominant understanding of data as instruments of authority rather than shared infrastructure.

- ***Legal and institutional voids:***

The absence of a comprehensive health data protection and governance framework enables discretionary restrictions on access and increases uncertainty for non-state actors, particularly innovators and researchers.

- ***Dependence on hierarchical authority:***

Interview data suggest that reluctance to delegate data-related decision-making is rooted not only in security concerns but also in institutionalized assumptions linking delegation to loss of control and interpretive authority.

These mechanisms were consistently articulated across interviews and documents, and together provide the contextual conditions under which the relational conflicts examined in the next step take shape.

Step Two: The Struggle Over Data (Relational Mapping)

To move from a static inventory of elements to an examination of dynamic interactions, a relational map centered on health data was constructed (Figure 2). Health data were selected as the focal point of analysis due to their recurrent presence across interviews and their central role in structuring interactions among key actors within the field.

The relational map illustrates that health data function not merely as a technical input but as a relational object around which actors' interests, responsibilities, and claims are organized. Analysis of the map reveals four empirically distinguishable domains of relations shaping the governance of health data in Iran.

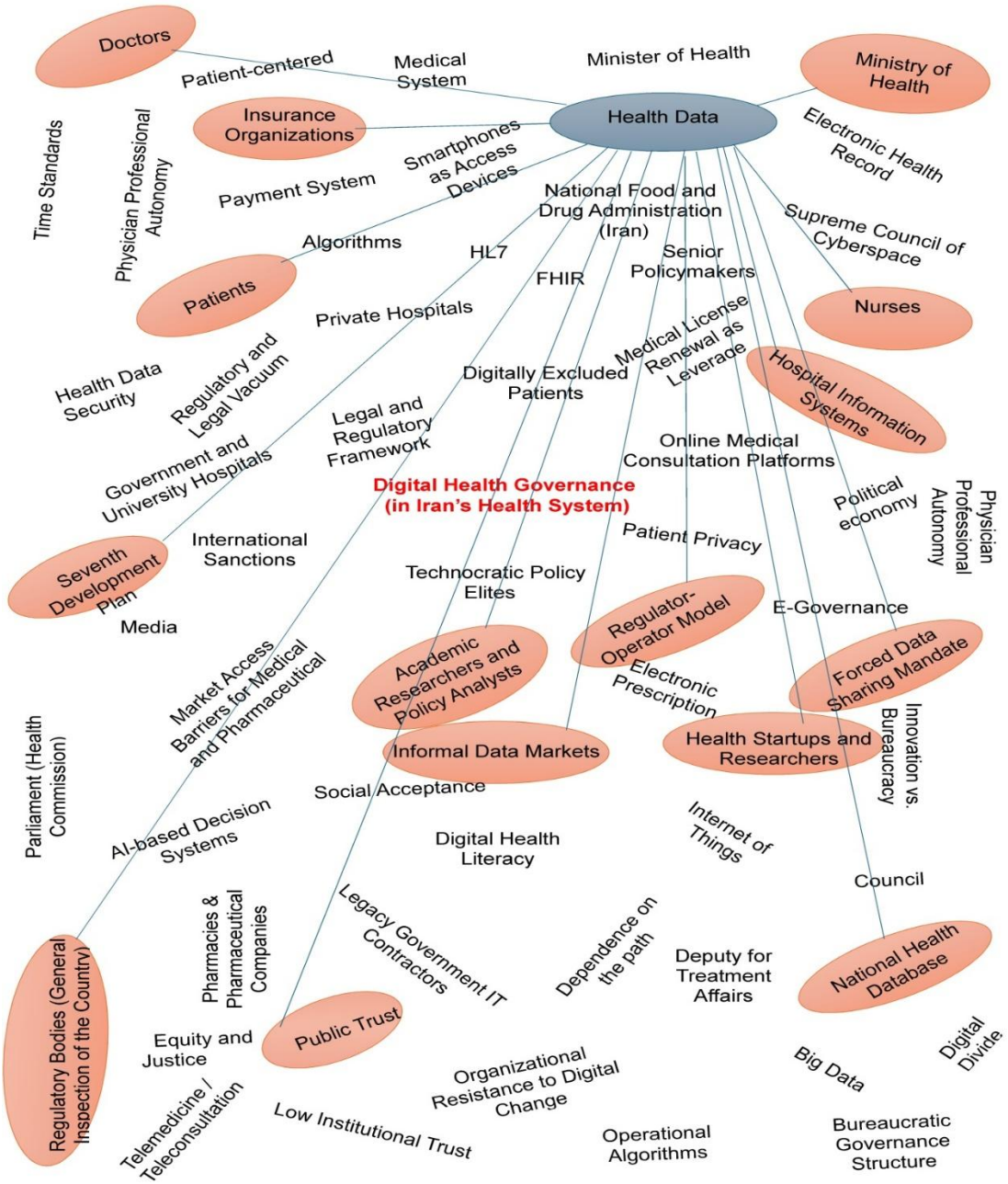

Figure2. Relational Map

Production and quality relations

Data generation under conditions of fragmentation and low incentives

Health data are primarily produced by clinicians as a secondary output of care delivery, often under conditions of heavy workload and administrative pressure. Interview data indicate that this context reduces incentives for accurate, comprehensive, and standardized data entry. As one physician explained:" When I have to see a hundred patients a day, the data I enter are just to meet administrative requirements and get paid—not for research. No one cares about quality, and the system isn't designed to help us." (Participant 7)

Such transactional engagement with data is further entrenched by Article 69 (Clause A-2) of the 7th Development Plan. By legally conditioning the renewal of medical licenses and hospital accreditations upon real-time data submission, the state has effectively institutionalized a 'coercive data culture,' prioritizing submission compliance over clinical data quality.

In addition, hospital information systems operate largely as isolated data silos, storing information in incompatible and non-standardized formats. This fragmentation—associated with hardware-oriented and non-integrated IT procurement practices—limits interoperability and constrains the circulation of data at the system level.

Power and control relations(Health data framed as a sovereign asset)

Relations of power and control constitute a central dimension of the relational map. Public-sector actors, particularly the Ministry of Health, predominantly frame health data as strategic national assets linked to security and sovereignty concerns. A senior official stated:

"These data are national assets related to the country's health security. We cannot simply hand them over to private companies. Protecting and governing them is our responsibility." (Participant 2)

In the absence of a comprehensive legal framework governing health data access and protection, this framing legitimizes restrictive access policies. As a result, decision-making authority over data remains concentrated within state institutions, reinforcing centralized control over data flows and use.

Value and innovation relations (Constrained access and unrealized innovation potential)

In contrast to the dominant regulatory perspective, actors within the technology and research communities conceptualize health data as a critical resource for innovation and knowledge production. Startups and academic researchers consistently emphasized that limited access to real-world, aggregated data restricts their ability to translate technical capacity into practical applications. As one entrepreneur noted:

"We have excellent algorithms for predicting heart disease, but without access to real, aggregated patient data, they remain academic papers. Data are the oil of this industry—and the valve is closed." (Participant 11)

The relational analysis shows that continued emphasis on administrative process optimization—characteristic of electronic governance approaches—constrains the development of data-driven services and limits the participation of non-state actors in value creation.

Cultural and social relations(Trust deficits and social resistance)

At a deeper relational level, health data governance is shaped by low levels of public trust in institutions' capacity to protect personal information. Civil society actors frequently linked resistance to data sharing with the absence of clear accountability mechanisms and data protection guarantees. As one activist observed:

"How can people trust a system that lacks a clear data protection law and constantly leaks information? Build trust first—then talk about data sharing." (Participant 16)

This trust deficit is further reinforced by limited digital health literacy among citizens and segments of the medical profession, contributing to cautious or defensive attitudes toward data sharing initiatives.

Interim Synthesis

Taken together, the relational map demonstrates that health data are embedded within a complex web of production constraints, control mechanisms, competing value claims, and cultural perceptions. These relations do not operate independently but intersect to shape patterns of inclusion, exclusion, and conflict within the field. The configuration observed here provides the empirical basis for the arena and social worlds analysis presented in the next step.

Step Three: The Struggle Over Power(Social Worlds and Arenas Mapping of Digital Health Governance)

To examine macro-level power configurations and patterns of interaction among collective actors, social worlds and arenas maps were constructed (Figure 3). This level of analysis focuses on how different social worlds organize around shared commitments, how they interact within arenas of action, and how authority and legitimacy are distributed across the field.

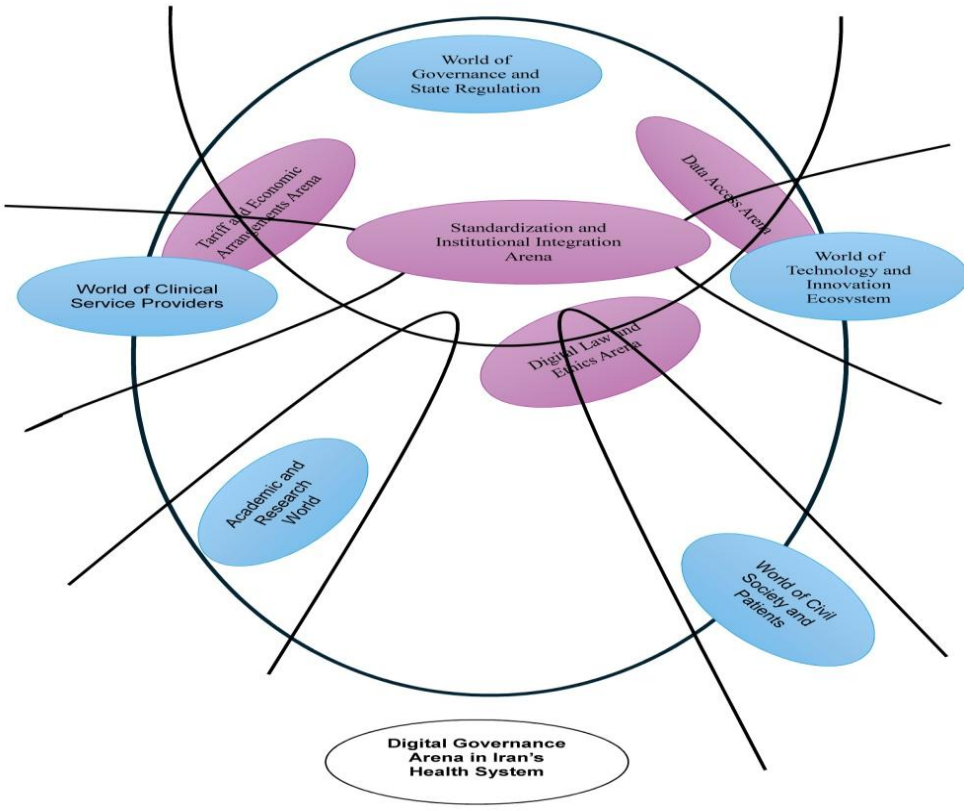

Figure 3. Social Worlds and Arenas Map

The social worlds/arenas map indicates that digital health governance in Iran is not organized as a unified policy arena. Instead, it is composed of multiple, partially overlapping social worlds operating within distinct arenas and guided by different sources of legitimacy.

Hegemony of the state regulatory world

The state regulatory world occupies a central and dominant position across arenas related to digital health governance. Regulatory institutions function as the primary gatekeepers of health data, standards, and authorization processes, shaping both the boundaries of participation and the terms of engagement for other actors.

The centrality of this world is reflected in its control over legal frameworks, licensing mechanisms, and access to core data infrastructures. Other social worlds—particularly technology actors and civil society—are structurally positioned in relation to this regulatory core rather than operating as autonomous centers of authority.

Structural fragmentation within the technology world

The technology world does not constitute a coherent or unified social world. Instead, the map reveals a structural divide between innovative startups and traditional, state-dependent IT contractors.

While startups orient toward data-driven innovation and platform-based solutions, established contractors remain closely aligned with existing procurement practices and hierarchical relationships with public institutions. This fragmentation limits collective action within the technology arena and weakens its capacity to influence governance arrangements or challenge dominant regulatory practices. This dichotomy is structurally reinforced by the Regulator-Operator model mandated in Article 69 (Clause A-4). By strictly defining the private sector's role as merely an executive operator under state regulation, the Plan constrains the scope for autonomous platform innovation.

Marginalized but discursively present civil society

Civil society actors—including patient groups, media, and advocacy organizations—are largely excluded from technical and economic decision-making arenas. Their direct influence over data governance arrangements and technological design remains limited.

However, the map indicates that civil society maintains discursive visibility through public debates, media interventions, and ethical framing of data-related issues. This symbolic and discursive presence contrasts with their marginal position in formal governance structures, producing an asymmetry between voice and authority.

Observed Governance Logics Across Social Worlds

Beyond the configuration of social worlds, the analysis identifies four governance logics that are empirically observable across arenas. These logics are unevenly institutionalized and variably embedded within different social worlds:

1. State-centric control and security logic, primarily associated with regulatory institutions
2. Innovation-oriented logic, fragmented across startup and research communities
3. Managerial efficiency logic, emphasizing process optimization and administrative performance
4. Rights- and ethics-based logic, articulated mainly by civil society and professional discourses

The coexistence of these logics without an overarching coordination mechanism contributes to persistent tensions across arenas.

Interim Synthesis of Power Relations

Taken together, the social worlds and arenas map demonstrates that power in Iran's digital health governance field is unevenly distributed and institutionally concentrated. Dominant regulatory actors shape access, participation, and decision-making, while other social worlds operate within constrained and often fragmented spaces.

These configurations do not represent isolated organizational choices but recur systematically across arenas, providing the empirical context for understanding stability and resistance within the field. The patterns identified here form the basis for the interpretive discussion developed in the following section.

Step Four: Prospective Scenario Construction

From Tensions to Trajectories

Building on the structural tensions identified in the Situational and Arenas analyses (specifically the conflict between state control and innovation needs), this study employed a deductive scenario logic (Schwartz, 1996). The tensions identified in Steps 1–3 were synthesized into two critical uncertainties—factors that are both highly important and highly uncertain.

Consequently, two axes were defined to structure the future landscape:

1. Governance Logic (Y-Axis): Ranging from State-Centric/Hierarchical (continuation of Finding 3.1) to Participatory/Networked (empowering the marginalized actors identified in Finding 3.3).
2. Data Regime (X-Axis): Ranging from Fragmented/Securitized (continuation of Finding 2.2) to Integrated/Open (realization of the innovation logic in Finding 2.3).

The intersection of these two axes generates a 2x2 matrix with four plausible scenarios for the year 2035, as illustrated in Figure 4.

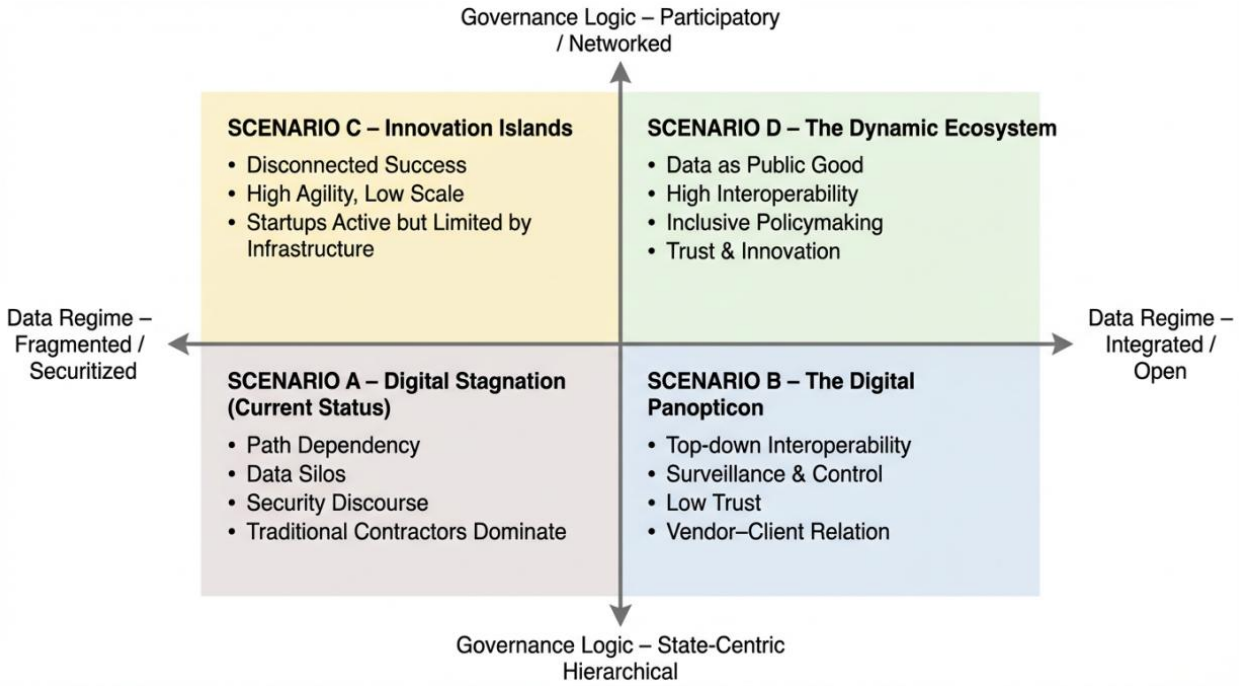

Figure4. Key Characteristics of Digital Health Governance Scenarios in Iran (Horizon 2035)

Each scenario represents a plausible future based on how these critical uncertainties might evolve:

Scenario A: Digital Stagnation (The Official Future) (State-Centric Governance + Fragmented Data)

This scenario represents the continuation of the current path dependency (see Finding 1.4). The state maintains strict hierarchical control, justifying it through security discourses. Data remains siloed in disparate systems due to the resistance of traditional contractors. Innovation is minimal, and the digital health ecosystem remains an archipelago of disconnected projects. The system is digitized but not transformed.

Scenario B: The Digital Panopticon (State-Centric Governance + Integrated Data)

In this scenario, the state successfully enforces technical interoperability (perhaps through top-down mandates) but retains absolute political control. Data flows efficiently, but it flows upwards to the regulator for surveillance and cost-control purposes. The private sector acts merely as a vendor for state-defined needs. While technical efficiency is high, social trust remains low (see Finding 2.4), and genuine bottom-up innovation is stifled.

Scenario C: Innovation Islands (Participatory Governance + Fragmented Data)

Here, governance becomes more inclusive, allowing startups and civil society a seat at the table. However, technical debt and infrastructural fragmentation (see Finding 2.1) remain unresolved. While the will to innovate exists, the means (integrated data infrastructure) are lacking. Success is sporadic and localized—excellent individual apps or hospital systems that cannot scale nationally.

Scenario D: The Dynamic Ecosystem (Participatory Governance + Integrated Data)

This scenario represents a transformative configuration relative to the current institutional arrangement. A shift in governance logic treats data as a public good rather than a sovereign asset. Interoperability standards are enforced to enable data fluidity, while governance mechanisms ensure privacy and equitable access. The structural split in the technology world heals as traditional contractors are forced to open up, and startups thrive on accessible data.

The analysis confirms that the Digital Stagnation scenario is currently being actively reproduced by existing power relations and data regimes. Transitioning toward the Dynamic Ecosystem scenario would entail a fundamental disruption of the structural tensions identified in the Arenas map.

Discussion: Interpreting Plausible Futures of Digital Health Governance

This study set out to explore the complex terrain of digital health governance in Iran, not merely to catalog its current dysfunctionalities but to explore its plausible futures through an anticipatory analytical lens. By integrating Situational Analysis with Scenario Planning, the findings reveal that the digital transformation of the health sector is currently trapped in a governance deadlock—a state where rapid technological adoption clashes with rigid institutional structures.

The discussion below interprets the four identified scenarios (Finding 4) through the lens of the structural tensions mapped in the earlier steps (Findings 1–3), highlighting the critical implications for governance theory and practice.

1. The Gravity of the Status Quo: Explaining Digital Stagnation

The scenario analysis suggests that Scenario A (Digital Stagnation) is not just a passive outcome but is being actively reproduced by the dominant power relations identified in the Arenas Map (Finding 3.1). The hegemony of the state regulatory world, combined with the fragmented data regime (Finding 2.2), creates a powerful path dependency. This dependency is now legally cemented through the enforcement of Article 69 of the 7th Development Plan. By tying medical licensing and institutional accreditation to mandatory data submission, the state has paradoxically deepened this stagnation rather than resolving it.

From an institutionalist perspective, this coercive mandate transforms health data sharing from a professional or clinical norm into a burdensome bureaucratic requirement. Consequently, the default trajectory for Iran's digital health system remains isomorphic mimicry—where the system adopts the form of digital government (e.g., procurement of high-end servers, launching centralized apps) without the function of digital governance, such as transparency, data fluidity, and stakeholder participation (Andrews et al., 2013). The recurrent failure to achieve interoperability should, therefore, be understood less as a technical limitation and more as a structural feature of the prevailing political economy. In this configuration, legal mandates are used to reinforce administrative silos, which continue to serve as power bases for traditional contractors and bureaucratic gatekeepers who benefit from the lack of data transparency.

2. The Trap of The Digital Panopticon: Efficiency Without Trust

A critical insight from this study is the danger posed by Scenario B, where technical integration is achieved at the expense of social trust. While the state's technical capacity for data integration was previously justified by crisis management needs (as seen during the COVID-19 pandemic), it is now being structurally institutionalized through the Regulator-Operator model and the centralized database mandates of Article 69 in the 7th Development Plan. This shift indicates a high risk of sliding into a Digital Panopticon.

Our Relational Analysis (Finding 2.2) showed that health data in Iran is primarily framed as a sovereign asset rather than a public good. The 7th Plan reinforces this by legally concentrating Tawalliyat (stewardship) within the Ministry of Health (Article 70), effectively ensuring that any data fluidity remains under strict hierarchical control. If the state achieves technical integration through these top-down mandates before it adopts a participatory governance model, the result will likely be high-tech surveillance and low-trust compliance. This trajectory aligns with Zuboff's (2019) critique of surveillance capitalism, but in a state-centric variation where data serves administrative discipline rather than public value creation (Zuboff, 2019). From a governance perspective, this highlights a critical risk: utilizing the legal power of the 7th Plan to enforce interoperability without simultaneously strengthening privacy protections and civil society oversight (Finding 3.3) may lead to a technically efficient but socially fragile system, where the efficiency of data flows masks a deeper crisis of institutional legitimacy.

3. The Innovation Islands: The Cost of Institutional Asynchrony

Scenario C reflects the persistent reality for the startup ecosystem identified in Finding 3.2. While the technology world possesses the agility to innovate, it lacks the structural power to scale these innovations within a rigid institutional landscape. This scenario is the direct result of what we term institutional asynchrony—a condition where technological speed outpaces the state's regulatory adaptation, leaving innovators to operate in a legal and data-sharing vacuum.

Despite the ambitious rhetoric of Smart Health and Digital Transformation in the 7th Development Plan, the institutional configuration—particularly the 'Regulator-Operator' model mandated in Article 69—reinforces this power imbalance. By legally defining private actors as mere executive Operators under centralized state Regulation (Article 70), the law effectively caps the growth of the innovation ecosystem. Unless the lines of tension between the central regulator and the innovation world are resolved through negotiated accountability, this configuration will result in a dual-track health system. We will witness a stagnant, bureaucratic public sector on one side, and a hyper-advanced but niche private sector on the other. Ultimately, these Innovation Islands of success remain disconnected from the core National Health Database (Article 69, Clause A-1); they are brilliant but isolated successes that fail to improve population-level health outcomes because they are structurally barred from the broader national infrastructure.

4. The Dynamic Ecosystem Scenario: Governance Implications

Scenario D represents a transformative governance configuration relative to the current institutional arrangement of digital health governance in Iran. Unlike the other scenarios, which largely reproduce existing structural tensions in different forms, the Dynamic Ecosystem scenario is characterized by a reconfiguration of the underlying governance logic shaping data flows, actor participation, and coordination mechanisms.

Interpreted through the lens of the Situational and Arena Maps (Findings 1–3), the realization of this scenario would require a fundamental re-interpretation—if not a structural revision—of the current legal frameworks, particularly the centralized stewardship (Tawalliyat) mandates codified in the 7th Development Plan. Rather than relying on the unilateral command-and-control mechanisms currently implied by Articles 69 and 70, coordination in this configuration emerges through institutional arrangements that enable interaction, interoperability, and negotiated accountability among diverse actors. In this sense, the Dynamic Ecosystem scenario aligns conceptually with broader theories of platform governance and polycentric coordination, where governance capacity is generated through structured interaction rather than unilateral authority (O'Reilly, 2011; Ostrom, 2010).

The analysis highlights two key governance implications associated with this scenario:

1. Reframing Health Data Governance

The Dynamic Ecosystem scenario implies a reconceptualization of health data—from a predominantly securitized and state-controlled asset toward a privacy-preserving public resource. This requires moving beyond the restrictive interpretation of the National Health Database (Article 69) as a tool for administrative oversight, toward a model that treats data as a shared infrastructure. In contrast to the fragmented and 'security-first' data regime identified in the Relational Analysis (Finding 2.2), this configuration is associated with data practices that enable controlled sharing, trust, and fluidity across organizational boundaries.

2. Reconfiguration of Actor Participation

This scenario is also associated with an expanded role for actors currently positioned at the margins of the governance arena. As highlighted in the Situational Maps (Finding 1.4) and Power Analysis (Finding 3.3), patients, independent researchers, and non-state intermediaries are largely excluded from meaningful participation under existing arrangements. In the Dynamic Ecosystem scenario, governance is characterized by greater inclusion of these actors, reflecting a shift toward co-production logics. Here, value is generated through interaction among heterogeneous stakeholders rather than being delivered through top-down administrative processes, effectively challenging the 'Regulator-Operator' hierarchy that currently limits the agency of the innovation ecosystem.

Taken together, these implications suggest that the Dynamic Ecosystem scenario does not represent a linear extension of current digitalization efforts, but rather a qualitatively different configuration of governance relations. Its analytical value lies in illustrating how alternative combinations of institutional logics and power relations could plausibly reshape the future trajectory of digital health governance in Iran.

When comparing these findings with broader foresight studies on smart governance in Iran, several structural parallels emerge. For instance, recent research on smart public administration scenarios (Kazemi et al., 2025) identifies bureaucratic resistance and institutional readiness as primary uncertainties shaping the digital transformation of the public sector. While their study highlights general administrative barriers, our findings demonstrate a more acute 'governance deadlock' specific to the health sector, where the drive for data centralization—codified in the 7th Development Plan—clashes with the needs of a specialized innovation ecosystem. This comparison reinforces the conclusion that unless the 'sovereign asset' framing of data is resolved, the health system remains at high risk of falling into the Digital Stagnation or Digital Panopticon scenarios identified in this study.

Limitations

This study is limited by its qualitative design and reliance on the subjective interpretations of a specific group of experts. The scenarios presented are plausible analytical constructions intended to provoke strategic reflection, rather than probabilistic forecasts. Furthermore, while the study captures the immediate institutional tensions surrounding the 7th National Development Plan, the actual implementation of these mandates is an evolving process; hence, the long-term institutional responses may diverge from current expert interpretations. Finally, the rapid pace of technological change—particularly the rise of Generative Artificial Intelligence—may introduce novel uncertainties and black swan events that could alter governance dynamics beyond the trajectories captured in this analysis.

Conclusion

The transition from electronic government to digital governance in Iran’s health system is neither automatic nor inevitable; rather, it constitutes a contested and politically mediated process now legally codified—yet structurally unresolved—by the 7th National Development Plan. By integrating Situational Analysis with a foresight-oriented scenario approach, this study has deconstructed the current messy situation of digital health governance and reconstructed a set of plausible futures grounded in existing structural tensions.

The findings demonstrate that the current configuration is shaped by a state-centric regime, where the legal mandates for data centralization risk reproducing a logic of bureaucratic control that constrains interoperability and dampens the innovative potential of the technology sector. Looking ahead, the analysis identifies four plausible futures. While institutional inertia threatens to solidify Scenario A (Digital Stagnation) or, through coercive enforcement, accelerate the slide into Scenario B (The Digital Panopticon), alternative trajectories remain conceivable. However, realizing the Dynamic Ecosystem (Scenario D) requires more than mere technological investment or top-down mandates; it demands a fundamental shift in political willingness to move beyond the 'sovereign asset' framing of health data toward a participatory, public-good model.

The primary contribution of this study lies in demonstrating the analytical value of combining Situational Analysis with foresight to illuminate how competing governance logics and legal mandates shape the range of plausible futures. In doing so, the study offers a structured basis for anticipatory reflection for policymakers currently grappling with the implementation of the 7th Plan. Ultimately, the future of digital health in Iran will be determined by whether these new legal frameworks are used as instruments of hierarchical surveillance or as platforms for inclusive, data-driven innovation. Finally, while this study is situated in Iran, the identified mechanisms—such as state-centric data sovereignty and the regulator-operator deadlock—offer a transferable analytical framework for other Global South contexts struggling with similar institutional inertia in their digital health transitions.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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