A Blueprint for Smarter Hospital Design

An opportunity to deliver care differently

The government's initial investment of £3.7bn to support the New Hospitals Programme presents a unique opportunity to redefine, refresh, and optimise the way that care is delivered and improve collaboration between previously siloed care providers. A more integrated approach to the design of our hospitals combined with the increased exploitation of digital technologies presents genuine opportunity to enhance user experience and deliver previously untapped benefits, by building facilities that are designed around the staff and patients that use them.

For those planning the delivery of smarter, more digitally enabled hospitals, the challenge is vast. COVID-19 has compounded pressures already faced by a healthcare service coping with burgeoning waiting lists and unprecedented estate maintenance backlogs[1]. NHS trusts have an imperative to act, yet must balance short-term, "business as unusual", pressures with the longer term demands to plan and phase new hospital investments that will deliver on the vision of a better, more effective model of care.

This next wave of new, digitally enabled hospitals presents a real opportunity to focus design on the needs of the users to deliver the "smart foundations"[2]. It will provide the stimulus to deliver care differently and increase the exploitation of digital innovation to enable new, more effective, more integrated models of care. Additionally, it will provide the catalyst to accelerate progression towards net zero carbon, and develop hospitals which are "reliable, modern secure, sustainable and resilient" by design.

The Smarter Hospital concept

IBM has traditionally framed "smarter" as capabilities which benefit from being instrumented, interconnected and intelligent[3]. The concept of a Smarter Hospital focuses not just on the building but its role within an Integrated Care System, and particularly in joining up care pathways at Place level. The Smarter Hospital focuses on the lives of its people—those working in it, receiving care, or visiting—the processes that run within the organisation, and its impact on the community and the environment in which it operates. IBM's Chief Medical Officer Mark Davies helped further contextualise this in proposing a vision for Smarter Hospitals[4] based around a human-centred, digitally enabled hospital, harnessing existing and emerging technology to improve the experience and efficiency of patient pathways and clinician workflows as set out below:

What is a Smarter Hospital?
A Smarter Hospital is created through the successful fusion of physical, digital and service design. It places user experience, operational efficiency, and improved, more sustainable, outcomes at its core to purposefully support and transform the evolution of care.

Setting a vision: Smarter Hospital goals

Smarter Hospitals combine the benefits offered by an improved and more sustainable physical environment with advances in digital solutions and technologies, and the development of new operating models to take pressure off the existing workforce and deliver on the following key transformation goals:

– **Experience** that places **patients and staff at the centre** of effective Smarter Hospital design
– **Efficiency** in the design, through-flow and operation of the new facilities and the technology that supports it
– A workplace designed to support the **digital enablement** of clinical and operational processes, capable of driving real improvement in **outcomes**—for patients, for clinicians and for those responsible for the smooth and efficient operation of the hospital

Charting the way

Hospitals built today need to endure for many decades and adapt to significant societal, cultural, environmental and technology changes during their lifetime. The only way to design a successful hospital is to put people's needs at the centre, through user-centred design and ensure the capability to change is factored in from the outset.

For those charting their journeys to implement the new breed of Smarter Hospitals—confidence is key. The adoption of a trusted delivery framework and repeatable model that reflects the learnings which others have made can offer real value for those contemplating how to transform their vision into a viable programme. These frameworks can guide and accelerate the redesign of care models to develop the new and improved user journeys that will address known pain points and deliver on targeted improvements in experience and efficiency.

This paper presents a proven and repeatable model to deliver on the **Smarter Hospital Vision** and offers practical advice and guidance to those contemplating such journeys through the lens of our **Smarter Hospital Digital Blueprint**.

IBM's vision

Our vision for the Smarter Hospital is founded on three simple constructs:

Outcomes—Firstly, Smarter Hospitals should be designed to enable the realisation of benefits routed in better outcomes, improved efficiency and an enhanced experience for all; and these benefits can be optimised by breaking down traditional siloes and weaving together the threads of physical and digital design through a clear focus on service design. This perspective echoes encouragement from the Government Office for Science and the Council for Science and Technology to apply technology to "transform the health system and create a more person-centred service"[5].

Governance—Secondly, successful digital transformation requires a parallel focus on programme governance—promoting consistency and interoperability in design and also promoting coherence and delivery assurance around time and budgetary constraints.

Digital Blueprint—Thirdly, the application of a Digital Blueprint can help provide the practical guide rails to support trusts as they seek to breakdown a complex transformation journey into a framework for delivery.

Experience has shown that there is enormous value in setting out "the how" upfront. Here our **Smarter Hospital Digital Blueprint** reflects our experiences in translating vision into action, in charting the transformational journey into manageable steps, and in aligning often disparate groups of stakeholders behind a common vision and delivery framework.
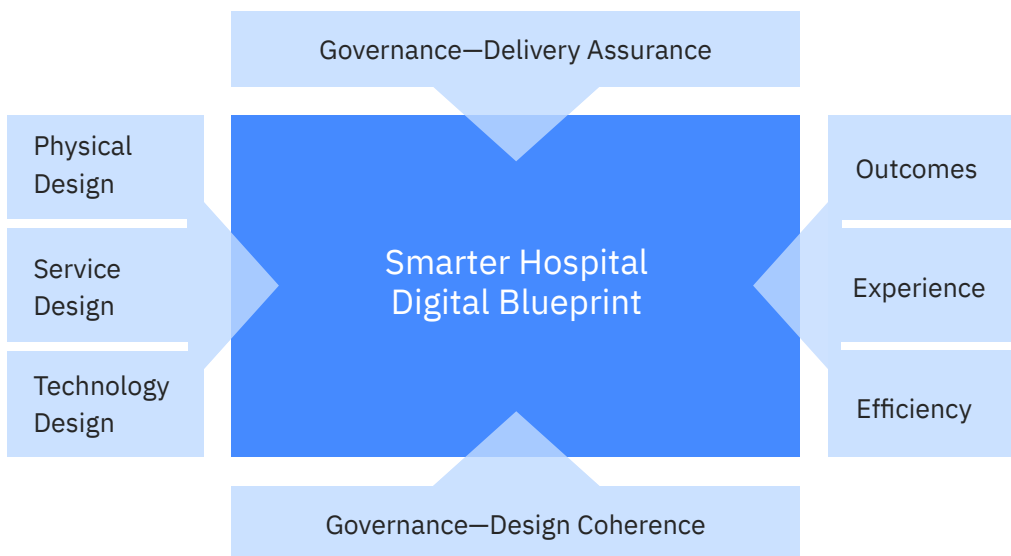

Figure 1: IBM's Vision for a Smarter Hospital

The IBM Smarter Hospital Digital Blueprint

As trusts contemplate their journeys towards a smarter, more digitally enabled future, differences in population health metrics, geographical location, clinical specialisms, and physical footprint mean that each trust will face its own unique blend of challenges, constraints and targeted benefits, and each will need to chart its own journey to reflect trust priorities, timelines and funding.

We have translated our experience supporting the delivery of Smarter Hospitals and combined this with our experience of digital transformation across private and public sectors into a **Smarter Hospital Digital Blueprint**. A repeatable toolkit that can encourage a holistic approach to planning, design and implementation and provide both the "North Star" and structure to support your transformation.

Our aim has been to establish a practical guide that can be used by trusts from the outset of their New Hospital Programmes, a vehicle which can help develop the digital maturity of the trust, a framework through which to understand where and how innovation and emerging technologies can make a real difference, and the foundations to provide practical support through the detailed design and implementation phases.

The blueprint comprises two sets of blueprinting activities and associated artifacts:

– **Planning** includes a suite of 3 **enabling** blueprint components and activities aligned to:
  1. **Assure** business case development
  2. **Articulate** the staff and patient journeys, and
  3. **Develop** the underpinning digital placemat and associated phased delivery plan developed through comparison with the **IBM Smarter Hospital Reference Model**

At the end of the planning phase the blueprint will reflect the prevailing Digital Maturity and define the gap between the prevailing digital footprint and that needed to deliver on the future vision for a Smarter Hospital. It will breakdown and assess the investment needed in Digital to underpin business case preparation, and set out the steps needed to be developed during the design phase.

– **Design**—a suite of 10 **foundational** components including articulation and documentation of:

1. **Target operating model** to describe the "to-be" delivery model for the Smarter Hospital, articulated in terms of clinical process, operational process, organisation, technology, people and place
2. **Facility and spatial design** to set out the physical layout, fabric, footprint and flow of the new facility and alignment to key sustainability goals
3. **Service design and care pathways** to develop and document the to-be staff and patient journeys, to define how the hospital operates within a future Integrated Care model
4. **Intelligent workflow** to define how the new physical design and digital solutions will be "e-enabled" to reduce waste and improve efficiency and experience
5. **Organisational design** to set out the organisational model needed to support the redesigned hospital based on what services and functions the hospital will self-deliver, manage and buy-in

6. **Digital infrastructure and enterprise architecture** to develop and document the digital architecture to support and sustain the exploitation of digital capability
7. **Emerging technology solutions** to set out how the hospital plans to optimise the benefit presented by automation, virtual and augmented reality, virtual assistants, 5-G, IoT, blockchain and other emerging and evolving technologies to relieve pressure on the existing workforce
8. **Data** and **insights** to set out the data strategy, governance and design principles to underpin the better capture, sharing and use of data to drive better and more timely decision making
9. **Security** and **resilience** to develop and document the processes, procedures and mechanisms to better manage and protect exposure to external threats and cyber attack
10. **Skills development** the evaluation and definition of training and educational activities needed to support the various hospital stakeholder communities in a more connected and digital world

Together the component elements of the Smarter Hospital Digital Blueprint provide a set of artifacts that frame and define a Smarter Digital Hospital, providing the vehicle through which to realise the benefits offered by the investment in Smarter Hospitals.
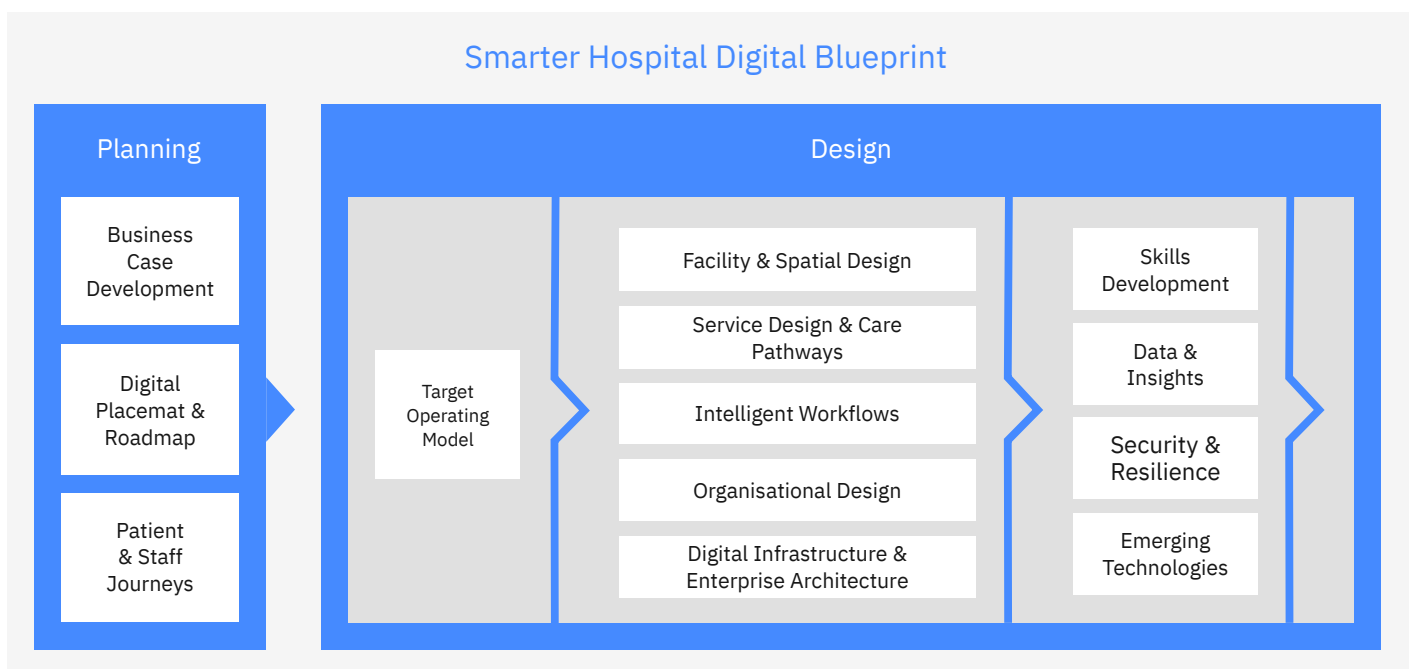

Figure 2: The IBM Smarter Hospital Digital Blueprint

A templated approach to the assessment of a trust's Digital Placemat can be accelerated and assured through comparison with IBM's Smarter Hospital Digital Reference Architecture.

The IBM Smarter Hospital Digital Reference Model–a templated model for the development of a future-fit Digital Placemat and supporting Roadmap.

IBM sees excellence in digital design as a key tenet in assuring the delivery of Smarter Hospitals. In support of this, we have developed an IBM Smarter Hospital Reference Model which comprises 11 key digital dimensions and 111 digital capabilities. This architecture reflects the lessons we have learned supporting clients in healthcare and beyond with their successful digital transformations. It has been developed to support coherence and efficiency in physical design (the layout, operation and flow of the hospital) and to support excellence in service design.

This reference model has been informed by our knowledge of what patients want, and what trusts and care providers need to deliver their services even better. It is underpinned by the possibilities offered by emerging and evolving digital technologies, which will enable the iterative and continuous improvement of the services offered to patients. This will enable your hospital to be "Fit for the Future" as new service requirements emerge.
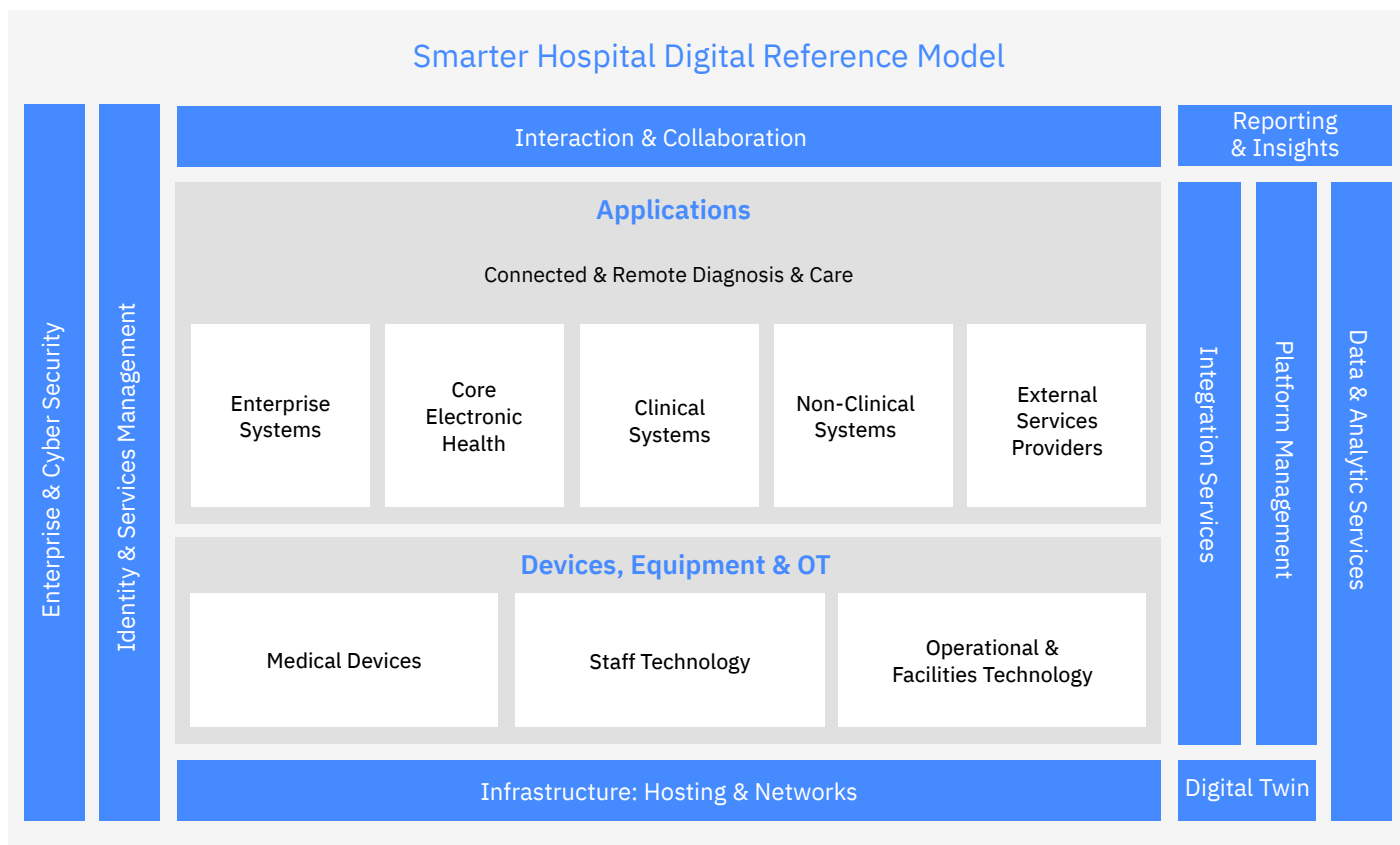
Figure 3: The IBM Smarter Hospital Digital Reference Model

Blueprint in action:

▼ Situation

IBM has been supporting a large private health provider with the planning and design of a new, state of the art hospital which is set to open in London in 2022. The challenge was to deliver an innovative technology environment that would enable a world-class, integrated, patient experience over the multi-site facility. IBM fully integrated into the client's workforce to identify, design, and build the technology to support the client's ambition, whilst also creating the blueprint for future expansion.

● Approach

IBM applied its Smarter Hospital Digital Reference Model and applied a technology agnostic stance in helping to assess the best technology for delivery against the defined digital vision. IBM managed multiple specialist suppliers to design and build the networks, applications and IT infrastructure needed to successfully deliver on the client's needs. The infrastructure was built to enable full use of an EMRAM Level 7 Electronic Patient Record System and included over 70 additional specialist applications.

IBM supported the client through the discovery, strategic advice, design and build phases of the programme, working as the client's Technology Systems Integrator. Our multi-disciplinary team included business analysts, experience strategists, transformation consultants, technical architects, facilities specialists and project managers to support the client with the development of a technology blueprint and supporting roadmap that was specific to its user journeys and the pain points of its caregivers and patients.

○ Outcome

Creation of a Digital blueprint to support the delivery of a new digitally enabled hospital and a template to support the client's future global expansion.

Conclusions

As we emerge from COVID-19, NHS trusts are at an inflection point and faced with the burden of coping with increasing demand alongside existing infrastructure. The investment in the New Hospitals Programme presents a real opportunity to accelerate the pace of transformation and can be a catalyst to drive towards the realisation of potential benefits in terms of efficiency, experience, and better outcomes for all.

As trusts tackle the start-up of their New Hospital Programmes, their planning and their integrated design, there is clear merit in learning from the experiences of those who have gone before, and in the adoption of more repeatable, more templated models of delivery. The IBM Smarter Hospital Digital Blueprint provides a proven model to support and accelerate your Smarter Hospital journey— bringing together the strands of service, technology, and physical building design into a cohesive delivery framework.

How IBM can help

IBM delivers business transformation, technology and digital design services. We can draw from a rich portfolio of successful digital transformation experience both across healthcare and more broadly. We can bring together teams which combine deep healthcare expertise with an understanding of digital, physical and service design. We can also support you in the application of our Smarter Hospital Digital Blueprint which will bring structure, confidence and assurance to all those involved in the planning and design of Smarter Hospitals.

For more information on our Digital Blueprint and associated Healthcare Services please reach out to the team.

For more information
Learn more about solutions for smarter health:
ibm.com/uk-en/industries/healthcare

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Robert leads our Real Estate and Facilities group and has over 20 years leading Digital Transformation programmes that interface our physical infrastructure and the digital systems that support them. Robert has advised a range of UK public sector organisations on blueprinting and implementation of their major capital programmes.

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Lisa has more than 20 years of leading and delivering transformation programmes for clients across the healthcare sector. Her healthcare professional services experience spans: clinical strategy, operational improvement, turnaround, business case development, population health and new models of care for providers, commissioners and local health systems.

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Julian leads our Healthcare and Life Sciences business. He has over 20 years consulting experience, advising senior clients on the strategic use of digital technology to enable clinical transformation. His experience spans advisory services to central policy bodies, providers, Trust Boards and Executive teams helping them to develop digital strategies which enable the transformation of clinical care.

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Mark is IBM's Chief Medical Officer covering Europe, Middle East and Africa. He has over 20 years' experience as an NHS General Practitioner in the UK. He has held a number of clinical leadership roles at the Department of Health, Cabinet Office and, most recently, as executive medical director of NHS Digital. He is also a non-executive director of the British Medical Journal.

References:

1. Could NHS waiting lists really reach 13 million? Institute of Fiscal Studies, 08 August 2021
2. NHS-X "What Good Looks Like Framework", 31st August 2021
3. "IBM Builds a smarter planet". IBM. Retrieved 2020-04-24
4. Emerging Smarter: A Smarter Hospital for the Future, a focus on people not buildings, Mark Davies, IBM, 2020
5. "Harnessing technology for the long-term sustainability of the UK's healthcare system: report", Government Office for Science and the Council for Science and Technology, 23 August 2021

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