



**A DIGITAL PLATFORM
IN A DATA DRIVEN
ECOSYSTEM**

DIGITAL INNOVATION WHITE PAPER

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FORWARD: THE FIVE AIMS OF HEALTHCARE

The Digital Transformation of the healthcare ecosystem is one of the most important enablers to achieve the “Aims” of the healthcare sector. Individual wellbeing is increasingly influenced by the social determinants of health - education, environment, economy - and genetics, with outcomes that are profoundly shaped by the quality of local services. There are many characterisations of the digital transformation of health with the most successful outcomes achieved by progress in:

- Clinical effectiveness
- Population health management
- Service access
- Sustainability
- People and Skills
- Re-admission

The Digital Transformation of the healthcare ecosystem can be divided into five entangled areas of intervention and policy making, that will be presented in this document.

1 MISSION CRITICAL INFRASTRUCTURE SHOULD ADOPT THE LATEST SOFTWARE BASED TECHNOLOGIES.

The convergence of technology, cloud, digitisation, machine learning, and next-generation software-defined will drive innovations in healthcare:

Utility based hybrid cloud - IT infrastructure shifts to buy the 'services' rather than the 'pipes' as it adopts a utility-based model like energy, water and natural gas.

Cost-effective discovery of insights – the exploration of deep insights from vast amounts of data is optimised with specialised compute power - cloud hosted GPU (data-science optimised) and TPU (deep-learning optimised).

Next generation cellular networks – pervasive, always-on, cheap and fast digital network connectivity: 5G.

Edge computing - computing at the critical point of care to preserve data privacy policy, enhance business continuity, improve reliability and reduce latency.

Healthy Planet - contributing to global sustainability commitments by making the carbon footprint of health IT neutral by 2030.

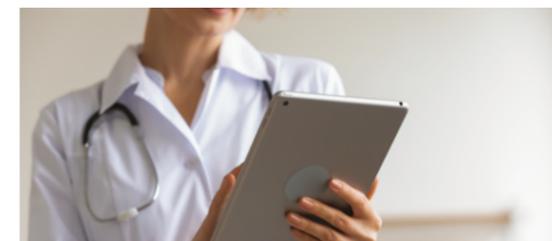
Security and privacy - enhancing the cyber-security posture of the healthcare ecosystem and responding to new threats.

2 ENABLING OPERATIONAL AND CLINICAL COLLABORATION WITH DIGITAL HEALTHCARE PLATFORMS.

The healthcare ecosystem is beleaguered with a colossal amount of meaningful data trapped in thousands of proprietary applications that have crept organically over many years of unregulated application procurement. This disparate and fragmented ecosystem prevents the efficient continuity of care for the citizen and inhibits the general wellbeing of the population. The healthcare ecosystem will evolve through the adoption of policies that guide the acquisition of Digital Healthcare Platforms to liberate the power of stranded healthcare data:

- The digital health platform addresses **the connectivity and interoperability of data captured in disparate applications.** Their inconsistent datasets and processes are integrated together by the adoption of: 'first mile' services (data integration, ingestion and indexing); the exploitation of data with cognitive insights (artificial intelligence and machine learning); the enactment of 'last mile' actions that transform new insights into real-world intervention.

- The digital health platform **boosts innovation by encouraging the reuse of routine data** for medical research and surveillance.
- The digital health platform **enables effective data-driven collaboration** across the wider territory spanning social care, home care, primary care, local surveillance, as well as acute care sectors such as hospitals, diagnostic services and rehabilitation centres.
- The digital health platform **provides telemedicine services** that complement the physical encounter with clinically appropriate consultations using virtual care services that respect privacy, confidentiality and security.
- The digital health platform **helps establish Command and Control Management Units (CCMUs)** that are similar to the defence or disaster management sector that monitor and predict in real-time the operational and clinical performance of a territory or segment.



3 THE MODERNISATION OF 'CLOSED DATA' SYSTEMS LIKE ELECTRONIC MEDICAL RECORDS, PATIENT ADMINISTRATION & IMAGING SYSTEMS..

The sustained growth of the healthcare application landscape means it must now confront significant bottlenecks due to their aging software architecture. A legacy portfolio often has limited scalability to support healthcare transformation, lacks interoperability standards, struggles to protect against modern cyber-threats and often results in the overprovisioning of IT resources with high carbon emissions. This legacy-burden inhibits an organisation's ability to innovate quickly, respond to dynamically changing situations, and adopt new care models. The modernisation of closed data systems is accomplished with new policies, an open approach to data and clinical decision support:

Policies that form the path to application modernization should embrace the latest technologies such as cloud-native applications, micro-service architectures and security-by-design principles. An incremental approach (rather than big bang) to modernization combined with the latest user experience (UX) frameworks helps facilitate community adoption with greater user satisfaction and more efficient workflows.

An **Open Data architecture**, contrary to the proprietary models often used today, **helps break-down barriers between applications** and eases the flow of information across hospital boundaries.

Clinical Decision Support (CDS) is central in the new wave of modern applications. It helps caregivers respond in real-time to the growing clinical demands of the population – an aging population, co-morbidity, chronic disease management.

Personalised Medicine (Precision Medicine) is facilitated by the healthcare platform and new applications are enabled though the combination of the Genotype and Fenotype data.

4 A 'DIGITAL FRONT DOOR' FOR CITIZENS AND CAREGIVERS THAT IMPROVES ENGAGEMENT AND ENCOURAGES EARLY PREVENTION.

Digitally native citizens have grown-up with high expectations of health technology with ubiquitous use of mobile devices, web applications and real-time video. Establishing multi-channel digital services - eBooking, eConsultation, eReferral - helps engage and activate citizen wellbeing, and encourages early prevention and intervention through:

- The democratisation of access to services and education for the population.

- A profound shift towards preventive early diagnosis medicine.
- The expansion of homecare services and the need for fewer acute care services.
- The integration of portable/wearable medical devices and behavioural appliances with healthcare platforms that leverage IoT technology.

5 MULTI-RESOURCE PLANNING & OPTIMIZATION THAT RESPONDS MORE QUICKLY ACROSS THE ECOSYSTEM

The digital healthcare platform enables the aggregation of multiple datasets - operational, clinical, demographical, behavioural, financial, social - to monitor in near real-time the usage of allocated human and physical resources across the ecosystem. Integrated platforms¹ will help to:

- Optimize multi-resource demand and supply planning by using predictive, cognitive enabled models that have been tuned to the characteristics of different health sub-segments.
- Respond efficiently and in real-time to crisis situations, for example a local or regional Covid outbreak.

The digital transformation of the healthcare ecosystem is expected to contribute to economical sustainability by maximising the efficiency of the deployed resources and by minimising the usage of high unit-cost care services.



¹ Glasser, J, Overhage, J, Guptill, J, Appleby, C, Trigg, D (2020) What the Pandemic Means for Health Care's Digital Transformation (Source: <http://bit.ly/3oMtG3l> (accessed:1st Feb 2021))

A DIGITAL PLATFORM IN A DATA DRIVEN ECO-SYSTEM HEALTHCARE

2020 was like no other year most people have experienced. Living conditions were altered for many and access to care was redefined. What were considered sacred boundaries were crossed, delivering solutions within the cycle time of the business were accelerated, and the ability to operate mission critical solutions within certain (or well qualified) risk constraints became acceptable. Indeed, being adaptive was the mantra.

Matt Ridley in his book¹ "How Innovation Works" opined that "innovation happens when people are free to think, experiment and speculate". This thrust was the undercurrent movement we witnessed during the peaks of the pandemic – health systems shortened their decision processes; the use of cloud-based solutions was uncontested and agile experimentation was pervasive.

LESSONS FROM COVID-19 (SPEED, SPEED, SPEED)

Acceleration has been the pandemic's most notable impact on health systems' digital strategy².

We witnessed tremendous adoption of transformational digital technologies, improvements in clinical and operational processes, rapid scaling of services, which when harnessed properly could turbo-charge many of the digital transformation initiatives that have stalled or biding their time on executive and boardroom shelves.

For example, Teladoc Health has redefined telemedicine as a proven channel for virtual care. Organisations and IT professionals embraced the industry shifts engendered by Covid-19 and changed the game through Innovation, Automation, Agility, Software Defined, Cost efficiencies and industry specific solutions.

OPPORTUNITY MEETS PREPAREDNESS

Prior to the pandemic, healthcare and life sciences industry witnessed market shifts towards:

- **Utility based Hybrid Cloud** - hybridized and secure clinical and administrative workloads are fast becoming the default operating model and the elasticity of cloud provides the economic case for action and business model transformation. Built in the premise that IT was becoming a utility like energy, water, gas, we are fast moving from "buying the pipes" to buying the specific services needed.

- **Processing compute power** - As digital approaches continue to revolutionize healthcare delivery¹, technology is enabling new insights. These insights combine personal, social, population and research data to create actionable information. Sound data strategies consist of the capture, connection, analysis and contextualization of data in order to create actionable information to guide decision making – however adopting the optimum processing power (CPU, GPU or TPU) creates differentiating market advantage. The goal is to derive insights from the data to deliver better patient care, better outcomes and lower costs².
- **Pervasive network connectivity** - 5G is going to change the paradigm of communication enabling scenarios and use cases today unimaginable.
- **Green agenda (4 Healthy Planet)** - Recent estimations³ testify data transmission is contributing to 4% of worldwide gas emissions. The Carbon footprint and the sustainability of ICT will become a priority. Putting sustainability at the centre of corporate strategy is essential preparation for a future climate event and opens up fresh business opportunities. Global organizations must understand their own carbon emissions and impacts on climate, and also those of their customers and supply chains (LeadingEdgeForum,2020)

¹ "Unlock healthcare data to deliver better patient care <https://bit.ly/3u7IoVr>"

² Unlock healthcare data to deliver better patient care <https://bit.ly/3u4BaBu>

³ LeadingEdge Forum <https://bit.ly/3tIBfBn>

PLATFORM STRATEGY AND APPROACH

We describe how the transformational power and network effect of platforms represents a new economic phenomenon that upends existing traditional business models. The combined effects of these platform services enable technology innovations such as:

Digital front door - next generation patient engagement

Advanced analytics - AI and population health management

With the Dedalus Platform, we offer a reference architecture that addresses the fragmentation, lack of standardization and sub-optimization of data across the complex and heterogeneous health IT ecosystems used in many large health care organizations today¹. Underpinned by a hybrid cloud, the Dedalus Platform global deployments have allowed our clients to master flexibility and adaptability.

At its core are key principles for market differentiation and leadership:

Optimised digital channels: digital front-door and next generation applications.

Microservices and modularity: greater reusability of common capabilities to increase consistency, governance and time to market

Externalisable service interfaces: that re-orientate portfolio with open APIs and API gateway services

Transform business models: with IoMT, AI/ML, conversational and cognitive tools

Continuity of care: value chain effect on data (provider, payer, pharma, medical devices, new players)

Integrated DevSecOps and Hybrid cloud foundation with deployments driven by declaratives and policies.



¹ Digital health platform reference architecture <https://bit.ly/3IKFvXP>



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About Dedalus

Dedalus is the leading healthcare and diagnostic software provider in Europe and one of the largest in the world. With its innovative framework of comprehensive and process-oriented solutions, Dedalus enables a revolutionary digital transformation of country-wide Healthcare Systems fully supporting the patient digital journey. Dedalus serves more than 6,100 private and public hospitals across 40 countries, through more than 5,500 highly specialized resources, of which 2000 are dedicated to R&D activities. We aim to help caregivers and healthcare professionals to deliver better care to the communities they serve and for this reason we are very proud of doing a special job, working with healthcare organisations to improve healthcare outcomes for patients.

Life flows through our software.

For more information, visit www.dedalus.com