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Disruptive Ecosystems

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Guided Open Collaborative Ecosystems as a Major Disruption in Health Systems

Healthcare systems face challenges like rising costs and limited access, but a focus on prevention, early intervention and digital innovation can transform outcomes. A shift toward home-based care and collaborative ecosystems involving governments, industries and patients can reduce costs, enhance quality of life and address global disparities. This proactive strategy fosters innovation and systemic improvement, meeting the growing demands of healthcare.

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key points

- Proactive health measures reduce costs and improve quality of life globally.
- Collaborative ecosystems drive innovation and systemic healthcare transformation.
- Early intervention and home care enhance outcomes and efficiency in healthcare systems.
- Digital tools enable better, faster and cost-effective patient care and diagnostics.
- Shifting resources to prevention addresses global healthcare access challenges.

Introduction

Over the past two centuries, we have made unprecedented progress in health outcomes, with the average life expectancy more than doubling due to major advancements in public health, pharmacological treatments, surgical techniques and medical device innovations. Most of these advances have occurred somewhat independently of each other. Imagine the progress that could be achieved if collective innovation efforts were guided in the same direction, with a common vision and a shared innovation agenda, using an ecosystem approach. This is what this paper proposes: a common Innovation agenda, “Stay Left, Shift Left-10X” (the what) and a directed or guided open collaborative ecosystem (the how). Before diving into the details, it’s essential to understand the necessity of this approach. As my former Intel colleague Cyndi Breazeale often noted, “80% of innovation comes from a stated need”.

Despite the major advances that have enabled significant health improvements, global healthcare systems face serious challenges. These include rising waiting lists and costs, workforce shortages and a demographic time bomb: for the first time in history, there are more people over the age of sixty-five than under the

age of five. Additionally, half of the world's population still lacks access to affordable healthcare (WHO 2017).

Stay Left, Shift Left-10X

In order to drive coherent, complementary and compounding innovation, I propose a new strategic direction or doctrine called "Stay Left, Shift Left-10X (SL2-10X)". This strategy has its origins in software engineering, where data shows that early detection of bugs or design flaws dramatically reduces lifecycle costs and improves product quality. The Intel Digital Health division has also adopted the "Shift Left" as an innovation strategy. While applied to healthcare, this thinking is manifested as:

- **"Stay Left"** emphasises the importance of maintaining wellness and managing chronic illnesses or rehabilitation effectively at home.
- **"Shift Left"** focuses on transitioning patients from the hospital to their homes as quickly as possible.
- **"10X"** represents the aspiration, backed by real-world empirical evidence, that the application of digital tools and data in healthcare can provide benefits that are ten times or ten-fold better, cheaper, earlier and at a higher volume.

The concept of "Shift Left" emphasises the benefits of tacking or moving tasks earlier in a process timeline, such as disease progression, to improve efficiency and effectiveness. Proactive health management, earlier detection and intervention allow dramatically improved survival rates and lower costs across many diseases. The diagram below illustrates that the aim of every digital health intervention should be to implement a "Shift Left" strategy, leading to cost savings as well as improved outcomes, experiences and quality of life. A simple example of this is the "hospital-at-home" model, where patients receive treatment and care in their own homes instead of in an acute care hospital. This approach not only reduces costs but also offers a better experience and higher quality of life for both patients and, often, clinicians.

SL2-10X introduces a new perspective challenging the 'rule of rescue' that seems to guide modern health systems. Not only does it advocate for a shift in the care paradigm to the left, but it also emphasises the need to reallocate budgets and resources closer to home. UK Health Secretary Wes Streeting encapsulates this new paradigm when he suggests that the NHS should stand for a neighbourhood health service rather than a National Hospital Service.

Unfortunately, over the past decade, the UK has witnessed a trend where over 10% of resources and budget have been redirected towards hospitals. SL2-10X promotes a new mindset focused on proactive and preventative health measures, advocating for the reallocation of more funds and care to the left to proactively create and maintain health. This vision and business model aligns closely with the ideas presented by former NHS England

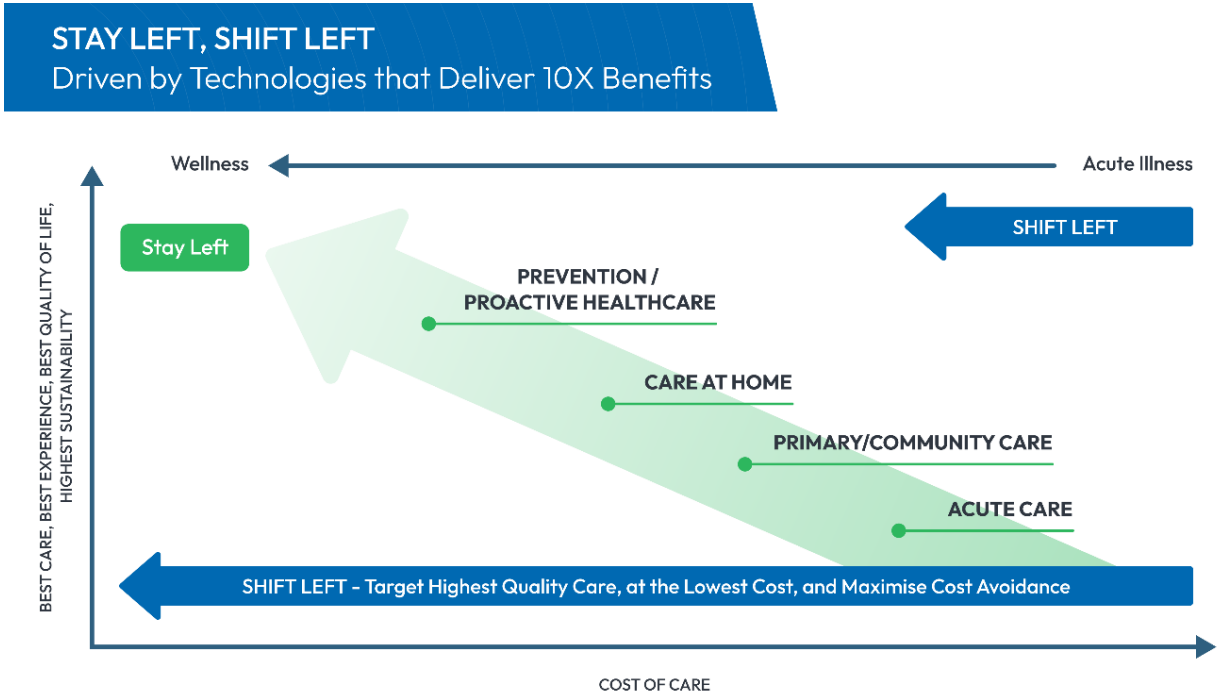

Figure 1. Stay Left, Shift Left-10X. Source: M. Curley

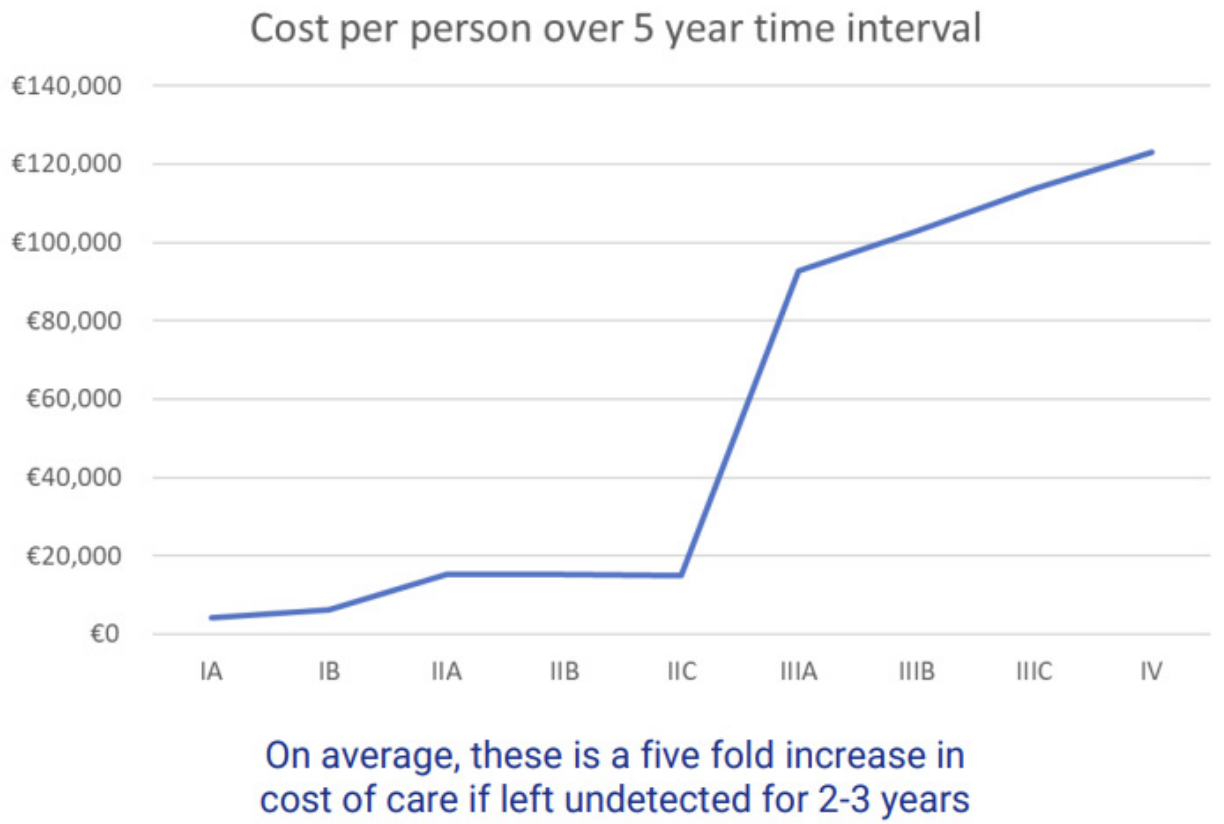

Figure 2. Skin Cancer Care Cost per Disease Stage. Source: AllView Healthcare

CEO Nigel Crisp in his excellent book "Home is for Health, Hospitals are for Repairs: Building a Health and Health-Creating Society".

The financial consequences of failing to shift left can be illustrated by examining a specific disease. The cost per person of treating a class one disease is significantly lower than the expense of remediating and treating a stage four skin cancer. In Ireland, Allview Healthcare has introduced a digital dermatology service that allows patients to quickly visit an AllView centre to have high-quality digital photographs of their skin issues. These images are then reviewed by a panel of expert dermatologists within just a few days. Compare this to the average waiting list of over nine months for a standard public hospital appointment. Early diagnosis and treatment is better for patients, clinicians and the healthcare system in terms of outcomes, costs and experience.

Shifting Budget to the Left

In Europe, 97% of health budgets are focused on restoring ill health, while only 3% are allocated to proactive health and wellness (OECD 2021). Imagine the benefits to all if we could increase proactive health spending to 10%. Today, primary care in many Western countries, primarily provided by general practitioners (GPs), accounts for the majority of healthcare services but often receives only a small fraction of the total budget. For instance, in the UK, GP practices reportedly provide 90% of the care while receiving only 6% of the total budget.

"Early diagnosis and treatment is better for patients, clinicians and the healthcare system in terms of outcomes, costs and experience."

Simple digital innovations such as the Wilmslow GP triage system (Ahmed 2023) allow patients to submit their symptoms and information online. A clinician promptly reviews this data and determines the most appropriate next step: online, face-to-face or telephone consultation. This simple system helps ensure patients who need urgent care are seen

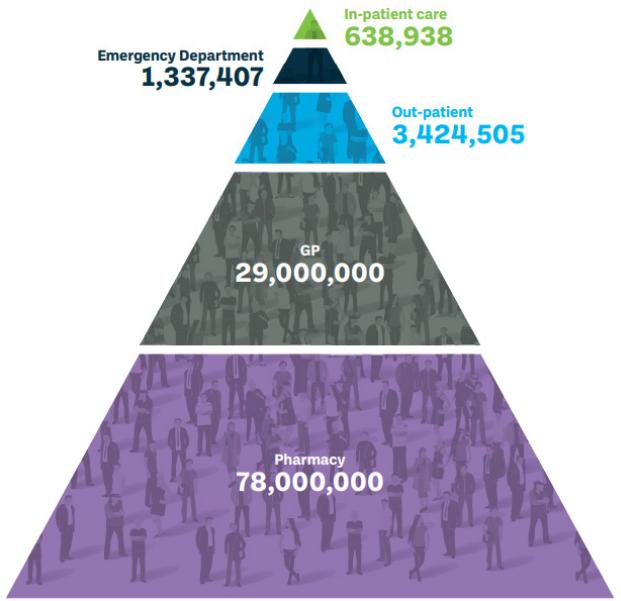

Figure 3. Patients Interaction Ireland – 2021. Source: Irish Pharmacy Union

promptly, while others can be managed without the need for a more expensive in-person consultation.

These kinds of solutions are win-win-win for the patients, clinicians and the overall system, providing better resource allocation, as well as more timely and more cost-effective care. Dr. Amar Ahmed says of the system: "A combination of modest tech with psychology, this approach has reduced unnecessary appointments, freeing up time for GPs to focus on more complex cases, improving patient satisfaction and improving psychological safety for our staff."

Shift Left of Resources and Workload

Shifting more care to the pharmacy would be a hugely untapped part of the health system. Dermot Twomey, former President of the Irish Pharmacy Union, suggests this as a key intervention to help ease the burden on the overall health system and improve access to care. In many countries, pharmacies account for the majority of clinical encounters. This is evident from the statistics in Ireland in 2021. There is an opportunity to empower and educate pharmacists to take on a greater role, which could lead to improved patient care and a better balance between supply and demand.

> "The aim of every digital health intervention should be to implement a "Shift Left" strategy, leading to cost savings as well as improved outcomes, experiences and quality of life."

Empowering pharmacists to take on greater responsibilities, such as through the new prescribing legislation introduced in Ireland in 2024, is a step in the right direction. Steve Barclay, the former UK Health Secretary, drove a "Pharmacy First" approach in the UK. This initiative allowed community pharmacies to provide NHS consultations and prescribe prescription-only medications for common ailments such as sore throats, sinusitis, shingles and even simple urinary tract infections in women.

One significant outcome of the Pharmacy First initiative was quicker access to care for minor ailments, which alleviated pressure on the primary care system. This shift enabled GP practices to focus on more urgent and complex issues. As a result, the "Shift Left" approach not only increased the capacity of the healthcare system but also improved its effectiveness, benefiting patients, pharmacists and GPs.

In the UK, this initiative saw widespread adoption, with over 95% (more than 10,000) of community pharmacies participating in the scheme. Additionally, a less recognised yet important benefit was that it allowed pharmacists to work at the top of their license, leading to increased job satisfaction and a more fulfilled career.

Use of a Directed or Guided Open Collaborative Ecosystem (D-OCE, G-OCE)

A new type of business configuration has emerged, known as an open collaborative ecosystem (OCE). According to Gastaldi et al. (2015), OCEs represent a fundamental shift in the competitive landscape of business. This concept was independently developed by Curley & Salmelin (2013) and Baldwin & von Hippel (2011). An OCE is characterised by a high level of trust and capability, where intensive

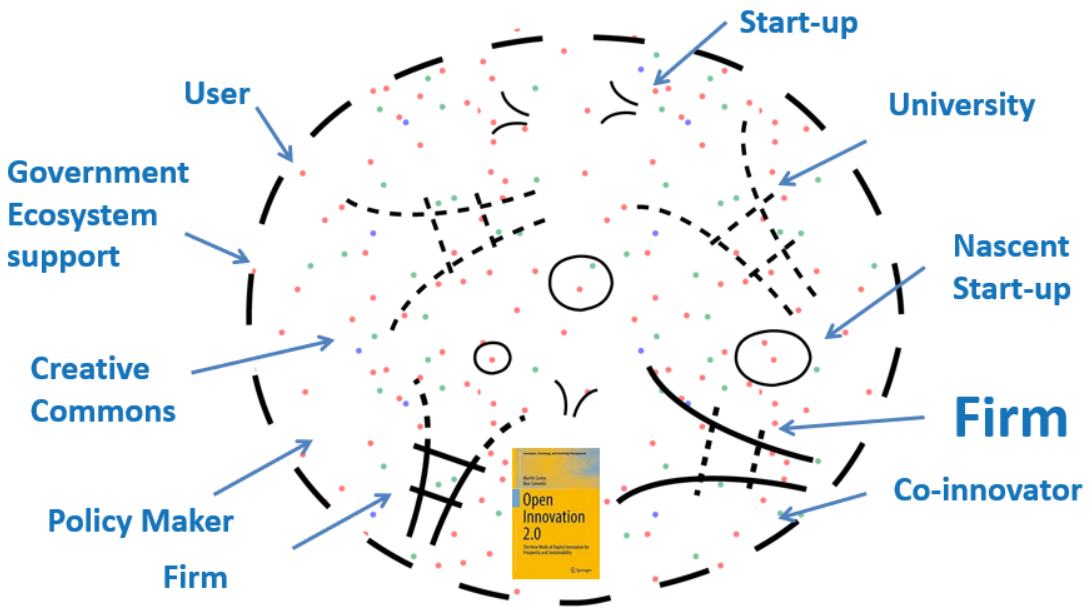

Figure 4. Open Collaborative Ecosystem. Source: M. Curley, B. Salmelin.

interaction and innovation occur among participants across the quadruple helix—government, industry, academia and citizens/patients. These actors work interdependently to achieve aligned, amplified and accelerated transformation and results.

In cases where an OCE operates with a shared vision, such as "Stay Left, Shift Left-10X", we refer to it as a directed or guided OCE. A key phenomenon of OCEs is emergence, in which the interaction of organisations is aligned with an agreed-upon top-down vision, leading to new, higher-order functionalities and configurations. The following diagram depicts such a configuration where a multitude of actors working together can achieve far more than any one actor working on their own.

When these actors unite around a common vision and collaborate interdependently based on shared values, they can create significant collective value. This collaborative effort can lead to structural changes far greater than any single actor, regardless of their size, could achieve alone.

The distinction between a directed and guided OCE is significant. When an OCE is organised by a country's national health authority, we refer to it as a directed OCE (D-OCE). As the National Director for Digital Transformation at Ireland's Health Service Executive (HSE), I established and led a D-OCE that achieved many transformational results (Curley 2024a).

Partly inspired by the ideas of Gastaldi et al. (2015), who argue that academics are well-positioned to serve as orchestrators of continuous innovation ecosystems, I transitioned and morphed the D-OCE into a guided OCE in response to ongoing organisational friction and resistance. This change coincided with the leadership of the OCE being transferred to the Innovation Value Institute (IVI) at Maynooth University. After a transition period, the guided OCE has continued to thrive and prosper (Curley 2024b), operating free from the inertia and resistance often imposed by bureaucratic public sector organisations.

> "A combination of modest tech with psychology (…) has reduced unnecessary appointments, freeing up time for GPs to focus on more complex cases."

A key question is which configuration—D-OCE or G-OCE—is more effective for driving system-wide healthcare change? The answer, of course, depends on various factors. Public sector organisations are typically designed for stable, steady-state operations, and their cultures are not often oriented toward adopting radical and disruptive innovations. However, when there is strong support from the Board and

CEO, along with a dedicated budget, a D-OCE can be very effective in driving transformational change.

Health systems are inherently complex adaptive systems. Therefore, orchestrating change from the outside, such as in a G-OCE, can also yield significant results. Perhaps this is the key factor distinguishing which configuration more effectively achieves coordinated and cohesive commitment and action among various stakeholders toward a shared transformational vision.

Architectural and Disruptive Innovation

D/G-OCEs do not only facilitate disruptive innovation but also enable an architectural innovation approach, as described by Henderson and Clark (1990). This type of innovation can often be the most challenging to defend against and can yield significant industry disruption. In architectural innovation, new and existing components are reconfigured and connected/integrated in different ways, resulting in significant increases in functionality or even structural change within an industry.

A good example of architectural innovation is the simultaneous introduction of the iPod and iTunes. This shift fundamentally transformed the music industry by creating a new platform and an innovative business model for how music is sold and distributed. Similar transformations are not only possible but even inevitable in the healthcare industry. Erik Topol, a renowned cardiologist, notes that while medicine is historically resistant to change, the influx of data flowing through the system will inevitably drive

transformation. He believes that mobile phones will play a key role in this shift, empowering patients.

In Ireland, a unique collaboration of eleven organisations worked together in a high-trust, high-capability framework to deliver a new service called the 'Health Elevator'. This service allows citizens to visit their local pharmacy for a fifteen-minute health check to identify any significant risk factors. After this assessment, participants receive a personal electronic health record and a fitness device, such as a Fitbit.

> "When these actors unite around a common vision and collaborate interdependently based on shared values, they can create significant collective value."

The Health Elevator service exemplified the concepts of "Staying Left" and "Shifting Left" in healthcare. It involved leading companies like CarePlus pharmacies, Roche, Fitbit, AWS and notable small and medium enterprises (SMEs) such as PatientsKnowBest and FullHealthMedical. While the Health Elevator solutions provided great benefits to patients at a cost comparable to a PCR test, they faced strong resistance from the Strategy Division of Ireland's national health organisation, HSE. This resistance highlights the difficulties often encountered in achieving adoption, even when clear tenfold benefits are available.

Lead User Innovation

In addition, such a D/G-OCE can be greatly enhanced by the democratisation of innovation through digital technologies, as noted by MIT's Erik von Hippel (2006). This allows individual clinicians or even patients to develop innovations themselves using increasingly advanced digital tools and technologies rather than depending solely on innovations developed by manufacturers. Von Hippel refers to this process as Lead User Innovation.

According to Von Hippel (2006), user-centred innovation offers great advantages over manufacturer-centric innovation. With amazing developments in digital technology and data, users are increasingly able to innovate for themselves. This enables them to create exactly what they need or want, particularly in the realm of information products such as electronic health records.

We are witnessing a growing trend towards a 'Lead User' approach (von Hippel 2006), where clinicians co-design and co-develop products with significant patient involvement. Lead users are those who are often significantly ahead of the majority of users in their populations regarding an important unmet need or significant market trend. According to von Hippel, the ability of a user to innovate is improving radically and rapidly due to several factors:

1. Continuously improving the quality and capabilities of software, networks and hardware.

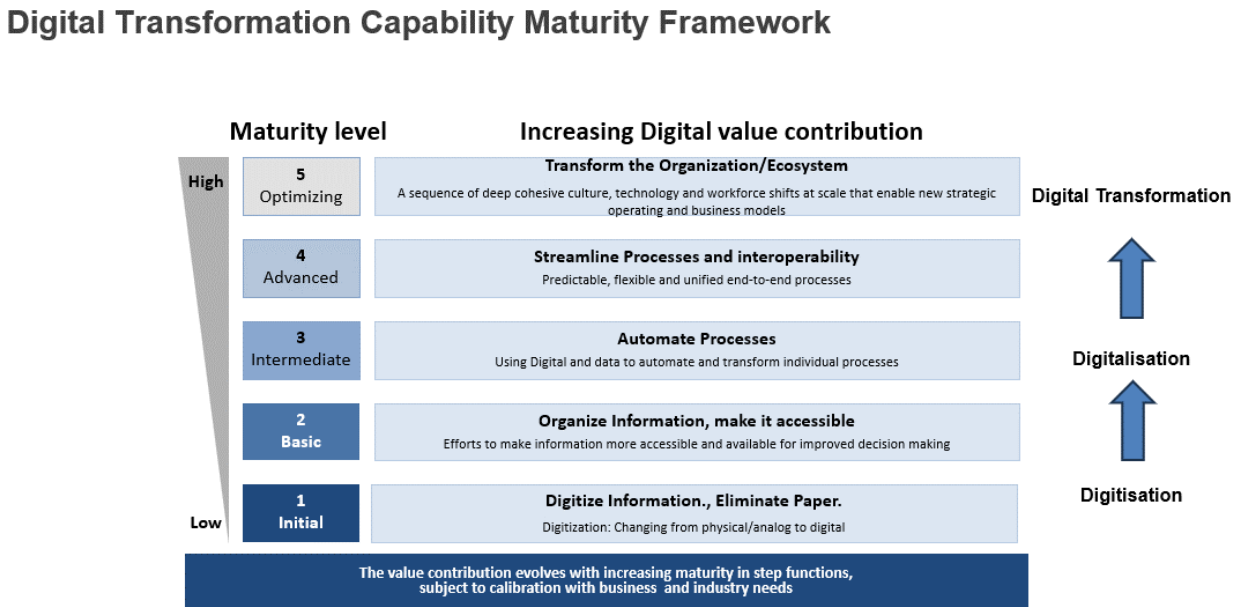

Figure 5. Digital Transformation Journey CMF. Source: M. Curley et al.

2. Increasing access to components (often API-enabled) and easy-to-use tools such as Low-Code platforms.
3. Access to ever-expanding and richer innovation commons.

On the island of Ireland, lead users such as Dr. Roisin Molloy (non-contact infrared thermometer), Eoin O'Reilly (Digital Dermatology) and Aonghus Shortt (Foodmarble Digital Digestive Measurement Device and App) are all examples of this trend. Their innovations are aligned in the same direction within the SL2-10X paradigm, contributing collectively to the acceleration of the shift towards a more efficient, effective and improved health system. The cumulative effect of their digital health innovations enhances this movement, promoting better overall healthcare experiences.

Capability Maturity Frameworks as Effective Management Tools for Improvement

Capability Maturity Frameworks (CMFs) are breakthrough management tools. They represent various levels and stages an organisation, ecosystem or industry goes through as it defines, implements, measures, controls and improves its process and outcomes. CMFs can be used to structure and codify best practices and invent new methods to drive structural change within an industry when applied systematically through Capability Improvement Programmes (CIPs).

Unlike Maturity Models, CMFs focus on both process and outcome maturity rather than process maturity. As Peter Drucker pointed out, "The problem for managers often is not how to do, but what to do". CMFs offer leaders and managers a roadmap for improvement, along with assessment tools and a compilation of best and next practices based on the collective intelligence of the industry that developed the CMF. A good example of a CMF is the IT Capability Maturity Framework (Curley et al 2016) which has been widely used across multiple industries, including healthcare, to improve IT capability and the returns generated from IT investments.

Digital Health and Wellness Capability Maturity Framework

Digital transformation presents one of the best opportunities for health systems to address the myriads of existing challenges. The figure below sketches an evolutionary improvement path for these systems, which progresses through moving through phases of digitisation, digitalisation and, ultimately, full digital transformation. This final stage represents a broad, coordinated transformation at scale. As shown in the figure, digital transformation involves deep shifts in culture, workforce and technology that enable new operating and business models. Vial (2019) defines digital transformation as a "process that aims to improve an entity by triggering significant changes to its properties through combinations

of information, computing, communication and connectivity technologies".

There is significant hope that digital and data technologies can serve as a radical transformative force for health systems and improve individual health globally. We can be inspired by Peter Diamandis's quote: "When something is digitised, it starts to perform like an exponential technology". At the Innovation Value Institute at Maynooth University in Ireland, efforts are underway to build a Digital Health and Wellness Capability Maturity Framework (DHW-CMF). This framework aims to help leaders and managers assess their progress on the digital transformation journey and offer recommended next steps and actions based on their current level of maturity.

The proposed DHS-CMF will provide a set of integrated design patterns and associated assessment tools that will enable leaders and managers to select the right digital interventions, significantly increasing the likelihood of their success. The use of the DHW-CMF should help accelerate the path to achieving these goals. As Seneca the Elder once said, "The way is long if you follow precepts (rules); the way is short if you follow patterns".

Conflict of Interest

None

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