Health Services Enterprise Architecture

A Framework For Capability Analysis and Design

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The Challenge

Conventional enterprise architecture fails in healthcare because it embraces technology solutionism - the misguided belief that technology improvements automatically produce organizational effectiveness. Despite significant investment in digital initiatives, we see fragmented systems, minimal interoperability, and disconnected technology workstreams without architectural foundation.

- Fragmented systems preventing collaboration and care coordination
- Technology-first approaches ignoring actual organizational reality
- Disconnected initiatives without coherent architectural foundation
- organizational structures not reflected in architecture models
- Minimal value delivered despite substantial financial investment

What This Framework Provides

This framework offers a causally-grounded not relying on technology artifacts. It supports decentralization while providing systematic guidance for capability development across multiple organisational levels.

The framework uses a “four-cause ontology” which allows us to analyse the NHS England actual structure, while revealing the constraints and dependencies across the capabilities and levels of the model.

Conventional Capability Maps 1 (example)

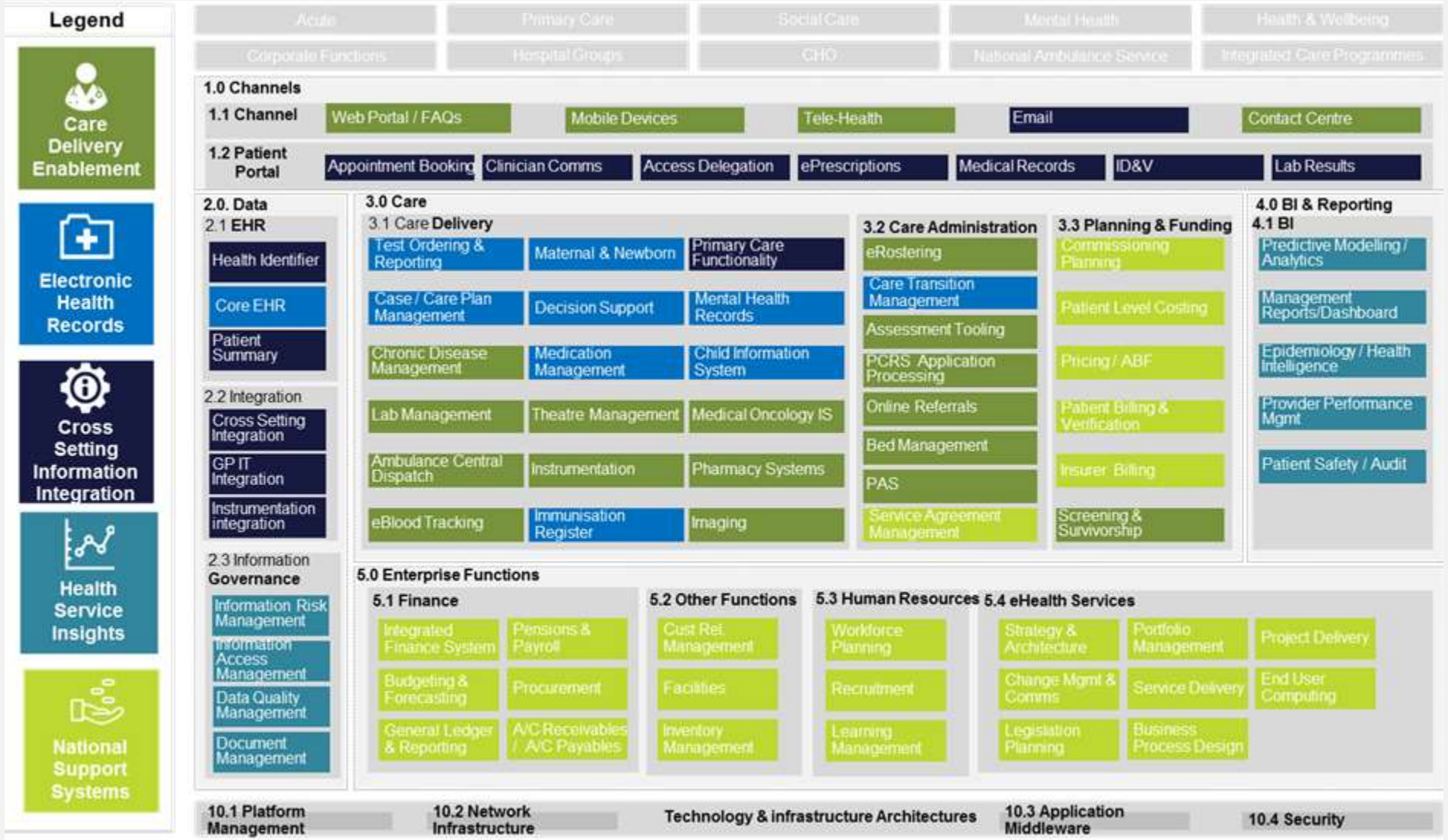

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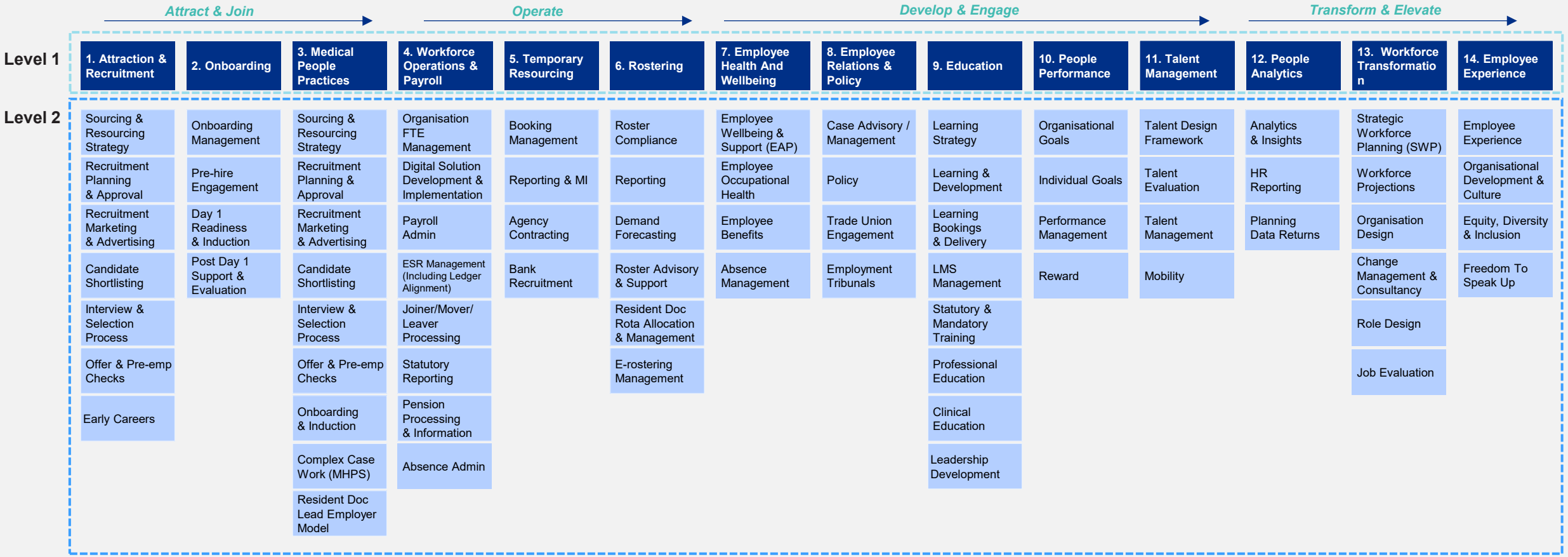
Figure 3: Future State Capability Requirements

Conventional Capability Maps 2 (example)



Definitions for each L1 and L2 function is [included here](#) in the appendix.

Core Principles Summary

Five ontological and five organizational principles form the non-negotiable foundation of this framework. These principles ensure causal clarity, respect organizational reality, and prevent technology solutionism while enabling coordinated action across extreme decentralization.

Ontological Principles

- Four-Cause Structure: Purpose → Standards → Workflows → Products (never inverted)
- Data as Trace: Data is evidence of human action, never the organizing principle
- Individuals-in-Roles: No pre-medicalization, no fixed patient/provider categories
- Purpose-First: Technology always instrumental to organizational purposes, never an end in itself
- Action-Activity Primary: Human purposeful action is foundational, technology is derivative

organizational Principles

- Local Execution Priority: Trust-level autonomy within explicitly defined constraints
- Central Constraints Not Commands: Funding and priorities set centrally, methods remain local
- Regional Coordination Not Control: Learning and pattern-sharing, not operational management
- Heterogeneity as Strength: Different contexts require different approaches
- Constraint Propagation: Systematic relationship between organizational levels

“Technology-First” Architecture Defined

Technology-First or “Technology Solutionism” is the conventional tendency to think that that technology improvements automatically produce organizational effectiveness. It manifests as technology-first design, vendor-driven roadmaps, and absent clinical partnership in healthcare transformation initiatives.

Common Manifestations

Technology-First Design: "We need an EPR system" before "What capabilities do we need?"

Magic Thinking: "AI will solve our problems" without specifying which problems or how

Vendor-Driven Roadmaps: Products determine priorities rather than community needs determining architecture

Absent Clinical Partnership: IT teams lead "healthcare transformation" alone with little or no end-user engagement

Shopping List Mentality: Multiple technology workstreams without architectural foundation or coordination

Why It Persists

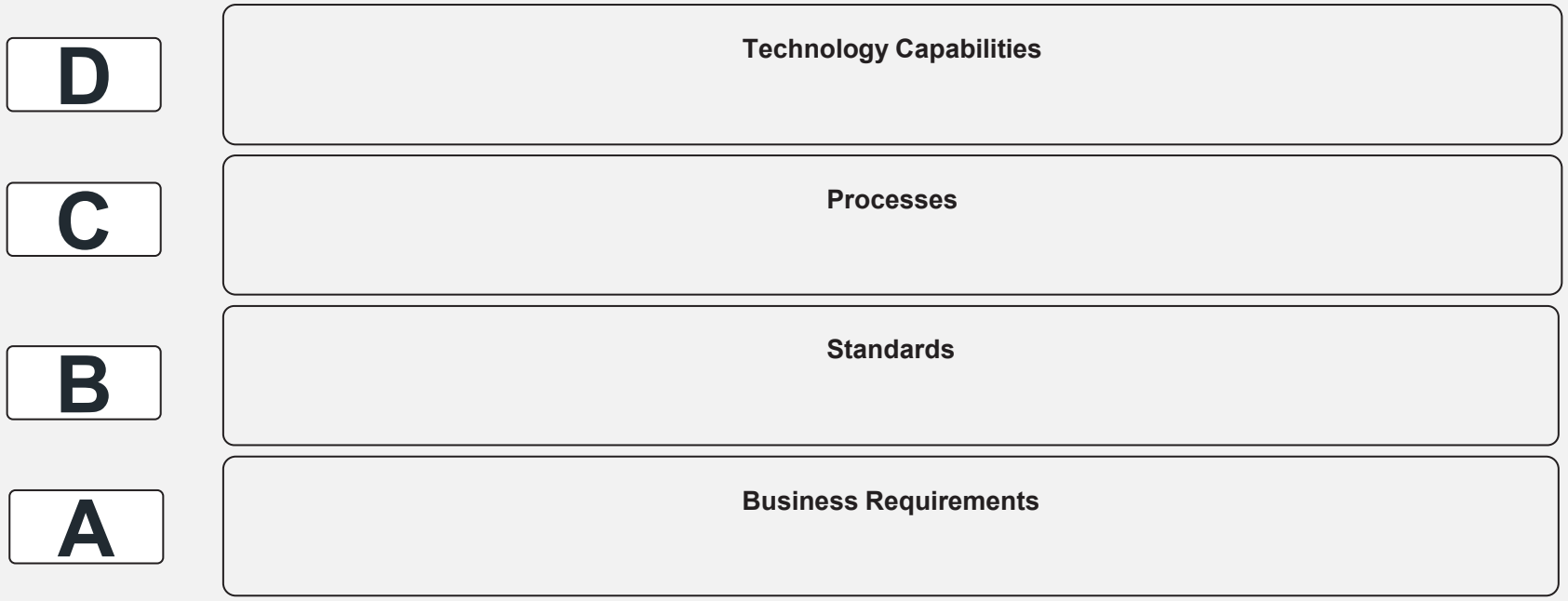
Technology is visible, marketable, and easy to sell to boards seeking quick wins

organizational change is genuinely hard; buying technology feels like action

Success stories from other contexts misleadingly suggest universal applicability

The Pattern of Failed Digital Transformation

Healthcare organizations invest significantly in digital initiatives with focus on technology products, but achieve minimal measurable improvement in capabilities. The Framework analysis reveals this pattern results from weak purpose definition, missing standards layer, fragmented workflows, but overactive technology investment.



Framework Analysis

Layer A (Purpose/Control): Often WEAK with vague "digital transformation" goals not grounded in local and regional needs

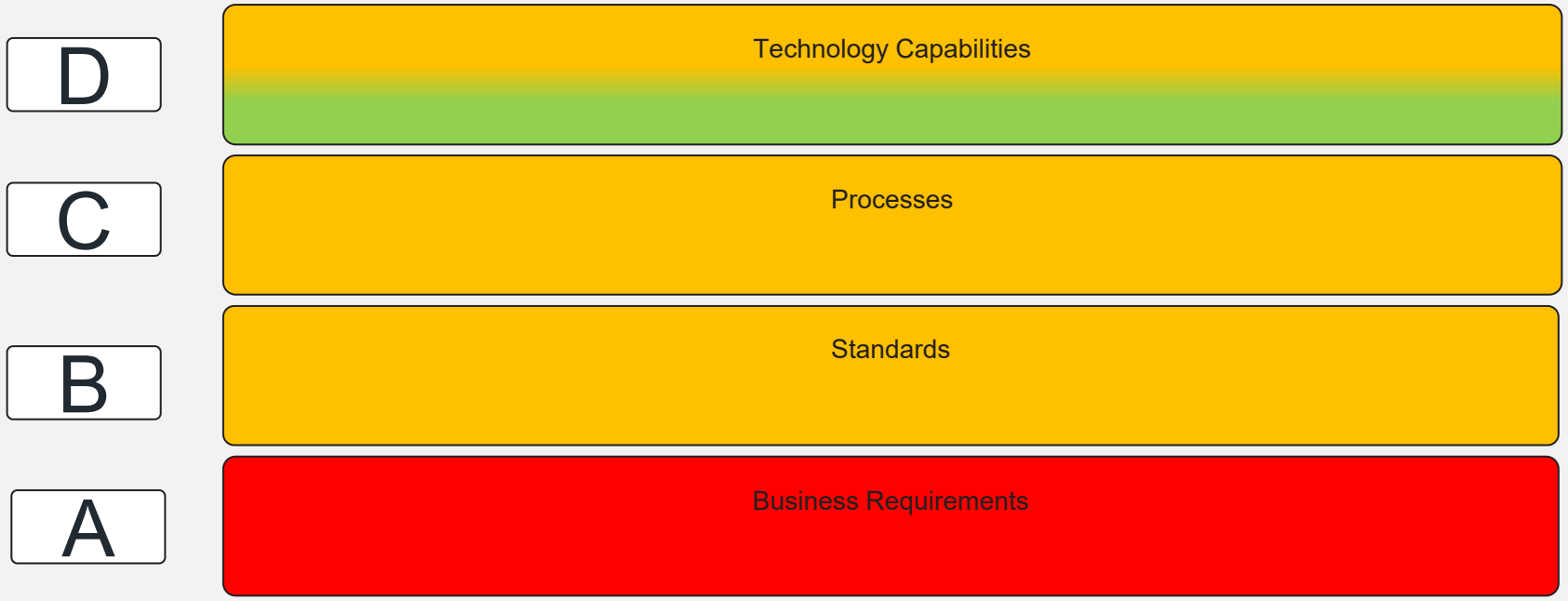
Layer B (Standards/Models): Typically MISSING with no interoperability standards, data architecture, or service design principles

Layer C (Workflows/Procedures): Usually FRAGMENTED with each organization implementing incompatible processes

Layer D (Products/Technology): OVERACTIVE with multiple technology initiatives creating expensive fragmentation

Results of the Technology-First Approach (approximation)

Healthcare organizations invest significantly in digital initiatives with focus on technology products, yet see minimal measurable improvement in capabilities. Framework analysis reveals this pattern results from weak purpose definition, missing standards layer, fragmented workflows, but overactive technology investment.



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The Reality of Technology Solutionism in the NHS

Lord Darzi's 2024 Independent Investigation documented that despite 15 years of digital transformation rhetoric, NHS remains in the "foothills of digital transformation" with £37 billion capital shortfall. The problem is not lack of technology ambition but systematic underinvestment in foundational standards and processes.

Key Findings

- NHS in "foothills of digital transformation" despite 15 years reshaping other sectors with technology
- £37 billion capital investment shortfall vs peer countries (2010-2020s period)
- Capital investment collapsed from 0.54% GDP (2009) to 0.26% GDP (2013), never recovered
- £4.3 billion raided from capital budgets (2014-19) to cover revenue deficits creating vicious cycle
- "Crumbling buildings," "Victoria-era cells infested with vermin," "decrepit portacabins" documented
- Yet Darzi still calls for "more technology" as solution - classic technology solutionism

Specific Problems Traced to Missing Foundations

Eight common problems in health services digital transformation each trace to missing architectural foundations, particularly Layer B (Standards/Models). These are not implementation failures but architectural design failures reflecting technology solutionism.

Problems

- Lack of Interoperability: Systems can't communicate due to missing Layer B standards for data models and APIs
- Inability to Collaborate: organizations can't work together due to incompatible systems preventing coordination
- Fragmented Procurement: Every organization buys different systems due to no Layer B procurement standards
- Security Vulnerabilities: Inconsistent security across organizations due to missing architectural security design
- Data Quality Issues: Inconsistent, unreliable data due to no Layer B data quality standards or governance
- Clinical Workflow Disruption: Technology interferes with care due to inverted causal sequence (Layer D before Layer C)
- Inability to Scale Innovation: Successful pilots don't spread due to missing Layer B standards enabling replication
- Vendor Lock-In: Dependency on specific vendors due to no Layer B standards for interoperability and portability

Why Conventional EA Frameworks Don't Help

TOGAF, Zachman, and ArchiMate exhibit systematic inadequacies making them unsuitable for health services architecture. They create inventories without causal relationships, invert technology's role, ignore organizational complexity, and lack measurement theory integration.

Systematic Inadequacies

- Inventory Orientation: Frameworks create comprehensive documentation with no execution sequence or causal guidance
- Technology Inversion: Technology treated as separate domain inverts causal reality, embedding solutionism in structure
- Missing Causal Structure: No ontological grounding for relationships results in arbitrary connections between elements
- Single-Level organizational Modelling: Frameworks assume hierarchical command-and-control, failing for NHS England's reality
- No Measurement Theory Integration: Frameworks silent on how to measure maturity or aggregate across levels

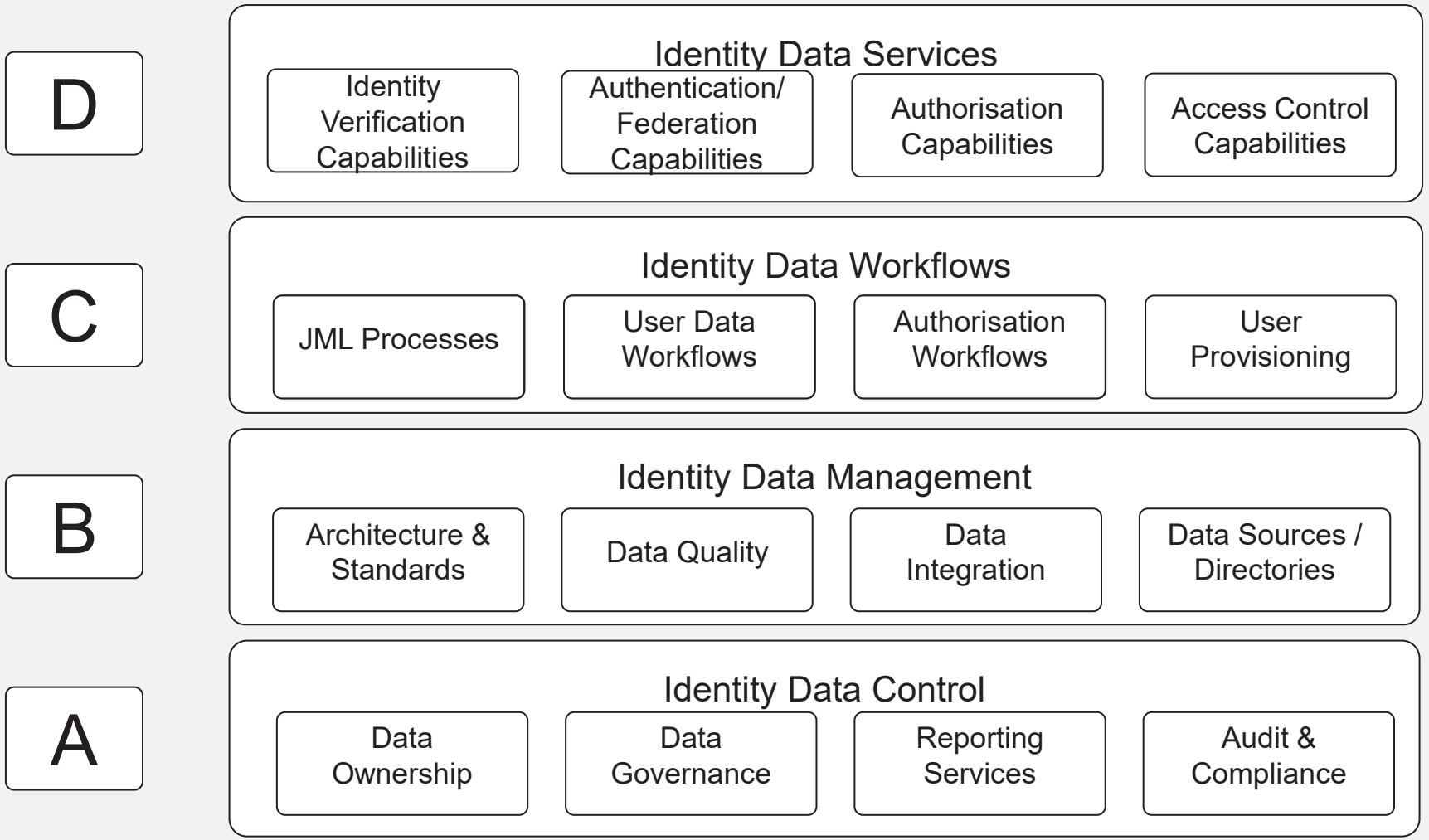
From Problem to Solution

Effective health services EA requires ontological grounding, causal clarity, multi-level formalization, measurement theory integration, and practical applicability. The framework presented in following sections addresses each requirement systematically.

Five Essential Requirements

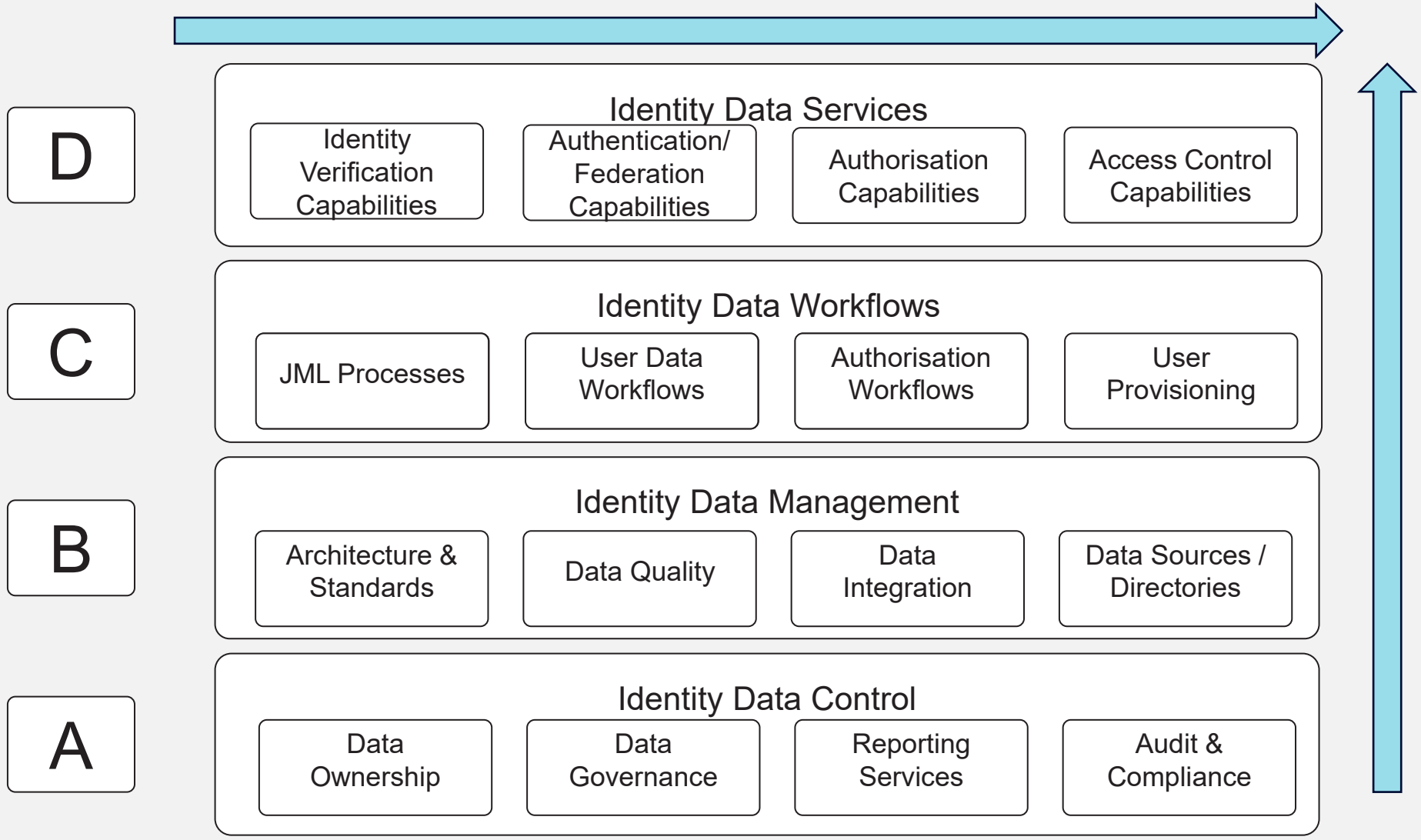
- Ontological Grounding: Start with philosophy of causality, derive framework from first principles with systematic justification
- Causal Clarity: Purpose causes standards, causes workflows, causes products - never invert this sequence
- Multi-Level Formalisation: Four organizational levels with formal constraint propagation respecting local autonomy
- Measurement Theory: Integrate measurement scales, acknowledge aggregation limits, enable context-specific criteria
- Practical Applicability: Work with actual organizational structure, provide concrete guidance, enable incremental development

The Example of Identity and Access Management



Visualization of the architectural layers and their interdependencies. Analysis: Multi-level Framework.

Constraint Propagation and Dependency Relations



Visualization of the architectural layers and their interdependencies. Analysis: Multi-level Framework.

Why These Four Layers and Four Components for Each?

The Four layers and the sequence of components in each of them represent the “four causes” that are necessary and sufficient for complete explanation of organized activity. Modern concepts of systems theory, organisational theory, and Axiomatic Design validate this structure.

Ontological Justification

- Final Cause (Purpose) is necessary because without purpose, action is random motion without meaning
- Formal Cause (Pattern) is necessary because purpose must take definite form to be realizable
- Efficient Cause (Process) is necessary because form must be instantiated through actual action
- Material Cause (Matter) is necessary because process requires physical substrate for execution

Modern Validation

- Axiomatic Design (Suh): Function → Design Parameters → Process Variables mirrors causal sequence
- Systems Theory: Goals → Models → Procedures → Components follows same structure
- Organisational Theory: Strategy → Structure → Process → Resources reflects identical pattern

Causal Sequence and Inversion

The proper causal sequence - Purpose → Standards → Workflows → Products - reflects how organized activity actually works. Technology solutionism inverts this causality, starting with products and hoping they produce purpose, which explains why it produces expensive failure.

Proper Sequence Example

Purpose (A): Improve diabetes care in deprived community considering social determinants

Standards (B): Develop integrated care model for diabetes incorporating social factors

Workflows (C): Design clinical pathways implementing the integrated model in local context

Products (D): Select and configure technology supporting the designed workflows appropriately

Inverted Sequence Example (Solutionism)

Products (D): Buy diabetes management software based on vendor promises or peer recommendations

Workflows (C): Force existing workflows into software's rigid structure causing disruption

Standards (B): Never properly developed; software becomes de facto "standard" without justification

Purpose (A): Original purpose lost; vendor features become organizational goals by default

Key Conceptual Distinctions

Four critical distinctions prevent common errors in health services architecture. Data-centric versus data-driven, equating individuals, person-centric versus user-centric, and technology as instrument versus purpose; each address systematic mistakes in conventional approaches.

Data-Centric vs Data-Driven

- Data-Centric (Correct): Data as trace of human action serving clinical purposes; architecture designed around action
- Data-Driven (Incorrect): Data as organizing principle with workflows designed to produce data; inverts reality

Equating Individuals

- Principle: Patients and clinicians are equal human actors in different situational roles, not different ontological categories
- Implication: No arbitrary domain boundaries based on traditional roles; same architecture applies to individuals regardless

Person-Centric vs User-Centric

- Person-Centric (Correct): Architecture models individuals in various roles; recognizes role fluidity and context-dependency
- User-Centric (Misleading): Assumes fixed user types; creates artificial boundaries; binds the individual to rigid interactions

Technology as Instrument vs Purpose

- Technology as Instrument (Correct): Technology serves organizational purposes; selected based on capability needs
- Technology as Purpose (Incorrect): Technology adoption becomes the goal; "digital transformation" as end in itself

Axiomatic Design and Aristotelian Causality - The Perfect Alignment

Nam Suh's Axiomatic Design theory (1990s) proposes a four-cause structure through rigorous engineering design analysis. The mapping between Functional Requirements (Purpose), Design Parameters (Form/Standards), Process Variables (Efficient Cause), and Physical Components (Material Cause) is not coincidental but reflects fundamental ontological necessity in any o...

I&AM sub domains	Customer Domain CAs	Functional Domain FRs	Physical Domain DPs	Process Domain PVs
1. Data Services	User lifecycle	Applications	Delivery	Parameters
2. Data Workflows "Provisioning"	User and management services	Authentication, Authorisation	Programmes and projects	User management
3. Data Management	Attributes of the System	Functional Requirements	Components, Sub-components	System processes
4. Data Control	Return, Efficiency	Business Goals	Business Structure	Human, Financial Resources
	CAs = Customer Attributes, FRs = Functional Requirements, DPs = Design Parameters, PVs = Process Variables			

The Four-Domain Mapping

Customer Domain (What?): Functional Requirements defining what the system must accomplish → Aristotelian Final Cause (Purpose/Layer A)

Physical Domain (How?): Design Parameters specifying the structure that realizes functions → Aristotelian Formal Cause (Standards/Layer B)

Process Domain (Implementation): Process Variables describing how design is instantiated → Aristotelian Efficient Cause (Workflows/Layer C)

Material Substrate: Physical Components and resources implementing processes → Aristotelian Material Cause (Products/Layer D)

Design Principles from Axiomatic Design

Nam Suh's Axiomatic Design theory provides systematic principles for hierarchical system design that validate and enhance this framework's structure. These principles ensure independence of functional requirements, minimal complexity, and systematic constraint propagation.

WHY: Which Processes are needed to Achieve the Business Goals (business strategy)	HOW: How processes are correlated across units, services, entities (models, frameworks)	WHO: Which Roles are responsible for each process (organisations, people)	WHAT : What are the results of products of the processes (technology, systems)

Core Principles Applied

Axiom 1 (Independence): Each of 16 capability blocks represents independent functional requirement; changes to one minimize impact on others

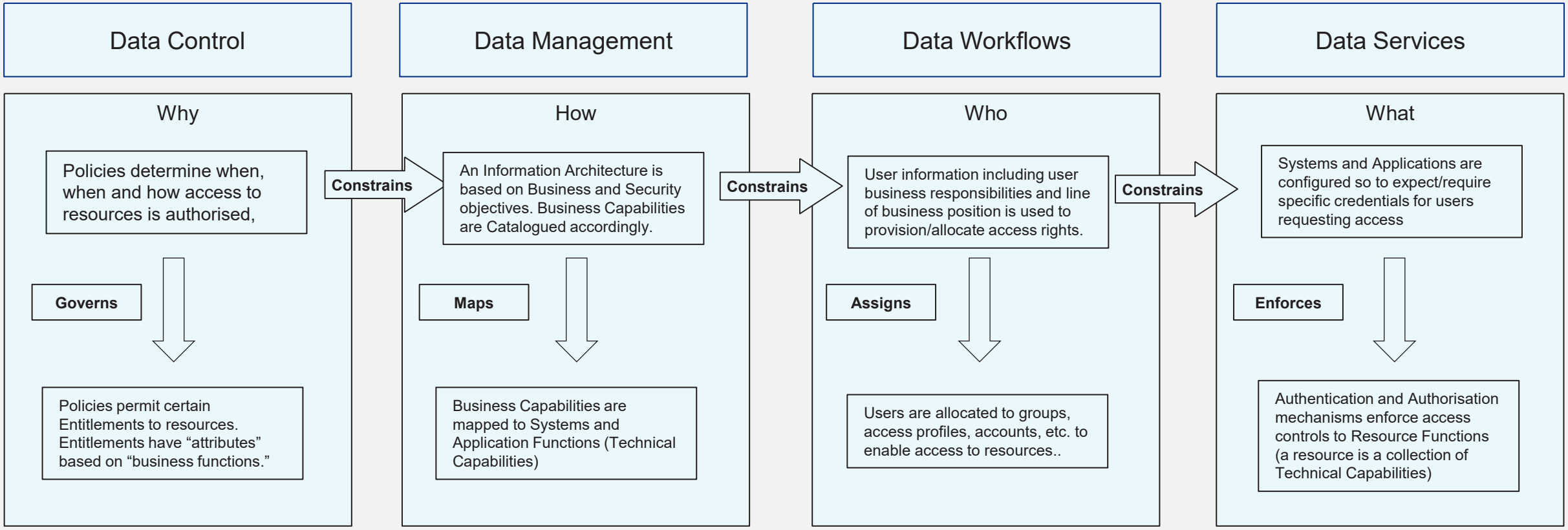
Axiom 2 (Information/Simplicity): 16 top-level capabilities represent necessary and sufficient structure

Hierarchical Decomposition: Complex systems decompose into hierarchies; each level resolves to finer detail naturally

Constraint Propagation: Higher levels set constraints for lower levels; lower levels have autonomy within constraints

The Process of Constraint Propagation in I&AM

Making dependencies explicit prevents attempting impossible development sequences, missing critical preconditions, or investing in technology that cannot be utilized. Four types of constraints operate in the framework: causal, resource, temporal, and organizational.



Axiomatic Design Principles Applied to Health Services

Each Axiomatic Design principle has direct application to health services architecture, validating this framework's structure and providing systematic guidance for capability development. The Independence Axiom prevents unnecessary coupling between capabilities; the Information Axiom ensures minimal complexity; zigzagging and hierarchical decomposition enable multi-level architecture.

Axiom 1: Independence (Minimize Coupling)

Principle: "Maintain the independence of Functional Requirements"

In Manufacturing: Design door hinge so opening door doesn't affect window position

In This Framework: 16 capability blocks represent independent functional requirements; changes to Person Services (Blocks 1-4) should minimize impact on Place Services (Blocks 5-8)

Health Services Example: Developing interoperability standards (Block 2B) should be independent from financial management systems (Block 12D)

Implementation: When coupling is necessary (e.g., Resources Management enables Services), make dependencies explicit in constraint relationships

Axiom 2: Information/Simplicity (Minimize Complexity)

Principle: "Minimize the information content of the design" - simplest design meeting requirements is best

In Manufacturing: Fewest parts, simplest assembly process that meets functional requirements

In This Framework: 16 top-level capabilities represent necessary and sufficient structure without unnecessary complexity

Health Services Example: APQC has 13 primary healthcare processes (arbitrary grouping); this framework has 4×4=16 (ontologically derived)

Implementation: Each of 64 elements (16 blocks × 4 layers) is necessary; removing any creates incompleteness; adding more creates redundancy

Zigzagging Between Domains

Principle: Design proceeds by mapping between domains systematically: Customer Domain (FRs) → Physical Domain (DPs) → Process Domain (PVs) → back to refine FRs

In This Framework: Purpose (Layer A) → Standards (Layer B) → Workflows (Layer C) → Products (Layer D) → feedback to Purpose for refinement

Workforce Example

Layer	Column 1: Purpose	Column 2: Standards	Column 3: Operations	Column 4: Data
A: Purpose & Control (Final Cause)	A1: Organizational Purpose & Workforce Strategy	A2: Workforce Governance & Accountability	A3: Workforce Resource Allocation & Planning	A4: Workforce Performance Goals & Measurement
B: Standards & Models (Formal Cause)	B1: Workforce Architecture & Role Frameworks	B2: Policy & Regulatory Compliance Frameworks	B3: Workforce Service Delivery Models	B4: Data Standards & Information Architecture
C: Workflows & Procedures (Efficient Cause)	C1: Workforce Acquisition & Entry Processes	C2: Workforce Deployment & Scheduling Operations	C3: Workforce Development & Support Processes	C4: Workforce Administration & Case Management
D: Products & Services (Material Cause)	D1: Workforce Analytics & Insight Services	D2: Employee Services & Benefits Provision	D3: Learning Resources & Educational Services	D4: Workforce Information Systems & Data Products

Workforce Capabilities

Workforce Services: 16 Capability Blocks with Internal Quad Structure

Each block contains internal quad (Why/How/Who/What) - 64 total elements

Block	Capability Name	WHY (Purpose)	HOW (Standards)	WHO (Actors)	WHAT (Outputs)
A1	**Organizational Purpose & Workforce Strategy**	Define ultimate workforce goals serving organizational mission	Strategic Workforce Planning frameworks, organizational goal-setting processes	Executive leadership, Board-level HR oversight, strategic planners	Workforce strategy documents, organizational goals, strategic plans
A2	**Workforce Governance & Accountability**	Establish oversight, compliance, and ethical frameworks for workforce management	Governance structures, accountability mechanisms, stakeholder engagement protocols	Governance boards, executive sponsors, compliance officers, trade union representatives	Governance frameworks, audit reports, accountability registers, stakeholder consultation records
A3	**Workforce Resource Allocation & Planning**	Operationalize strategic direction through resource decisions and headcount planning	Budget allocation methodologies, headcount planning processes, approval workflows	Finance + HR leadership, workforce planners, budget holders	Workforce budgets, approved headcount plans, resource allocation decisions
A4	**Workforce Performance Goals & Measurement Frameworks**	Translate strategy into measurable outcomes enabling accountability	KPI frameworks, performance measurement standards, balanced scorecard methodologies	Performance management leadership, measurement specialists	Performance frameworks, measurement taxonomies, KPI definitions
B1	**Workforce Architecture & Role Frameworks**	Define formal structures for organizing workforce capabilities and roles	Role taxonomies, competency frameworks, career architectures, organizational design principles	Organizational design specialists, workforce architects, competency framework designers	Role frameworks, competency matrices, career pathways, organizational structure diagrams
B2	**Policy & Regulatory Compliance Frameworks**	Establish formal rules ensuring legal compliance, ethical conduct, and consistent treatment	Policy development methodologies, legal compliance requirements, consultation protocols	Policy specialists, legal advisors, compliance officers, policy authors	HR policy library, compliance registers, legal opinions, policy briefings
B3	**Workforce Service Delivery Models**	Define HOW workforce services are structured and delivered across the organization	Service design specifications, delivery model architectures, channel strategies	HR service designers, transformation leads, service architects	Service blueprints, delivery model documentation, service standards
B4	**Data Standards & Information Architecture**	Establish data models enabling consistent workforce information across systems	Data governance frameworks, information standards, architecture principles, data quality rules	Data architects, information governance leads, data stewards	Data dictionaries, information models, data quality standards, metadata repositories
C1	**Workforce Acquisition & Entry Processes**	Execute procedures for bringing individuals into the organization	Recruitment workflows, selection procedures, onboarding protocols, early careers programs	Recruiters, hiring managers, onboarding coordinators, selection panel members	Candidate pipelines, offer documentation, Day 1 readiness confirmations, onboarding completion records
C2	**Workforce Deployment & Scheduling Operations**	Execute day-to-day workforce assignment, coordination, and temporary staffing	Rostering procedures, temporary staffing workflows, assignment protocols, demand forecasting	Roster coordinators, bank coordinators, assignment managers, scheduling specialists	Published rosters, booking confirmations, assignment records, shift patterns
C3	**Workforce Development & Support Processes**	Execute learning, wellbeing, and performance development activities	Training delivery protocols, wellbeing intervention procedures, performance review processes	Trainers, wellbeing advisors, line managers conducting reviews, coaches, mentors	Training attendance records, wellbeing consultations, performance reviews, development plans
C4	**Workforce Administration & Case Management**	Execute transactional HR processes and handle complex employee cases	Joiner/Mover/Leaver procedures, case management workflows, payroll processing, absence admin	HR administrators, case managers, payroll processors, employee relations advisors	Transaction records, case files, payroll runs, absence records, employee file updates
D1	**Workforce Analytics & Insight Services**	Provide data-driven insights enabling strategic decisions across all workforce capabilities	Analytics platforms, reporting services, insight generation methodologies, visualization tools	Data analysts, business intelligence specialists, insight consultants	Workforce dashboards, predictive models, trend reports, ad-hoc analysis, regulatory data returns
D2	**Employee Services & Benefits Provision**	Deliver tangible services enhancing employee value proposition and experience	Benefits platforms, service portals, advisory services, employee assistance programs	Benefits administrators, service desk staff, wellbeing service providers	Benefits enrollment confirmations, service tickets resolved, pension services, wellbeing support
D3	**Learning Resources & Educational Services**	Provide accessible learning materials and educational experiences for all staff	Learning platforms (LMS), content libraries, certification programs, educational partnerships	Content curators, platform administrators, educational service providers	Course completions, certifications, learning records, educational content libraries
D4	**Workforce Information Systems & Data Products**	Maintain comprehensive workforce data serving all capabilities across the organization	HRIS platforms (ESR), data warehouses, employee records systems, integration infrastructure	System administrators, data custodians, integration specialists	Employee records, workforce datasets, system availability reports, data extracts

The 16×4 Matrix Overview

The framework applies four-cause ontology recursively, creating 16 capability blocks (four primary capabilities, each with four sub-capabilities) crossed with four causal layers, resulting in 64 architectural elements that comprehensively map health services organization.

Horizontal Dimension (16 Blocks)

Person Services (Blocks 1-4): Purpose, Standards, Workflows, Products for serving individuals in all roles

Place Services (Blocks 5-8): Purpose, Standards, Workflows, Products for communities and populations

Resources Management (Blocks 9-12): Purpose, Standards, Workflows, Products for organizational resources

Governance (Blocks 13-16): Purpose, Standards, Workflows, Products for organizational control and direction

Vertical Dimension (4 Layers)

Layer A: Purpose/Control defining goals and direction for each capability

Layer B: Standards/Models providing patterns and structures for each capability

Layer C: Workflows/Procedures implementing processes for each capability

Layer D: Products/Technology providing tools and infrastructure for each capability

Healthcare General Capability Map

HEALTH SERVICES ENTERPRISE ARCHITECTURE

Complete 16×4 Capability Matrix (64 Elements)

Layer/Block	Position 1: PURPOSE (WHY)	Position 2: MODEL/STANDARD (HOW)	Position 3: WORKFLOW (WHO)	Position 4: PRODUCT (WHAT)
LAYER A: PURPOSE/CONTROL (Final Cause)				
A1: Population Health & Wellbeing	Establish societal mandate to improve population health, reduce disease burden, eliminate health inequities, and ensure health security for all community members.	Public health principles, health equity frameworks, social determinants of health models, and universal health coverage standards that define societal health responsibility.	National health authorities and public health agencies define population health objectives, conduct health needs assessments, and establish strategic health priorities through stakeholder consultation.	National health strategies documenting population health improvement goals, health equity targets, disease prevention priorities, and health security commitments (policy declarations as data).
A2: National Health Policy & Legislative Framework	Translate population health mandate into constitutional, legislative, and regulatory requirements that establish enforceable health rights, provider obligations, and system governance.	Health acts, constitutional health provisions, regulatory frameworks, ministerial mandates, and health system governance standards that formalize health system purposes into legal instruments.	Legislative bodies enact health laws, regulatory agencies develop health regulations, and legal counsel ensures compliance frameworks align with constitutional health rights and international obligations.	Published health legislation, regulatory requirements documentation, compliance frameworks, ministerial orders, and constitutional health provisions (legal texts as authoritative data).
A3: Health Governance & Accountability Processes	Operationalize national health policy through ministerial planning cycles, parliamentary oversight mechanisms, public health authority functions, and stakeholder engagement that ensure strategic accountability.	Ministerial planning procedures, parliamentary committee terms of reference, public consultation protocols, strategic initiative management standards, and accountability reporting requirements.	Ministers of health convene planning councils, parliamentary health committees conduct oversight hearings, public health officers manage strategic initiatives, and stakeholder forums provide community input.	Meeting minutes, oversight reports, consultation summaries, strategic initiative progress records, and accountability review documentation (governance process data traces).
A4: Strategic Health Plans & Performance Frameworks	Document and communicate health system strategic direction, establish measurable performance indicators, and enable public accountability through transparent reporting of health system outcomes.	Strategic planning frameworks, performance measurement standards (e.g., WHO health system performance assessment), balanced scorecard methodologies, and public reporting specifications.	Strategic planning teams draft national health plans, performance analysts develop indicator frameworks, communications teams prepare public reports, and audit bodies validate performance data.	Published national health plans, annual performance reports, strategic health dashboards, public accountability statements, and health system outcome indicators (strategic planning documents as reference data).
LAYER B: MODEL/STANDARDS (Formal Cause)				
B1: Clinical Excellence & Evidence-Based Practice	Ensure all health services are grounded in best available evidence, clinical effectiveness principles, and patient safety standards that define what constitutes quality care.	Evidence-based medicine frameworks, clinical effectiveness standards, patient safety principles (WHO Patient Safety Framework), quality improvement methodologies, and professional practice standards.	Clinical leaders establish excellence criteria, professional bodies define practice standards, patient safety officers develop safety protocols, and quality improvement teams set effectiveness benchmarks.	Clinical excellence frameworks, patient safety standards documents, evidence-based practice guidelines, and quality improvement protocols (normative standards as reference data).
B2: Clinical Taxonomies & Care Pathway Models	Enable caregivers to consistently classify and communicate about subjects-of-care's conditions, ensuring shared understanding across clinical encounters and care transitions through standardized terminologies.	ICD-11 disease classifications, SNOMED-CT clinical terminologies, LOINC observation codes, HL7 FHIR interoperability standards, and standardized care pathway specifications that caregivers use to document health states.	Clinical terminology committees maintain classification systems, care pathway developers validate clinical pathways, informaticians ensure interoperability standards, and clinical experts map local practice to international terminologies.	Published ICD/SNOMED code sets, care pathway libraries, clinical protocol templates, terminology binding specifications, and interoperability conformance statements (classification systems as structured reference data).
B3: Clinical Guideline Development & Quality Assurance	Systematically translate clinical evidence into actionable practice guidelines and quality standards through rigorous development processes that maintain clinical validity and practical applicability.	Guideline development methodologies (GRADE, AGREE II), systematic review protocols, clinical audit standards, quality assurance frameworks, and continuous improvement cycles.	Guideline development groups conduct evidence reviews, clinical experts author recommendations, quality improvement teams perform audits, and validation panels ensure guideline rigor and applicability.	Evidence synthesis reports, guideline draft documents, clinical audit findings, quality assurance assessments, and guideline validation records (guideline development process data).
B4: Clinical Guidelines & Protocol Libraries	Provide caregivers with accessible, authoritative clinical guidelines and protocols that standardize care delivery and support evidence-based decision-making at point of care.	Clinical guideline publication standards, protocol library structures, guideline dissemination specifications, version control requirements, and clinical decision support integration standards.	Clinical publishers disseminate guidelines, library maintainers ensure accessibility, clinical educators integrate guidelines into training, and informaticians embed guidelines in decision support systems.	Published clinical guidelines, protocol libraries, best practice summaries, clinical decision algorithms, and guideline implementation toolkits (guideline publications as actionable reference data).
LAYER C: WORKFLOWS/PROCEDURES (Efficient Cause)				
C1: Timely & Coordinated Care Delivery	Ensure subjects-of-care receive appropriate clinical interventions at the right time, in the right sequence, with effective coordination across caregivers and care settings.	Care coordination frameworks, timeliness standards (e.g., emergency department wait times, referral-to-treatment intervals), care transition protocols, and multidisciplinary team coordination requirements.	Care coordinators orchestrate patient journeys, multidisciplinary teams collaborate on care plans, referral managers facilitate transitions between care levels, and scheduling teams optimize appointment timing.	Care coordination plans, appointment schedules, referral tracking records, care transition summaries, and timeliness performance data (coordination workflow data traces).
C2: Service Delivery Models & Referral Frameworks	Define organizational structures for care delivery through tiered service models (primary/secondary/tertiary), referral protocols, workforce role definitions, and care coordination standards that enable systematic care delivery.	Tiered service delivery specifications, referral protocol standards, clinical role definitions (scope of practice), care team composition requirements, and inter-provider coordination frameworks.	Service planning teams design delivery models, workforce planners define role structures, referral management develops protocols, and integration teams establish coordination mechanisms across care tiers.	Service delivery model documentation, referral protocol manuals, workforce role specifications, care team structure definitions, and coordination framework guidelines (service model specifications as reference data).
C3: Clinical & Administrative Operational Processes	Execute the actual delivery of clinical and administrative services through standardized patient journey workflows that guide subjects-of-care from initial contact through post-care follow-up.	Patient journey workflow specifications (registration→triage→assessment→diagnosis→treatment→discharge→follow-up), appointment scheduling procedures, clinical documentation standards, and administrative support protocols.	Clinical teams (physicians, nurses, allied health) deliver care following patient journey workflows, administrative staff manage appointments and documentation, care coordinators facilitate transitions, and support teams provide operational assistance.	Appointment confirmations, triage records, clinical assessment notes, diagnostic reports, treatment records, discharge summaries, follow-up plans (operational workflow data traces of all caregiver-patient interactions).
C4: Care Episodes & Patient Records	Preserve comprehensive documentation of all clinical encounters and care delivery activities, creating permanent evidence of caregiver-patient interactions that supports care continuity, billing, quality improvement, and legal accountability.	Electronic health record (EHR) standards, clinical documentation requirements, data retention policies, record completeness criteria, and information governance frameworks that specify what must be documented and how.	Clinicians document encounters in real-time, medical records teams ensure completeness, health information managers maintain record integrity, and compliance officers verify documentation standards adherence.	Complete patient health records, documented care episodes, clinical encounter notes, diagnostic imaging records, laboratory results, medication records, consent forms (comprehensive clinical data repository).
LAYER D: PRODUCTS/SERVICES (Material Cause)				
D1: Accessible & Actionable Health Information	Provide subjects-of-care, caregivers, and decision-makers with timely, understandable, and usable health information that supports informed decisions, self-care, clinical practice, and health system management.	Health literacy standards, information accessibility requirements (WCAG), patient portal specifications, clinical information system usability standards, and health information presentation guidelines.	Health informaticians design information systems, patient portal developers create access interfaces, health educators ensure information understandability, and communications teams disseminate population health information.	Patient portals providing personal health records access, public health websites, clinical information systems, health education materials, and decision support interfaces (information delivery systems).
D2: Data Standards & Interoperability Specifications	Enable seamless health data exchange across systems, providers, and jurisdictions through standardized data structures, exchange protocols, and quality requirements that ensure data can be shared, understood, and trusted.	HL7 FHIR interoperability specifications, data quality frameworks (completeness, accuracy, timeliness), reporting format standards, API specifications, terminology binding requirements, and information governance policies.	Health informaticians develop data standards, interoperability architects design exchange mechanisms, data governance committees establish quality requirements, and technical teams implement standards in systems.	Published data exchange specifications, API documentation, data quality frameworks, terminology binding guides, interoperability conformance statements (data standards as technical reference documentation).
D3: Data Analytics & Reporting Workflows	Transform raw health data into meaningful information through systematic collection, aggregation, analysis, and visualization that reveals patterns, trends, and insights supporting health system improvement.	Data collection protocols, data aggregation methodologies, analytical frameworks (epidemiological methods, statistical analysis), visualization standards, report generation procedures, and dissemination protocols.	Data analysts aggregate and analyze health data, epidemiologists identify population health trends, business intelligence teams create dashboards, statisticians validate analytical methods, and report authors communicate findings.	Data collection records, aggregated datasets, analytical reports, statistical summaries, trend analyses, data quality assessments (analytical workflow outputs and intermediate data products).
D4: Health Intelligence Products & Services	Deliver actionable health intelligence through population health dashboards, performance reports, surveillance systems, and decision support tools that enable data-informed decisions at all health system levels.	Dashboard design standards, report formatting specifications, data visualization guidelines, decision support algorithm documentation, surveillance system protocols, and intelligence product quality standards.	Dashboard developers maintain real-time visualizations, report producers generate periodic performance reports, surveillance teams monitor disease patterns, and decision support engineers deploy clinical algorithms.	Live population health dashboards, published performance reports, disease surveillance alerts, clinical decision support recommendations, predictive analytics outputs (final health intelligence products consumed by decision-makers).

What This Framework Enables

The framework enables systematic capability analysis with justified architectural decisions for enterprise architects, capability development with investment prioritization for Trust leaders, contract specification with realistic expectations for ICB commissioners, and realistic expectations with standards focus for policy makers.

Implementation requires starting with organizational structure assessment and capability gap analysis, focusing on Layer B (Standards) development before Layer D (Products) investment. Challenges include cultural resistance to a purpose-first approach, technical complexity of multi-level architecture, top-level priorities, and resource requirements.

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