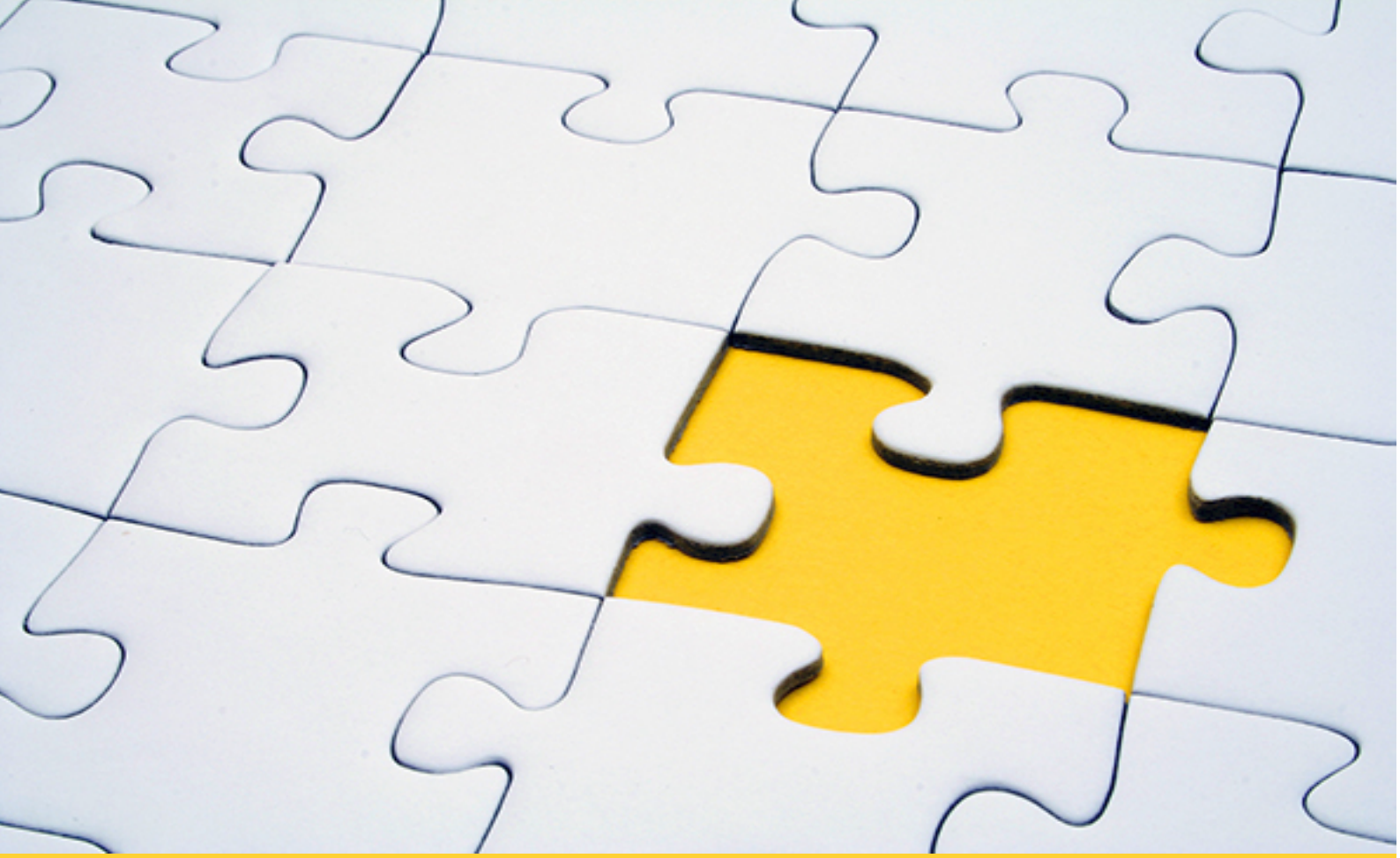

WHITE PAPER

Transforming healthcare

A concept paper for enabling transformation of healthcare systems

By Scaling Lab

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1. EXECUTIVE SUMMARY

A profound crisis has emerged in healthcare systems globally, rooted in a confluence of factors, including demographic shifts, an aging population, surging cases of chronic diseases, workforce shortages, and protracted waiting times. While our proposed transformation holds promise as a solution to these challenges, some proponents advocate for higher-order incentive-driven concepts such as New Public Management (NPM), Value-Based HealthCare (VBHC) or Patient-Centred Care as alternatives (PCC).

Despite substantial investments in digitalization over the last 30 years, these efforts and the above higher-order concepts, have not solved the escalating challenges in healthcare.[1] In fact, the problems in healthcare systems show exponential growth. We argue that there is *an underlying systemic value configuration issue* that needs to be addressed to solve the crisis in healthcare systems.

So, this white paper delves into the fundamental principles underpinning how value is created in healthcare, employing the lowest-order method to identify the foundational challenges and propose a systemic reconfiguration of underlying logic going forward. By addressing this systemic logic, healthcare systems have the potential to double their performance and output while simultaneously reducing human resources.

At its most fundamental level, healthcare encompasses two primary activities, diagnostics (value shop) and treatment (value chain). Diagnostics, often referred to as «problem finding», necessitates advanced expertise and experience. Conversely, treatment, in many instances, can be streamlined using a standardized «factory» logic.

The most effective structure for managing complex workflows and processes at scale until the digital age has been the functional hierarchy; the patient journey is a stepwise, linear and sequential "handover" across independently governed and optimised siloes. The interfaces between the functional hierarchy and the actual work processes are the main reason for the current exponential growth in healthcare system load.

The question then arises: Can healthcare be restructured on the third model of value creation – the value network? In other industries, digital transformation has significantly altered how value is created, and the value network model is currently the dominant value configuration model globally. Consider prominent examples such as Amazon, Airbnb, Meta, Uber, and Google. Could a similar transformation be applied to healthcare, yielding comparable gains?

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[1] Lower-order concepts are the building blocks of knowledge and usually refer to tangible or narrowly defined entities. Higher-order concepts are abstract, generalized ideas that encompass and organize multiple lower-order concepts. Using higher-order concepts like VBHC, PCC or NPM to solve an underlying systemic problem is like a physician treating symptoms rather than the underlying cause.

To affect the underlying value creation of healthcare, we must target how value is configured. This necessitates a shift to an «actor-centric» model, where autonomous actors manage themselves and collaborate directly with other actors on a shared digital platform without the need for a functional hierarchy to intervene.

This paradigm shifts our understanding of what is a patient: The patient is no longer a passive element - or «package» - in the system. Instead, the patient becomes an actor on par with other actors, collaborating with other actors such as physicians, nurses, laboratories, imaging services, and pharmacists – each with decision-making capabilities that contribute to the healthcare network.

A transformation to a value network logic requires three fundamental enablers (Fjeldstad, Snow, Miles and Lettl, 2012):

a) Autonomy for actors—allowing each actor to make informed decisions.
b) A shared system for learning and information—a collective repository for information accessible to all actors.
c) Digital infrastructure—with interoperable protocols, software, and applications that facilitate interaction among all actors.

Transitioning from the current system to an actor-centric model requires a cohesive, top-down strategy with a robust core digital infrastructure that supports a gradual, bottom-up reconfiguration of the healthcare system. Organisation and processes must evolve simultaneously with the development and implementation of technology.

Attempts to implement large, monolithic IT systems in existing hierarchies and processes – imposing new technology top-down – have resulted in unsustainable burdens for health systems. The monolithic approach disregards the necessity of autonomy and synchronized evolution among actors, technology and organizational practices. We will explain why large monolithic systems fail in implementation.

Instead, we advocate for an «ecosystem» approach to digital transformation, enabling technology, autonomous actors and organizations to evolve together, discovering novel approaches based on the power of the value network model.[2] And we provide guidance on developing a coordinated top-down strategy in conjunction with bottom-up innovation processes.

Numerous initiatives have focused on incremental improvements in healthcare but merely digitizing individual processes has not addressed the core issue: Complexity in healthcare drives costs exponentially with healthcare system load due to fundamental structural inefficiencies. By reconfiguring the current value creation logic onto a more potent value creation model healthcare can unlock exponential value. What is currently

[2] An ecosystem is a system formed by the interaction of actors with one another and with their milieu. It's a dynamic and interconnected web where each component plays a role in maintaining balance and supporting and upholding the system.

perceived as the primary challenge – complexity – is the defining strength in our approach, which we call the actor-centric network (ACN).

Transforming healthcare to an actor-centric network model is likely to follow the path of a paradigm shift, which, even in the most favourable scenario, will span two decades or more. This timeline reflects the depth and breadth of change needed – not only in infrastructure but also in mindsets, workflows and system interconnectivity. The gradual shift will necessitate a sustained commitment to reconfiguring value creation, evolving roles, and integrating new technologies. By fostering alignment across top-down strategies and bottom-up initiatives, this transformation can unfold progressively, laying the foundation for a robust and sustainable healthcare system.

2. PREFACE

Over the past decade, Scaling Lab has been deeply involved in the topic of innovation and value creation in healthcare. We acknowledge that healthcare is a complex domain and that a transformation of the sector represents significant challenges. To facilitate understanding, we have adopted a conversational tone throughout this white paper, employing the pronouns «we» and «you» to convey our proposal for the healthcare sector in a dialogue-like manner.

We propose a conceptual framework for transforming healthcare from its current model based on diagnostics and problem-solving (value shops) and industrialised treatment (value chains). We envisage transforming to a value network model to increase the value creation potential in the healthcare sector. Our proposals are firmly grounded in relevant research within the healthcare sector. We believe it is possible to unlock significantly better output of our healthcare systems with less resources allocated.

Modern systems increasingly operate as dynamic ecosystems, transcending conventional boundaries and fostering specialized roles and interdependent networks. This transformation necessitates a flexible, unifying digital platform to support a decentralized, actor-oriented healthcare system. Such a platform will emerge over time by the expanding landscape of medical and information technologies.

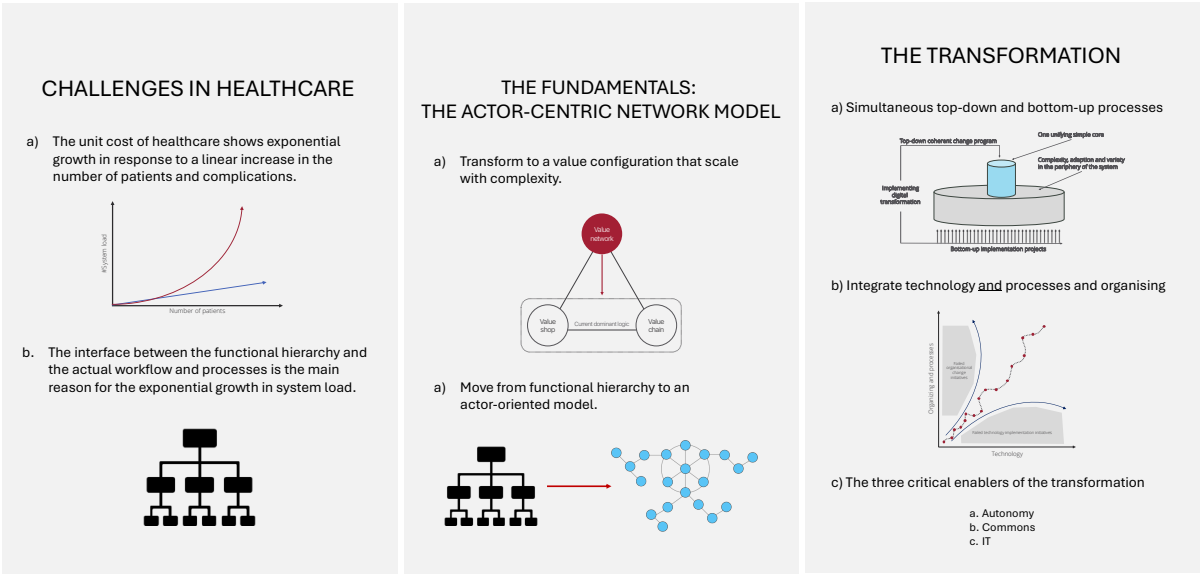
We believe that the transformation of healthcare will depend on its actors' seeking autonomy, demonstrating creativity, and discovering novel methods enabled by emerging technologies. We argue that transformation commences at the policy level in healthcare, where stakeholders should prioritize three main responsibilities:

1. **An overall strategy for healthcare transformation**: Develop a cohesive strategy that defines a high-level vision from the policy and executive level outlining the implementation from the operational level.
2. **Orchestration**: Assign a long-term mandate with resources to competent, non-political «orchestrators» to guide and drive the transformation.
3. **A cohesive digital core for the future healthcare system**: Develop a common, shared infrastructure that all stakeholders can access and connect to seamlessly.

A transformation, however, will not occur through top-down directives; it will emerge bottom-up through service redesign (Fjeldstad et. al., 2019), advancing process by process, actor by actor, institution by institution, and region by region – as you succeed. This fosters autonomy and decentralises decision-making, enabling roles in healthcare to become more independent and less constrained by current structures.

A comprehensive analysis of the transformation of healthcare presents a multifaceted challenge. To provide readers with a holistic understanding of our proposal, we have structured the narrative into three fundamental concepts: Challenges, Fundamentals,

and Transformation. We await this framework to facilitate effective presentation and discussions with your colleagues.



We hope you will find this white paper engaging. Read and share!

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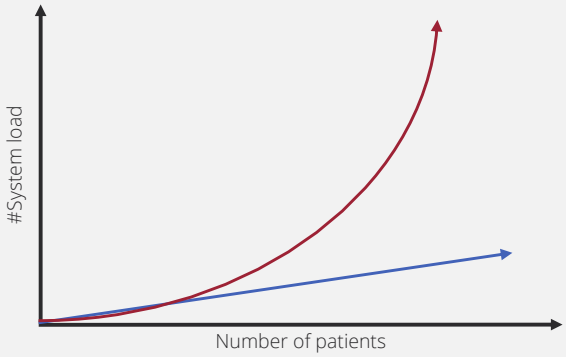
Tom Lindtein, Civil engineer

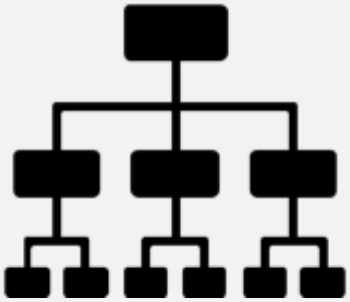
Per Ingvar Olsen, Professor

CHALLENGES IN HEALTHCARE

a) The unit cost of healthcare shows exponential growth in response to a linear increase in the number of patients and complications.



b. The interface between the functional hierarchy and the actual workflow and processes is the main reason for the exponential growth in system load.



3. INTRODUCTION

Despite huge investments in digitalisation over the past decades, the momentum of the systemic challenges is growing. So, developed economies have not succeeded sufficiently with digital transformation and produced the results hoped for.

Looking at today's digital challenges in a historic perspective, healthcare information systems have undergone significant evolution since the 1970s. In the US, several of these systems have matured into substantial and comprehensive hospital management platforms. These systems have also been exported to other countries, exemplified by Epic and Cerner. These systems originated within the context of «corporate ICT systems», e.g., to effectively serve the organization as a unified digital system.

In Europe, digital pioneers such as the Scandinavian countries adopted a strategy to acquire comprehensive systemic solutions and adapt them to their local contexts around 2010. This approach emerged in response to a history of highly decentralized developments of digital solutions since the 1970s in both primary and secondary care. Following unsuccessful attempts to develop «complete» systems within domestic healthcare regions in the late 1990s and early 2000s, focus shifted towards acquiring and adapting complete solutions from US suppliers. This suggested a «revolutionary approach» to eliminate all the numerous local systems and install a new, modern, and «complete» digital management system.

The new approach, however, encountered significant challenges. Firstly, adapting US-based systems to the European healthcare context proved difficult due to substantial systemic differences. Secondly, there was a severe issue of long-term lock-in effects towards highly influential international suppliers controlling the newly developed digital systems. Thirdly, implementing and initiating large-scale revolutionary systems proved highly problematic in terms of user adaptation, experiences, and value outputs. Essentially, the approach fundamentally disrupted essential learning and collaborative processes with users necessary for effectively co-developing, adapting, and maximizing the value of the investment. Consequently, policy makers and owners of healthcare systems are currently in a period of strategic reorientation.

In the current situation it is a growing concern in healthcare that the large monolithic systems are becoming too difficult and costly to implement. Negative stories of failure spread to the public and healthcare policy makers are left with pressure to digitalize but with high risk and fewer options on the table. We believe that this situation represents an opportunity to take a position and partner at a strategic level in healthcare – to navigate a strategic direction for a digital transformation in the healthcare sector.

In parallel with healthcare's digital development, there has been a history of economic models and frameworks heavily influencing healthcare. Originating in the 1970s and implemented in the 80s and 90s, the OECD-led «New Public Management» concept played a significant role in transforming European healthcare systems - whereas «Value Based Healthcare» (VBHC) emerged internationally a few decades later from its origins in the US.

Value Based Healthcare (VBHC)

"The delivery of health outcomes that matter to patients relative to the cost of achieving those outcomes."

- Michael Porter

VBHC is a US economic framework promoted as governing principles of healthcare systems.

We perceive VBHC and the actor-centric network (ACN) approach we propose in this document as complementary. Both endeavors aim to enhance outcomes and efficiency but whereas VBHC addresses a *higher-order* systemic level based on an economic framework, the ACN addresses the *lowest-order* fundamentals of how value is created by deconstructing tasks and workflow and processes at the very lowest level. Both VBHC's use of efficient resource utilization to deliver value aligns within our networked framework and the patient-centric care naturally aligns with our ACN model.

While VBHC is typically structured around healthcare providers and payers, rewarding specific treatment outcomes, our ACN approach envisions a broader network that includes non-commercial actors such as family, community health services, digital platforms, and preventive care, emphasizing ongoing interactions that create value beyond clinical metrics alone.

Actor-Centric-Network (ACN)

The combination of a network driven value creation model and an actor-oriented model for organising.

This creates a decentralised digital organisation where autonomous actors collaborate to produce a common output.

Furthermore, VBHC tends to operate within existing healthcare structures and often applies hierarchical and siloed approaches to improve specific outcomes. The ACN model, however, aims to organize interactions across silos, fostering real-time collaboration across the decentralized network, providing effective decision-making and effective work-processing support through enabling technologies and data commons.

For true synergy, VBHC would need to evolve toward supporting flexible, decentralized, and interconnected operations. VBHC often focuses on discrete, measurable outcomes tied to specific episodes of care. In contrast, our ACN model views healthcare as a continuous, adaptive process where value is created through shared learning, knowledge transfer, and actor autonomy. To align, VBHC might need to accommodate metrics that reflect longitudinal outcomes and complex, systemic improvements.

VBHC is grounded in economic theories suggesting that value is reflected in market prices and that effective healthcare service allocation is ideally achieved through

market transactions within structured transactional systems. Our approach acknowledges this valuable contribution but adopts a distinct perspective - rather than focusing on market transactions, we concentrate on the methods by which health services are produced. The value creation logics that serve as the fundamental basis for organizing efficient and effective economic activities are the subject of our analysis. These models reveal specific economic mechanisms that explain their effectiveness and the circumstances under which they can be productively applied.

Value chains, value shops, and value networks represent the three fundamental models at work in healthcare. Our objective is to explain the essence of their functionality and describe their respective roles. We propose that an effective strategy for developing a more efficient and effective healthcare system entails the development of the value network model upon the foundation of a digital platform-infrastructure equipped with advanced analytical engines capable of operating and managing data analysis and flows. This approach should facilitate data-driven decentralized networked healthcare operations that prioritize the collaboration of actors involved in the creation of healthcare services in practice, including patients, healthcare providers, family members, and other relevant actors, resources and activities.

The concept proposed in this paper is not radical, as it has been a subject of discussion since the late 1990s. The exponential problem appearing when managing workflow and processes in healthcare has been described before and using digital means to solve these challenges is not a new idea. And the concept of value configurations and actor-oriented organising in healthcare is described in Fjeldstad et. al. (2019). In essence, the proposals presented in this white paper are firmly grounded in research in the fields of strategy, organizational design, and business models within the healthcare sector.

What is new is the recognition of the significance of system level strategy and how systems are implemented - the process through which a more efficient and effective decentralized healthcare system can be effectively developed and adopted. The lessons learned from the last decade of efforts to acquire and implement revolutionary technologies and systems, such as those from Epic, point toward an evolutionary, emergent, and interactive learning-oriented development and adaptation strategy.[3]

This approach requires time but also holds the promise of generating value as progress is made and solutions are tailored to the context where people and organization's need to learn and develop with digital systems. Therefore, the strategy should be integrated into a thorough comprehension of process methodologies that prioritize effectiveness and efficiency as outcomes of interactions among actors, resources and activities.

[3] Whereas revolutionary is a sudden, drastic, and often transformative change that disrupts the existing order, evolutionary is gradual, incremental change or improvement that builds on the existing structure.

ACN must be «radically adaptive», which necessitates a digital architecture with a stable core combined with numerous modular systems in the diverse, complex, and dynamic periphery of healthcare provisioning services. These modular systems can be developed and renewed independently of each other while maintaining the overall stability of the system. The final part of this paper will be devoted to a more practical guide on how to implement ACN in accordance with this logic.

We argue that the current situation where policy makers and healthcare owners cope with rising worries linked to implementation failure of large and complete systems, - it is currently an opportunity to take a strategic position as “the alternative” to the monolithic model. This paper will explore what is the obvious alternative, its fundamentals, its enablers and how to implement.

4. GLOBAL HEALTHCARE SYSTEMS: CRISIS AMID PLENTY

Healthcare systems worldwide are currently on an unsustainable trajectory. A confluence of demographic changes, workforce shortages, escalating demand, and the reliance on imported healthcare professionals has pushed many systems to the brink. These challenges are not novel; the Covid-19 pandemic merely accentuated and accelerated the inevitable limitations of a system that has long been under strain.

Demographic shifts and the ageing population: The developed world is experiencing an unprecedented aging population, with birth rates declining and some countries recording fertility rates below 1.0. By 2060, 30% of Europe's population will be over the age of 65, and the growth in the number of individuals over 80 will surpass any other age group (Eurostat, 2019). This demographic shift poses significant challenges to the existing healthcare infrastructure, necessitating substantial investments and adaptations to meet the care needs of added millions of elderly citizens by mid-century.

The rise of chronic disease: Over the past half-century, lifestyle-related diseases such as cancer, diabetes, obesity, and hypertension have supplanted infectious diseases as the leading causes of mortality. Chronic conditions, many of which become more prevalent with age, now account for the dominant share of all deaths in Europe. The concomitant rise of these conditions and the aging population present a formidable challenge for healthcare systems.

Rising expectations and technological demands: Public expectations for high-quality healthcare have also experienced a significant increase. Advancements in medical technology and personalized treatments have elevated the standards, but these innovations come with substantial financial burdens and necessitate specialized expertise. As new technologies emerge, many remain inaccessible to most of the population due to the excessive costs and scarcity of skilled health professionals.

Workforce shortages and the global brain drain: The healthcare workforce is experiencing a significant shortage at an alarming rate. The Association of American Medical Colleges projects a shortage of 139,000 physicians in the US by 2033, while the World Health Organization estimates that Europe will face a deficit of 4.1 million healthcare workers by 2030 (WHO, 2023). Notably, Norway is confronted with an expected deficit of 180,000 healthcare professionals.

The primary factors contributing to this exodus are burnout, inadequate compensation, and deteriorating working conditions, and thus, recruitment challenges are on the rise. To address these shortages, many developed countries are resorting to recruiting healthcare professionals from developing nations. While this approach may provide a temporary solution, it also perpetuates inequalities by depriving poorer countries of essential healthcare expertise.

Soaring waiting times: In the UK alone, approximately 7.62 million individuals (NHS, 2024) are currently awaiting treatment under the National Health Service (NHS). Despite Sweden's legislative commitment to a 90-day waiting guarantee, a significant portion of patients, encounter extended delays. Notably, the average waiting time for knee replacement surgery in Norway is 156 days (OECD 2022). Furthermore, emergency room wait times typically exceed 8-12 hours, while mental health services, particularly those catering to children and adolescents, are plagued by substantial year-long backlogs.

The rising costs of healthcare: Healthcare expenditures have experienced a significant surge, with their share of GDP in OECD countries increasing from 4-6% in the 1970s to 10-12% in 2020. Notably, in the US, healthcare now accounts for nearly 18% of GDP, and in most developed nations, it has emerged as the most substantial and rapidly expanding part of public budgets (OECD, 2021).

A system on the verge of breaking: Despite the prevalence of resources, the healthcare crisis surge. Whereas Canada currently employs 2.0 million individuals (ESDC Canada, 2021), the highest figure in history (CBC, 2022), the EU boasts over 12 million healthcare professionals. The US employs 16.3 million people (US Bureau of Health Workforce, 2021).

Substantial financial and human resources have been allocated to address challenges. But despite spending USD 172 billion annually (Statista, 2024) on digitalization and allocating record levels of financial resources and personnel, the problems continue to escalate: Healthcare system's output has decreased despite more input resources.

Also, improvement projects that rely on existing value creating models, organisational structures and processes are unlikely to yield the impact or outcomes. Escalating pressures and increasing cost in healthcare cannot be solved by adding more resources to the already burdened and strained system. When confronted with multiplexing challenges, the magnitude and complexity of incoming issues grow exponentially.

The unit cost of healthcare rises exponentially with linear growth in patients: As numbers of patients and issues expand, the complexity and dynamics of healthcare delivery undergo significant changes. This encompasses more intricate diagnostic procedures, a broader spectrum of medical conditions, an increased range of procedures, a surging volume of data, and enhanced compliance, reporting and regulatory requirements.

Each of these factors contributes to the administrative and coordination burden, necessitating additional resources to manage reconfiguration, reorganization and adaptation to escalating demands. Healthcare system costs escalate at a rate that surpasses the cost of direct medical treatments: *The unit cost of healthcare show exponential growth in response to a linear increase in patients and issues*.

The long-awaited digital healthcare revolution: Over the past several decades, digital technology has revolutionized numerous industries and significantly impacted daily life. Healthcare is poised for a similar transformative journey. Governments worldwide are actively investing in the sector, exemplified by Germany's substantial commitment of nearly €5 billion to modernize hospitals digital infrastructure. Also, various initiatives are actively digitizing services at both clinic and hospital levels and in primary care.

Some market reports estimate the digital health market to over USD 300 billion annually by 2024, propelling numerous improvement projects and the development of novel technologies. Despite these efforts, the realization of healthcare's digital revolution has proven to be challenging, resulting in only modest outcomes. This begs the question: Despite 20 years of digitalisation efforts, why does it look like we are not becoming more efficient?

Transforming healthcare is change of value configuration model: Investments in digitalization have mostly concentrated on incremental improvements – bolstering efficiency within existing value creation logics. However, this merely optimizes existing systems, falling short of a transformation. In line with Fjeldstad et. al. (2019), we advocate that a transformation requires a shift in the core logic of healthcare delivery – a reconfiguration of the systemic value configuration.

A «stronger» value configuration transcends mere efficiency gains and reshapes how value is generated, shared and scaled. This entails a dynamic redesign of healthcare to support a model that is resilient, adaptable, and responsive to evolving needs – and complexity. Only by reconfiguring the systemic value creation logic is it possible to unlock the potential of digital transformation and have sustainable healthcare systems.

In the subsequent chapters, we will delve into the underlying conceptual models that govern how value is created and explain how these impacts organising and processes and technology.

5. FUNCTIONAL HIERARCHIES AND DECENTRALIZED NETWORKED ORGANIZING

The historical development of organizing and organisations has been shaped by challenges related to information and knowledge: Obtaining, analysing, and distributing information and knowledge was a resource-intensive and intricate process, and hence, this function was centralized where advanced, critical, or time-sensitive information and knowledge were required.

The Romans revolutionized information and knowledge challenges by establishing a functional hierarchy that prioritized discipline, command and centralized control. The hierarchical structure ensured effective knowledge and information sharing and controlled activities – based on the technologies at the time. This model extended beyond warfare, influencing religious, feudal, and eventually industrial systems. It permeated the corporate world, public sector and healthcare, solidifying with Max Weber's concept of bureaucratic hierarchy (1921).

Digitization has fundamentally disrupted the functional hierarchy by drastically reducing the costs of information sharing. Knowledge can now be disseminated swiftly and efficiently across all components of a complex system, enabling decentralized decision-making and empowering frontline actors to make informed choices in real time.

In healthcare, digital transformation further advances this capability by providing precise, continuous decision support and delivering essential information precisely when needed. This shift allows previously allocated administrative resources to be reallocated, enhancing service delivery within the same budget constraints.

In this paper, we define **hierarchy** as the general structure owning the resources and responsible for the outcomes. In contrast, the **functional hierarchy** controls workflows and processes: Autonomous actors will make operationally related decisions collaboratively and decentralized, minimizing the need for hierarchical decision-making and management other than to manage resource constraints.

Consequently, operational healthcare improvement initiatives must navigate a digital landscape that renders the functional hierarchy obsolete. Our proposal presents opportunities for solutions beyond present paradigms, necessitating a reimagining of organizational design in healthcare and beyond, clarifying value creation models and organizational models. We will delve into its exploration in subsequent sections.

The overall organizational structure in healthcare, encompassing meritocratic principles within clinics, the competence hierarchy in research, and the administrative hierarchy in system governance, will remain. However, the nature and rationale of this hierarchy may evolve over time, necessitated by the need to foster and expand a value configuration logic with a greater focus on the network and the allocation of resources to its actors.

The bottleneck in a hierarchically organized healthcare system lies at the intersection of the siloed hierarchical governance structure and the diverse, complex, and dynamic operational activities that span across these silos. In operations, the information and knowledge required to make decisions and perform effectively do not originate from the hierarchy but come from the context of the activity itself and from a variety of data sources that can be provided to them without disrupting the hierarchy.

Seeking active leadership from hierarchically oriented leaders towards operational activities will neither be effective nor sufficient. Leadership must be executed by those at the forefront of the practice. In medical practice, such leadership typically resides with the medical expertise. However, in an actor-centric network, all actors are decision-makers and responsible participants in health co-creation work – usually rooted in team-based cross-sectional organizational structures.

Siloed organizational structures impede coordination and attempts to enhance coordination capabilities result in exponential growth in coordination costs when coordination is introduced as an additional organized function. To achieve effectiveness, coordination should be integrated into organizational structures and primarily managed by information technology rather than human intervention.

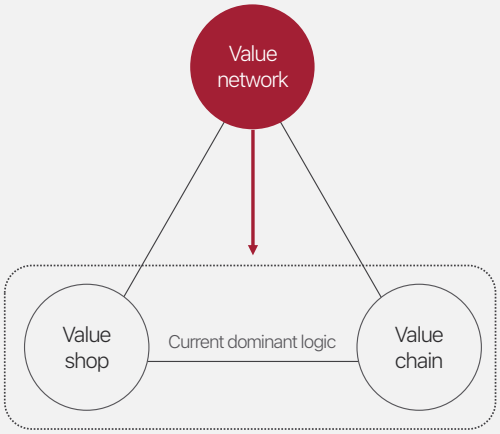
Healthcare organizations are typically structured into departments or units in which each unit operates with a degree of autonomy, often with its own systems and processes. When patients move between these units, there is a need for coordination to ensure continuity of care, frequently not seamless. The transfer of information and responsibility between units is susceptible to delays, misunderstandings, and errors, creating bottlenecks, particularly for cases that require multidisciplinary collaboration.

The management of coordination between silos generates substantial administrative work that consumes resources without directly contributing to patient care. Scheduling appointments, transferring medical records, and obtaining approvals are examples of tasks that contribute to the bottleneck.

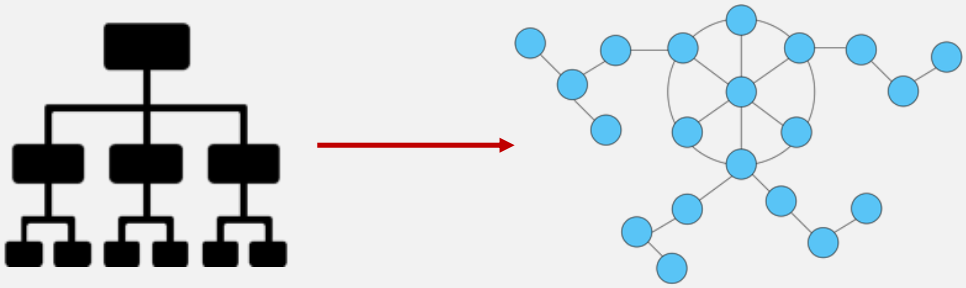
Similarly, the lack of timely and adequate information supporting the workflows and processes of actors will lead to wasteful priorities of activities and allocation of time and resources. This potentially represents the most significant bottleneck where effective solutions may substantially reduce the workload on human actors and automate work.

THE FUNDAMENTALS:
THE ACTOR-CENTRIC NETWORK MODEL

a) Transform to a value configuration that scale with complexity.



a) Move from functional hierarchy to an actor-oriented model.



6. HOW VALUE IS CREATED: THE FUNDAMENTALS

To clarify the transformation of healthcare, particularly how knowledge and information reshape organizations and healthcare delivery, we introduce three value-creation models: the value chain, the value shop, and the value network.

Why bring these models into focus now? While digital technologies can enhance efficiency in existing logics, a transformation requires a rethinking of the underlying systemic value configuration. This extends beyond organizational structure and encompasses mental models, competencies, recruitment, leadership, processes and technology. Such a shift renders digital transformation more complex than digital optimization, as it reshapes the logic in which value is created and sustained.

In the subsequent chapter, we will delve into the roles these models assume in healthcare systems, their interrelationships, and the strategies for optimizing each. Furthermore, we will clarify the need for an accelerated shift toward the value network model in the context of the transformation of healthcare.

The value chain model

The value chain model illustrates an industrial «economy of scale» logic in a factory. Value creation occurs through a series of linked processes combining lower-value inputs, processing, and the subsequent delivery of a higher-value output. Its primary strength lies in scalability and repeatability as the system yield increased output with enhanced efficiency.

In the healthcare sector, this model is exemplified by the industrial aspect of healthcare, encompassing departments that perform standardized procedures, such as hip replacements or laboratories processing thousands of blood tests daily. In such settings, lean methodologies can enhance efficiency and effectiveness – and quality.

For healthcare, the value chain is pivotal in ensuring efficient system operations, enabling the treatment of a large patient population with the appropriate competence, information and equipment. System capacity is enhanced by improving existing or establishing new «production lines» for each treatment category.

Treatment in healthcare, both clinical and non-clinical procedures, can be standardized, which is crucial for efficient resource utilization. Replacing human resources in a standardized system is more feasible and cost-effective compared to non-standardized approaches. While critical roles in clinical procedures require competent physicians, their involvement in standardized care (value chains) can lead to bottlenecks.

The value shop model

The value shop model is employed to address intricate and high-stakes challenges that necessitate profound expertise and specialized skills in creating value. The complexity

of the problem directly correlates with the value of the solution. In the healthcare sector, this model particularly applies to diagnostics, often requiring multidisciplinary experts, in conjunction with tests, imaging and other diagnostic tools.

The extensive training and education required to become a physician make this model challenging to scale. Developing world-class expertise takes years, and replicating it is arduous. Given the critical nature of diagnosis and decision-making in healthcare, we prioritize placing the most competent individuals in the most critical positions. Physicians organize themselves into a competence hierarchy based on research, specialization and experience, reflecting the meritocratic nature of healthcare.

The value shop model dominates the operational logic of our healthcare systems. A physician's decision regarding the treatment facility or medication prescription for a patient determines which part of the value chain the patient is assigned to. Physicians possess the authority to modify or alter procedures for each patient.

The value network model

The value network model generates value by establishing connections between nodes, such as individuals, organizations or machines, in a shared and collaborative setting. This model has gained significant traction in the digital era, driving the transformation of numerous industries by enabling the integration of digital platforms and applications in a vast digital ecosystem, unlocking virtually limitless possibilities.

When multiple nodes, or «actors», are interconnected in a network, each gains value from the others. In a large network, even the addition of a single new actor can create value for all existing actors and vice versa. This interconnectivity implies that the potential for value creation increases exponentially with the square of the number of actors, as more actors and data join the network.

In essence, the network model flourishes with increased complexity, offering unique advantages in environments with continuously evolving complexity. Value potential differs from delivered value; it becomes tangible value only when actors are connected in a manner that promotes reciprocity and collaboration. These interactions transform the network's potential into tangible outcomes.

Metcalfe´s Law

This law states that the value (V) of a network is proportional to the square of the number of its connected nodes (n).

Mathematically, this can be expressed as: $V \propto n^2$

Combining value creation models

Although most organizations integrate elements of the three models to serve distinct functions, healthcare apply a more intricate combination of models. They utilize value chains to ensure efficiency in routine procedures, while for complex diagnostics, they rely on value shops, where specialists address unique cases. The strength of the value

network lies in integrating, configuring and reconfiguring value shop and value chain activities, establishing a cohesive network of networks system that enhances collaboration and adaptability - which are crucial in a complex healthcare environment.

The value network institutes a shared digital platform connecting patients, providers, laboratories, insurers, pharmacies, and technology companies, facilitating a seamless exchange of services and data across various segments. Whereas providers gain access to real-time laboratory and device data, enabling enhanced patient care, insurers gain valuable insights for improved policy planning. Through the integration of services and the establishment of data-driven connections, a multisided network contributes to improved outcomes and reduced costs - optimizing a healthcare ecosystem.

Artificial Intelligence will have huge impact on healthcare

AI's impact lies in its ability to scale the value shop model, which has historically been limited by human expertise. In healthcare, AI can revolutionize diagnostics by rapidly processing data and extracting insights from extensive datasets, surpassing human capabilities in terms of speed and accuracy. AI can seamlessly collaborate with value shops and value chains through the value network model, enabling value shops to scale in ways previously attainable only through network models.

Since AI primarily acts as a value shop in support of existing value shop roles, it does not challenge the role of the functional hierarchy or how actors collaborate, in most cases it can be implemented without much resistance from the organisation.

In the initial phase, AI is anticipated to serve as a supportive tool for physicians and decision-makers within the healthcare industry. However, as AI technology advances, it possesses the potential to operate autonomously, which entails the emergence of novel challenges pertaining to job roles, accountability mechanisms, and legal frameworks.

7. FROM FUNCTIONAL HIERARCHY TO ACTOR-ORIENTED MODEL

Healthcare has traditionally relied on a hierarchical structure to manage complex tasks in stable environments. Academic hierarchies structure medical research, while hospitals are organized by specialty-based meritocratic hierarchies, with separate administrative hierarchies to allocate resources.

The value configuration paradox: From problems to value

Healthcare is an intricate system comprising diverse actors with distinct roles and responsibilities - organized into silos. Historically, these silos have been the most effective means of coordinating information, resources, secure command and control, and enabling the value shops.

As patients navigate the system, embarking on a journey from diagnosis to treatment and recovery, the healthcare system must orchestrate service requests from various silos to realise its objectives and facilitate seamless patient handovers to subsequent silos. The system is characterized by a multitude of interdependencies that necessitate coordinated management, and data exchange is crucial between silos. Each silo faces a dilemma: Optimizing its performance while simultaneously prioritizing the patient's well-being.

The growth in system load is exponential because complexity increases the number of variables, dependencies and interactions non-linearly within and between these siloed systems. Instead of a simple additive effect, each new element interacts with multiple existing elements, multiplying the overall workload. This phenomenon aligns with the "combinatorial explosion" in systems theory, where the total number of interactions grows exponentially as new components are added.

Combinatorial Explosion

Combinatorial explosion occurs when the number of possible interactions (system load) between elements increases exponentially as the number of elements grow linearly. In mathematical terms, if a system has (n) elements, the potential number of interactions is

$SL=n(n-1)/2$.

As healthcare advances, the system has consistently incorporated additional interaction points, expanded data volume, heightened decision complexity, increased specialization, enhanced dynamic system adjustments, and increased documentation and reporting. Despite the influx of personnel and financial resources, the complexity of the system generally tends to escalate system flow, rather than diminish.

The value network model and the value shop and value chain combinations in healthcare respond to complexity in fundamentally opposite ways, creating a paradox. In the value network model, complexity exponentially enhances value potential because

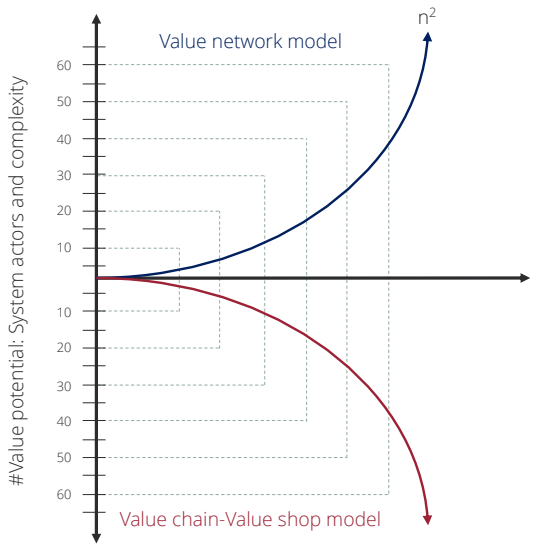
each new connection between actors adds possible interactions, while the value potential of the network scales with the square of the number of actors (Metcalf's law).

In the healthcare industry, certain workflows and processes exhibit a combinatorial explosion effect, while others do not. The System Load on the healthcare system will be a combination of effects that exhibit linear cost growth and some with exponential cost growth. Based on this argument, we argue that the System Load of healthcare grows exponentially even with a linear growth in incoming patients and problems. Accordingly, increasing funding and resources alone will not be sufficient to address this issue.

This dynamic supports efficient, information-based transactions, minimizing costs related to search, interpretation and decision-making. As more actors engage and data flow improves, value creation relies on effectively obtaining information, analysing and disseminating information and knowledge, rather than manual work, thus reducing unit costs. This means lower costs per patient as the network grows and more participants leverage shared knowledge.

In the current value shops and chains in healthcare, increasing complexity drives up costs. As the number of patients, data points and unique cases grow, managing these elements within a linear, sequential workflow becomes increasingly resource-intensive, raising the unit cost. Each additional layer of complexity reduces the system's efficiency, as addressing diverse patient needs requires more intensive processes.

While the network model leverages complexity to enhance value, the value shop and value chain models, the dominant value configuration logics in healthcare, are strained by it.[4] So, the *value creation potential* in the value network scales exponentially with the square of the number of actors (n^2) whereas costs in the value shops and chains rise exponentially with the addition of actors and complexity (see figure).



As previously mentioned, the current healthcare systems are experiencing relative returns, resulting in a decrease in value output despite an increase in resources and funding. Accordingly, the escalating pressures on the healthcare sector cannot be resolved by allocating more resources to the healthcare system.

[4] This logic will in real life be moderated because some factors does not cause combinatorial explosion, and all value potential will never be exploited.

Alternatives like New Public Management, Value-Based Healthcare and/or Patient-Centred Care cannot solve these systemic problems. Being higher-order concepts, they can only complement a transformation of the systemic value creation logic in healthcare.

> Using a higher-order approach like VBHC, PCC or NPM to solve an underlying systemic problem is like a physician treating the symptoms rather than the underlying cause.

The key differences in lower-order models and higher-order models are explained below

Aspect	Lower-order concepts	Higher-order concepts
Focus	Operational processes and mechanisms.	Systemic governance and strategy.
Scope	Specific components or value creation processes.	Entire systems, encompassing multiple actors and levels.
Purpose	Optimizing existing operations or analyse isolated aspects of value creation.	Transform systems for higher efficiency, alignment, and value.
Complexity	Simpler and context specific.	Broader, complex and multi-dimensional.
Examples	Value chain, value shop, value network.	VBHC, PCC, NPM, Public sector reforms.

In our view, the solution is to move the management of workflows and processes onto the value network model and organise in accordance with actor-oriented principles, viz., what we refer to as the **actor-centric network** (ACN) model.

The big bottlenecks challenges in healthcare

The patient's journey through the healthcare system is predominantly a sequential process. At each stage, at least one unit in a silo assumes ownership of the patient before it is transferred to the next unit or silo. The workflow of each silo and the patient's journey is managed and coordinated from both an internal and patient perspective.

Currently, this process is managed by a functional hierarchy organized at the silo level. To make decisions at the silo level, information is collected, interdependencies must be cleared, resource availability must be checked – and prioritizations made. This results in a dual-level decision-making system across all silos in the system.

The inefficiency in the system arises when the functional hierarchies are managing the details of the workflows, processes, and patients. As healthcare systems evolve, the functional hierarchy faces an almost insurmountable challenge in managing a «combinatorial explosion» challenge. The intrinsic inefficiencies of this structure create bottlenecks at almost every step of the process.

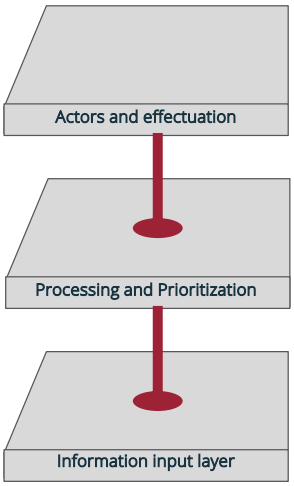
There are several other reasons for bottlenecks to occur in the healthcare system, such as a lack of capacity, particularly in roles that require high competence. However, on a fundamental systemic level, we believe that the dual-level decision-making at the silo level is the main challenge that requires the attention of a digital transformation.

Moving from functional hierarchy to an actor-oriented model

The basic idea is that the actors in the system should have autonomy and system support to decide on the workflows and processes without involving a functional hierarchy. With effective sharing of information and system support, a new way for all actors to collaborate will leave the functional hierarchy redundant.

The networked information sharing of the digital age, has enabled a more efficient way of organizing the resources. A conceptual way of understanding the logic is to introduce a 3-layer network model that connects all actors.

- Information input layer, where all relevant information, new and real time, is uploaded to the system and made, available to all actors.
- A separate network layer, processing all data, taking the role of command and control in the system, including prioritization, managing the workflow and processes of all actors.
- The effectuation layer, where the system calls and engages the actors of the system. The information needed for the task is presented, with analysis and support for the actor to do its part of the job.



The effectuation layer connects to both value shops and value chains and as tasks are completed, information from the task, even real-time is fed back to the information layer. With more information and more processing power and more AI support the system can move from management of workflow and processes to creating value real time through all processes and follow the patient from home.

The networking of all actors and the central processing capabilities makes the functional hierarchy unnecessary. Actors working directly with patients will become autonomous over time. The new way of working needs to evolve stepwise collaboratively with new technology and interdependent actors.

The actor-oriented model will strengthen the role of the first line of resources. All actors will collaborate directly with all other actors without using the functional hierarchy. As the functional hierarchy is dismantled many of the bottlenecks will dissolve. In addition, enabling the network model with actor-oriented organising will unlock many levels of efficiency and new opportunities. AI and real time processing has the potential to support the actors to delivery faster, better and more precise services.

When combining the value network model and the actor-oriented organizing, the **actor-centric-network (ACN)** in healthcare emerges as the powerful combination needed to transform healthcare.

Information supremacy and automation

The shift to an actor-centric network model hinges on information supremacy: Reliable data enables tasks to be automated. Diagnosis and patient prioritization could increasingly rely on data-driven algorithms, replacing some of the hierarchical command structures. With integrated data, algorithms can organize complex patient care scenarios more efficiently, allowing professionals to focus on areas requiring human expertise.

In business, industries that move to value network models often achieve global market expansion dominated by a single leader, driven by data quality, network nodes, multisided models and strong algorithms. Similarly, in healthcare, transitioning to a value network model promises:

- Increased patient value through data-driven insights.
- Essential high-quality data on patients and treatments.
- Adoption of multisided interaction models.
- Enhanced efficiency via AI and processing power.

All patient data, sensors and stakeholders must be integrated into a cohesive network structure over time, enabling seamless data exchange and collaboration across healthcare.

Examples of digital infrastructure for an integrated healthcare ecosystem[5]

A digital infrastructure is essential for efficient patient and workflow and process management, linking primary care, specialist care, home care and other ecosystem functions. This horizontal, process-oriented infrastructure must function across healthcare's institutional framework, adaptable to various settings. The infrastructure focuses on the patient-GP interaction model, allowing scalable coordination.

In an ideal healthcare ecosystem, platform-based infrastructures would support specialist care, primary care and individual needs outside formal settings. Patients can access tailored resources, whether self-care support, specialist referrals or primary care pathways. Each pathway is supported by digital platforms that enable information sharing, enhancing overall coordination. The overarching principle is the more actors the more value we can enable.

CASE example: patient-centred systems and remote monitoring

The ecosystem model is inherently patient-centric. A shared horizontal platform

[5] In this section, we refer to some examples that have proven valuable in solving bottlenecks in the Norwegian healthcare system. These can of course be equally relevant in an international context.

infrastructure underpins timely and role-specific data exchanges, improving predictive and planning capabilities, patient flow, and coordination. For instance, Dignio's platform at AHUS facilitates remote monitoring, helping prioritize patient needs, reduce wait times, and manage patient flow. Remote monitoring aids in chronic disease management and follow-up care, enabling patients to manage health independently and potentially reducing hospital visits.

Case example: DNV Imatis and digital platform infrastructure in healthcare
The Imatis Fundamentum platform serves as a horizontal infrastructure in specialist healthcare, focusing on logistics rather than direct clinical care. Integrating with hospital systems, it provides real-time data for various staff roles, coordinating patient journeys and ensuring smooth operational workflows. Imatis facilitates "semi-autonomous networks" for self-organized service delivery and reports early phase efficiency gains of 30-50% through enhanced coordination, resource management, and patient services.

Extending the DNV Imatis solution to clinical work and primary care
To support end-to-end patient care, DNV Imatis could expand to include clinical workflows and decision-making processes, enabling it to manage more complex care pathways. As part of the European MyPath project, Imatis aims to optimize execution of clinical processes, with AI enhancing planning and prioritization.

Imatis also extends to primary care, providing municipalities, nursing homes, and home care with real-time data sharing tools. Its integration with remote patient monitoring (RPM) would enable proactive care, helping shift hospital treatments to home-based care and enabling early intervention based on predictive analytics.

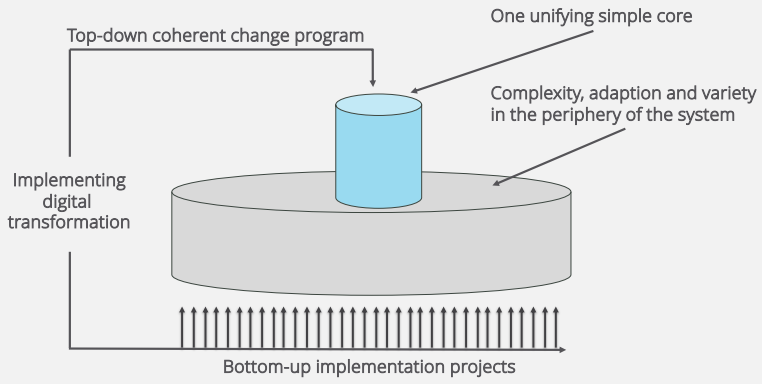
Building a unified digital infrastructure

Linking DNV Imatis across hospitals, primary care, and RPM creates a cohesive digital infrastructure supporting patient workflow and processes across healthcare settings. This integration forms the foundation for a decentralized, actor-oriented healthcare system with semi-autonomous, networked actors.

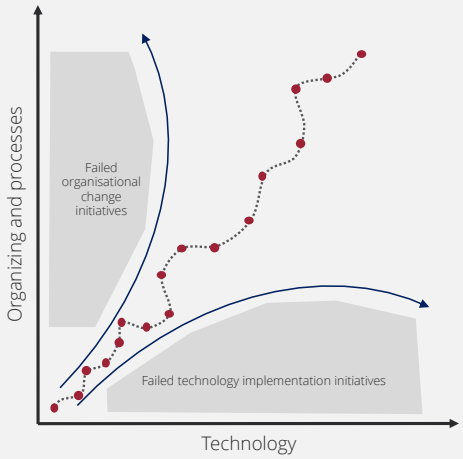
On the Imatis platform, actors can develop apps to support the collaboration between actors as needed. All actors can co-develop, adjust and improve the digital tools to fit their collaborative process. In this way organisation and technology evolve stepwise, bottom-up to find the best way together for every case. While the system core and common protocols remains stable and enable all actors to connect and collaborate.

THE TRANSFORMATION

a) Simultaneous top-down and bottom-up processes



b) Integrate technology <u>and</u> processes and organising



c) The three critical enablers of the transformation

a. Autonomy
b. Commons
c. IT

8. HOW TO TRANSFORM THE HEALTHCARE SECTOR

Throughout its history, healthcare has experienced several paradigm shifts, but few were as transformative as the discovery of bacteria. This breakthrough redefined the logical framework of medicine, leading to a profound shift in understanding disease causation and catalysing advancements in medical practices. The transformation unfolded through key events and a multi-layered approach to implementation.

Governments supported through top-down legislation and public health programs. The new agenda spread through a "train-the-trainers" methodology, embedding the core principles into teaching programs and encouraging the parallel development of related practices and technologies. This comprehensive approach led to substantial improvements across healthcare, with the microbiology paradigm taking approx. 30 years to become the dominant framework worldwide – from its scientific foundation in the 1860s to its global acceptance by the 1890s.

In this paper, we apply the lessons from the microbiology revolution, coupled with insights from today's digital transformation efforts, to advise on a modern healthcare paradigm shift.

Top down and bottom-up strategy

A top-down approach emphasises a clear strategy with a well-defined vision of the future and a "business model" derived from that strategy. To effectively implement this approach, the following foundational elements must be addressed:

1. **Strategy and System Design:** A unified strategic framework provides the direction, supported by a system design and policies that define how modular, bottom-up subsystems can integrate seamlessly into the overarching system.
2. **Central Architecture:** A core system architecture is pivotal, encompassing:
    - Policies.
    - Regulations.
    - Defined roles.
    - Allocation of resources.
    - Core infrastructure, including interface protocols for interoperability with subsystems.
3. **Adaptation and Local Customization:** A robust top-down model allowing modular systems to connect and adapt efficiently at local and regional levels, supporting decentralized needs while maintaining cohesion with the central framework.
4. **Decentralized Market Development:** Where necessary, the approach should guide the development of markets for decentralized services. This includes adapting roles, regulations and services to these needs.

5. **Coordination of Key Structures:** This coordination spans platform-in-platform models, regulatory measures, payment systems, data security, access controls and other essential elements.

By harmonizing these components, the top-down strategy ensures that both governance, strategy and local flexibility coexist effectively.

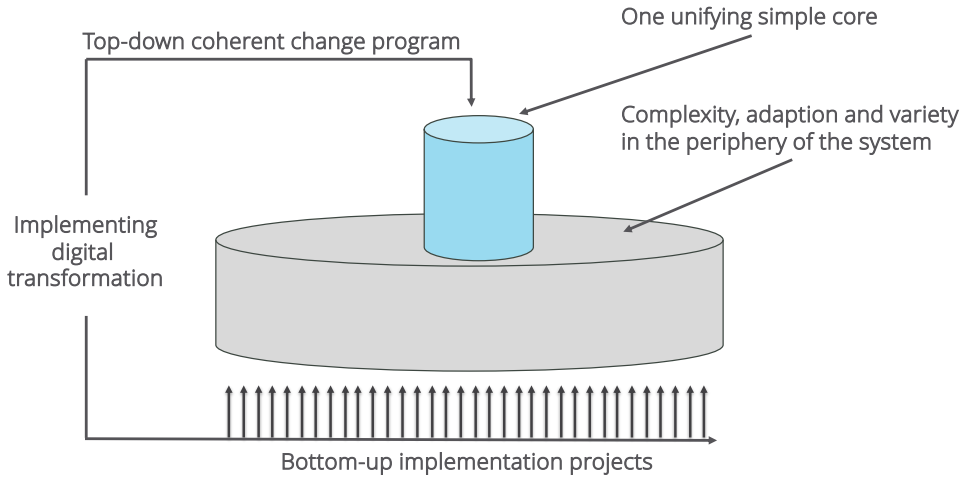
A bottom-up strategy includes a wide variety of subsystems functioning as modular components. These modules can be replaced or updated over time without requiring changes to the overall system as the core remains more stable. Modular solutions must, however, operate within the frameworks established through the top-down strategy.

In practice, the development of bottom-up initiatives and the formulation of top-down strategies are interactive and emergent processes. Transformation occurs in phases, where complexity is managed sequentially, moving from one "bottleneck" to the next. This phased approach is necessary due to the cognitive limitations of decision-makers when faced with high levels of complexity and dynamic challenges.

To navigate such complex transformation processes effectively, having a clear and consistent strategy and guiders over time is critical. Incremental developments at the modular level must align with the main goals so that the system evolves cohesively despite its dynamic and distributed nature.

Aligning autonomy with strategy

From a health policy perspective, bottom-up projects should adhere to central principles while retaining autonomy and flexibility to devise the most effective solutions to specific problems. This approach fosters complexity and a variety of solutions at the periphery, yet all anchored to the fundamental principles. Essentially, governments and health policymakers must synchronize top-down strategies with bottom-up initiatives.

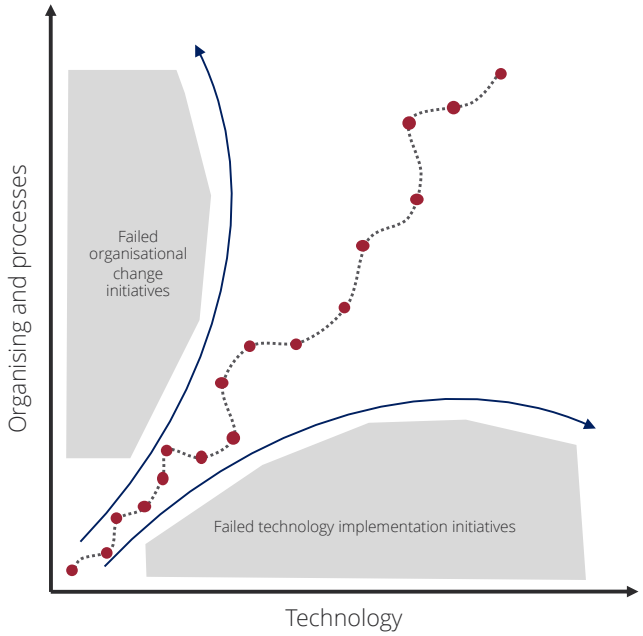


Successful transformation requires all actors, resources, activities and knowledge to actively collaborate. Introducing novel technologies, software and concepts to these actors initiates a process of testing, experimentation and learning. Both technology and

personnel must evolve simultaneously. Allowing this iterative process to unfold is crucial, recognizing that transformation is not a one-time implementation but a continuous journey of adaptation and improvement processes.

In the pursuit of modernizing healthcare, a pivotal question emerges: How can we effectively accelerate transformation at a large scale? Providing a framework and strategy does not necessarily catalyse change. A potential solution lies in the concept of "change accelerators" - targeted initiatives designed to catalyse innovation and adaptation in complex systems – the foundation of ecosystems.

An accelerator is understood as managing multiple transformation projects in parallel, learning from each other and coordinating efforts. Over time, the accelerator enhances its capabilities to undertake more challenging and valuable projects while simultaneously reducing time - integrating organising and processes and new technology simultaneously. *Systemic transformation is the cumulative result of numerous small projects, bottom-up and top-down – adhering to the same core logic*.



Central to this approach is the identification and engagement of all relevant stakeholders, including clinicians, administrators, support staff, and even patients and next of kin. This inclusivity fosters a sense of ownership and collaboration. Crucial questions guide the process: Which actors are involved? How can they be effectively integrated into the project? What information is required, and how can it be shared seamlessly? The iterative nature of this process facilitates adaptation and refinement, recognizing that transformation is a continuous improvement process.

As confidence and capability is gained through initial successes, the number of projects running in parallel will increase and even more complex challenges accepted. External innovators and service providers can be invited to take part in the transformation, introducing novel software, technologies and ideas. Multiple suppliers contribute

various solutions, but all must adhere to the same core framework of transformation: Emphasizing autonomy, interoperability, and patient-centric care.

By empowering autonomous actors to innovate within a unified strategic framework, both technology and personnel evolve together. The iterative nature of this process facilitates adaptation and refinement, recognizing that transformation is not a one-time implementation but a continuous improvement – flow by flow, process by process.

Lack of a top-down strategy implies that individual initiatives may yield localized improvements but fail to contribute to a broader transformation of the healthcare system. Fragmentation leads to a patchwork of solutions that are not interoperable, limiting scalability and the potential for widespread impact. Without the guiders of a top-down strategy, projects lack the alignment to drive collective progress.

Recall, transformation is not a monolithic endeavour, it is integrating people and technology – workflow by workflow, process by process. By leveraging the power of transformation accelerators and the pivotal role of orchestrators, the healthcare system can evolve organically, ultimately accomplishing efficient patient-centred care.

Embracing the actor-oriented model in healthcare

To successfully revamp the healthcare sector, it is imperative to establish the enablers of transformation inherent in the Actor-Oriented Model, viz., the three key components:

1. **Autonomy**: Each participant in the healthcare ecosystem possesses autonomous capabilities. Empowering individual actors, resources, and activities – including clinicians, administrators, and patients – to make informed decisions fosters innovation and responsiveness at every level. The most significant change will likely be redefining patients from “passive packets” to autonomous actors, actively and digitally connected throughout their health journey.
2. **Commons**: A shared system for collective learning and information storage is key. By cultivating a communal repository of knowledge, actors can learn from one another, avoid redundant efforts, and accelerate the adoption of best practices.
3. **Digital Infrastructure**: Robust digital systems, standardized protocols, and seamless networks are the backbone of efficient information sharing and streamlined workflows. A digital infrastructure enables interoperability and collaboration across disparate entities and platforms.

As previously outlined, a transformation is inherently gradual, a meticulous, stepwise learning process involving rethinking and reshaping workflow and processes piece by piece, function by function. Initial efforts should focus on simpler, non-clinical tasks. As these prove merit, they can be adopted by others with increasing speed and efficiency.

Even with successful models to emulate, each new implementation must navigate its unique challenges. The learning curve persists until a new standard emerges, one that dominates the field through demonstrated efficacy and adaptability. It is a marathon,

not a sprint; the transformation will likely span decades, requiring patience, commitment - and continuous learning.

In essence, the ACN model offers a new way of organising healthcare – a blueprint that leverages autonomy, shared knowledge and digital connectivity to foster a more responsive and efficient system. The progressive offering ultimately delivers superior value and care to society.

The art of orchestration

At the core of the healthcare transformational process is the “orchestrator”, overseeing alignment of actors, resources, activities - and knowledge. An orchestrator is a central developer, enabling the alignment and synchronization of multiple, decentralized actors and/or components within a system to achieve shared goals effectively. The orchestrator facilitates interaction by providing a framework for communication, collaboration and decision-making, often leveraging information and technology to enhance operational efficiency and coherence.

The orchestrator’s role is to view the transformation from a systemic perspective, balancing the autonomy of individual projects with the need for systemic cohesion, preventing fragmentation - ensuring that efforts converge to a meaningful system-wide impact. For a transformation of healthcare to succeed, both bottom-up and top-down orchestration is key, ensuring that autonomous efforts align with a cohesive strategy.

In the subsequent chapter, we will delve into the governance of the emerging of healthcare systems, governance networks in healthcare systems, and the role of orchestration in digital transformation.

9. GOVERNANCE OF THE EMERGING TRANSFORMATION OF HEALTCHARE SYSTEMS

The organizing of healthcare systems varies considerably across the international landscape. Across EU member states the institutional and industrial structures are vastly different as well as their political cultures and sector governance regimes. Even though many of those healthcare systems have been subjected to historical transformations with shared cross-national roots and transformation forces, the national systems are still very different and reflecting their individual histories of becoming.

Similarly, the level of digital transformation of their healthcare systems varies considerably – from relatively advanced early movers to late adapters – partly reflecting the complexity of their institutional structures and the associated difficulty in aligning developmental strategies and interests and in growing supplier industries capable of delivering and co-developing advanced digital solutions with the healthcare provisioning organizations.

The importance of the healthcare sector to society and the economy, and the complexity as well as the acknowledged urgency of the digital transformation, requires governments to apply a heavy-handed policy to direct, align, incentivise and fund the transformation process. Without such an active and targeted government policy, progress will tend to be slow due to complexity and uncertainties.

Broadly speaking, the execution of such government policies will be handed by their hierarchical governance institutions, public healthcare providing organizations and different kinds of non-publicly owned healthcare institutions and insurance systems. However, facing the digital transformation challenge, all these critically depend on the emergence of markets for solution providers and co-development partners with technical as well as other kinds of required competences. Almost all of these are considered actors in competitive markets, and the relationship between the healthcare provisioning organizations in Europe and the market actors are strictly regulated by common EU public procurement regulations.

This system is basically structured in accordance with a simple and fundamental view of effective economies as rooted in two kinds of governance: The effective hierarchy on the one hand and the effective competition between autonomous actors within market institutional systems on the other. By playing these two hands effectively, this will lead government policies to the best possible outcomes.

However, facing challenges related to large scale innovative, emergent and complex technological, institutional and organizational processes such as represented by digitalization of healthcare systems, these two governance mechanisms are hardly

sufficient to safeguard an effective journey towards the stated targets. The complexity, the uncertainties, the dynamics, the need for standards and shared systemic architecture, -infrastructure, -platforms, -market institutions, -staged development processes, etc. and the necessary inclusion of complementary solution providers, call for some kind of coordinating governance system in addition to the hierarchical and the competitive markets of autonomous actors.

The current governance hierarchies and procurement regimes for competitive bidding are designed to manage stable ongoing business. However, transforming healthcare presents a significant challenge to this approach. Essentially, the existing governance-procurement framework is a systemic setup that hinders the successful implementation of digital transformation in healthcare.

To take on large innovation projects like transforming healthcare, the networked ecosystem governance system is a better choice. This is a governance form in between the hierarchical and the competitive market governance systems – one which can be observed across a broad range of industries before they reach a state of mature restructuration through internalization into a smaller number of integrated corporations competing for market shares and margins.

The network governance system (Kapoor, 2018) is essentially a structure to manage an ecosystem of autonomous actors that come together because they share a common value proposition where the success of their individual contributions depends on the successes of the others. Hence, it becomes a network of interdependent autonomous actors that need effective coordination of their efforts towards a shared goal to contribute significant values to their customers and users. In this sense, it is a developmental, process-oriented governance system that will usually have to co-evolve with the development and delivery process. To be effective, the network governance function needs to be more than just coordination of activities. it must also have mandates and capability to govern on behalf of the network members.

This is what we define as the orchestrator function. Because this function cannot be executed through a strict hierarchy, it needs to be rooted in trust, competence and contractual arrangements.

In the context of digital transformation in healthcare, the network governance system needs to embrace actors on both the supplier and user/buyer side. This implies that the trusted and capable governance hub of the network is ideally located in between those sides – and in public healthcare systems particularly, in between the government and the suppliers and the user institutions.

Who needs and who are the members of such governance networks in healthcare systems?

In European healthcare systems, the ability to deliver solutions by market actors goes through regulated public procurement procedures. To pass such and establish contracts with the healthcare provisioning system is accordingly a precondition for possibly becoming a member of an actual governance network. Furthermore, membership depends on whether interests can be aligned with complementary supplier and user actors who share a common value proposition to the public healthcare system.

In such a structure, each of the suppliers will on the one hand be committed through a direct contract with the buyer in accordance with the stated contractual obligations. On the other hand, it will be a co-development partner in a network of complementary supplier and user organizations in the further development of systemically integrated solutions.

These developments will lead to additional procurements that need to be governed independently from the collaborative network. Hence, it is important that the governance network is not managed by the procurement function. Procurement should be external to the network. Healthcare provisioning organizations that need to participate in the co-development of the new solutions and to invest in it, are possible members along with contracted complementary suppliers.

If the value proposition is such that it can be delivered by a single company with sufficient capabilities, there is no need for a collaborative network of complementary suppliers. Hence, the networked governance system is an alternative governance mechanism when the development and delivery depend on contributions from several otherwise autonomous actors. In the present market for digital transformation of healthcare solutions, there are suppliers of unified digital solutions such as Epic and Cerner who offer already existing solutions in need of contextual adjustments and adaption by users. Healthcare systems who prefer a less dominant supplier and a solution tailored to their particular contextual circumstances, faces the alternative to co-develop such solutions with multiple suppliers and user institutions. These are the ones that need networked governance systems.

The orchestrator function

All systems are basically hierarchical and modular. This implies that they have a particular hierarchical order in the form of an overall system made of subsystems in subsequent underlying layers. In each of these layers, they may have multiple modular systems with complementary functions that builds on subsystems below and integrated modular systems above. The overall system may also be a platform-infrastructure on which top-level modular systems can be placed. This character of systems has

important advantages and consequences in relation to systemic development and transformation efforts.

Firstly, it requires coordinated orchestration horizontally as well as functionally and vertically. Many of the subsystems and modular systems will typically be organized internally in hierarchically controlled organizational entities and can thereby be coordinated and connected by these. Others will have to be coordinated and integrated between such organizations. This requires interfaces between horizontal layers as well as between horizontal modules to be standardized and shared by all actors.

Secondly, the modular structure permits both a stepwise development process where results can be harvested as you move forward, and where modular entities can be developed or shifted without disturbing the functioning of the remaining system. This requires a much more stable architecture and technical core system that provides the shared infrastructure for the flexible and adaptive modular entities.

Thirdly, each of the different modular systems may be subjected to competitive procurement procedures over time as well as to internal developmental initiatives. In a multi-actor system with open standard interfaces, this provides the systemic foundation for an adaptive and change oriented organization capable of adopting to new technologies and opportunities as well as additional in the future – thereby stimulation the markets for ideas, new technologies and capabilities.

The orchestrator function of the network governance system is to manage and coordinate such efforts at the overall system level. Additional orchestrator functions are needed for major subs-systems that also depend on multi-actor coordination. Who should be the orchestrator will depend on who in a given national, regional and industrial context would be seen as a trusted, competent actor with sufficient mandates and long-term commitments to be given such a role. In general, it needs to be placed in between the government and the market actors and be trusted by both suppliers and user organizations as impartial, collaborative and effective.

In many cases, the role may be handed to a complementary team or executive unit. A reason for this would be that the governance unit needs access to supportive recourses such as technical and market analysis, research and knowledge in specialized areas, planning capacity, administrative support etc. This may require the bundling of governance resources from more than one organization. In some countries, the executive governance entity would be invited and placed within a government directorate to ensure authority and access to necessary resources. In others it may be organized by a not-for profit competence organization, a trusted consultancy company or even sometimes a small firm with individuals with personal trust and authority.

To play an important role in the digital transformation of healthcare, one need to acquire a position at the tables where such networked orchestrations are organized and performed.

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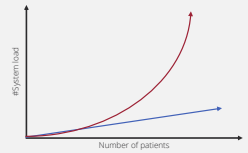
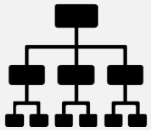
ENABLING TRANSFORMATION OF HEALTHCARE SYSTEMS

CHALLENGES IN HEALTHCARE

a) The unit cost of healthcare shows exponential growth in response to a linear increase in the number of patients and complications.

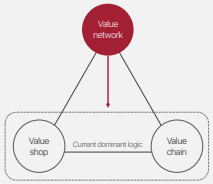


b. The interface between the functional hierarchy and the actual workflow and processes is the main reason for the exponential growth in system load.

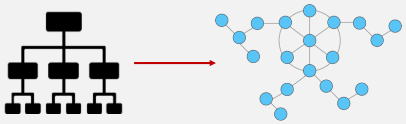


THE FUNDAMENTALS: THE ACTOR-CENTRIC NETWORK MODEL

a) Transform to a value configuration that scale with complexity.

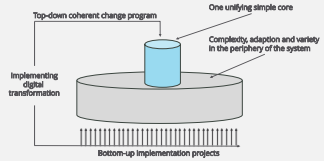


a) Move from functional hierarchy to an actor-oriented model.

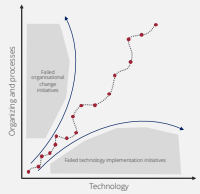


THE TRANSFORMATION

a) Simultaneous top-down and bottom-up processes



b) Integrate technology and processes and organising



c) The three critical enablers of the transformation

a. Autonomy
b. Commons
c. IT

DNV HEALTH STRATEGY

Leadership!

- Manage transformation
- Secure enablers
- Train the world