Reconceptualising the digital maturity of health systems

Published Online
August 22, 2019
http://dx.doi.org/10.1016/S2589-7500(19)30083-4

There is increasing international consensus that health systems need to be digitally enabled if they are to continuously improve. However, large-scale digital transformation initiatives have typically struggled to balance national priorities with local needs.[1,2] In the UK, following the change in centralised procurement strategy through the National Programme for Information Technology (NPfIT),[3] an independent review recommended more devolved approaches to procuring software.[4] Subsequently, £595 million was committed to NHS England's Global Digital Exemplar (GDE) Programme, with the aim of catalysing the creation of a cohort of digitally outstanding UK National Health Service (NHS) organisations that would proactively share experiences, leading to the creation of a national learning ecosystem.[5]

The question of how digital excellence in health care, or the safe and effective use of digital health technologies is conceptualised, is of considerable interest, but little international consensus exists on how it should be defined, let alone measured. This poses challenges for leaders of digital transformation programmes—most importantly, how to set clear targets in the absence of an agreed basis for assessing current achievements or desired final goals. The rapid, continual emergence of new technologies adds further complexity.

Internationally, the most widely used assessment of digital excellence is the Healthcare Information and Management Systems Society (HIMSS) Electronic Medical Record Adoption Model (EMRAM).[6] This model maps out eight stages, from 0 to 7, for the adoption and utilisation of electronic medical record (EMR) functions culminating with HIMSS Level 7 (no use of paper charts, CPOE/CDSS [Computerized Provider Order Entry and Clinical Decision Support System] used in over 90% of the hospital). HIMSS Level 7 remains an uncommon achievement. For example, despite substantial federal investment through the Health Information Technology for Economic and Clinical Health (HITECH) Act,[7] only 6% of US hospitals have achieved HIMSS Level 7.[8]

Various related frameworks have also been developed, including the HIMSS Analytics Infrastructure Adoption Model (INFRAM) and the Continuity of Care Maturity Model (CCMM). NHS England has adapted EMRAM, adding dimensions of interoperability, technological readiness, and infrastructure components to create a Digital Maturity Index to assess hospitals' digital capabilities.

The key limitations of HIMSS EMRAM (and related approaches) are an almost exclusive focus on technological functionality rather than human and organisational capabilities and a failure to ensure that these are contextualised as enablers of transformation. HIMSS EMRAM also focuses on improving the efficiency and effectiveness of data exchange within hospitals rather than with other health-care organisations or settings such as primary and social care, which is fundamental to the provision of integrated care—often thereby neglecting innovation in service delivery models and social innovation. The portrayal of a single pathway towards excellence, achieved through a series of stages, might also unhelpfully distort priorities. Thus, a hospital could achieve HIMSS EMRAM Level 7 by having a closed-loop prescribing and administration system, but lack expertise in maintaining it or interrogating the data it generates. Additionally the costs of achieving closed-loop prescribing, which might be justified in terms of improving safety within a hospital, might not be the most pressing priority when considering patient pathways across an integrated health service. Although cost is a key driver for procuring digital systems in health care, which might be reinforced by models such as HIMSS EMRAM Level 7, focusing purely on technological capabilities, increasing evidence now also suggests that cost savings are unlikely to materialise and that the introduction of complex systems can have undesired consequences. Improving safety and quality might therefore be more realistic goals.

The notion of digital excellence serves an important purpose, providing a vision that can help motivate stakeholders and coordinate activities towards the pursuit of the quadruple aims of improving population health, controlling costs, enhancing patient experience, and improving the working life of health-care providers.[9] However, new frameworks for assessing digital maturity in relation to these complex and often contradictory goals are needed. These frameworks should facilitate setting clear targets and establishing ways to assess progress across diverse providers and

For more on **NHS England's Digital Maturity Index** see https://www.nhs.uk/service-search/performance-indicators/organisations/digital-maturity

For more on the **HIMSS Analytics Infrastructure Adoption Model** see https://www.himssanalytics.org/news/infram-pathway-infrastructure-maturity

For more on the **HIMSS Continuity of Care Maturity Model** see https://www.himssanalytics.org/CCMM

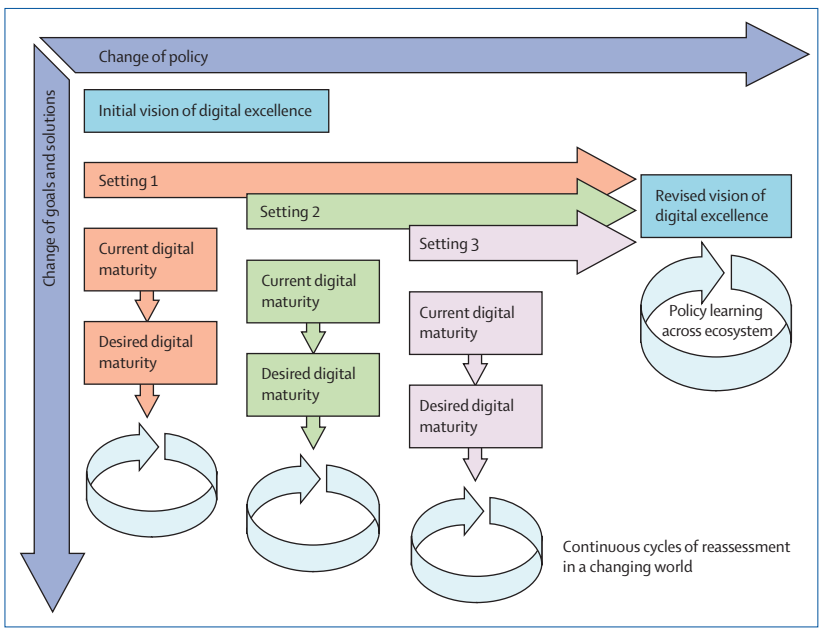

Figure: **The "Evolve in Context" model of digital excellence in health care**

settings, while also being agile by allowing targets to be updated throughout this journey. In doing so, we offer an alternative framework of measuring digital excellence where digital maturity can be tailored to the needs of local populations and build upon their existing institutional and technological infrastructures. This approach provides scope for adjustments over time in a context in which goalposts are changing, and where there is no agreed conception of direction and no endpoint (figure).[10] Our model takes these complexities into account. Here, different settings need to make constant re-assessments of their existing and desired digital state over time as goals, IT solutions, and policies change. This model could involve local providers identifying their own priorities and periodically reassessing these against their locally defined or desired outcomes.

Large-scale digital change programmes need to take these localised dimensions of digital maturity into account—for example, by adjusting endpoints of envisioned future states according to local factors. Use of HIMSS Level 7 as a measurement of success for all organisations is likely to lead to disillusionment among those involved as health-care organisations might become frustrated with their local needs not being met and policy makers might become frustrated by mandated targets not being met.

**Kathrin Cresswell, Aziz Sheikh, Marta Krasuska, Catherine Heeney, Bryony Dean Franklin, Wendy Lane, Hajar Mozaffar, Kathy Mason, Sally Eason, Susan Hinder, Henry W W Potts, Robin Williams*

Usher Institute of Population Health Sciences and Informatics (KC, AS, MK, CH), Business School (HM), and Institute for the Study of Science, Technology and Innovation (SH, RW), University of Edinburgh, Edinburgh UK; UCL School of Pharmacy, University College London, London, UK (BDF); National Health Services Arden and Greater East Midlands Commissioning Support Unit, Warwick, UK (WL, KM, SE); and UCL Institute of Health Informatics, University College London, London, UK (HWWP)
kathrin.beyer@ed.ac.uk

All authors are investigators on the evaluation of the GDE Programme (https://www.ed.ac.uk/usher/digital-exemplars). AS was a member of the Working Group that produced "Making IT Work" and was an assessor in selecting GDE sites. BDF supervises a PhD student partly funded by Cerner, on a subject unrelated to this Comment article. This article has drawn on a programme of independent research funded by NHS England. This work was also supported by the National Institute for Health Research (NIHR) Imperial Patient Safety Translational Research Centre. The views expressed in this publication are those of the authors and not necessarily those of the NHS, NHS England, NHS Digital, the NIHR, or the Department of Health and Care. We gratefully acknowledge the input of the wider GDE Evaluation team and the Steering Group of this evaluation. We would also like to thank two anonymous peer reviewers for their comments on an earlier version of this manuscript.

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