



30 month report

Independent Evaluation of the Global Digital Exemplar (GDE) Programme

Submitted to NHSX

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on behalf of GDE Evaluation team

July 2020

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Please, use the following statement for citation:

R. Williams, K. Cresswell et al. (2020) 30 Month Report - Global Digital Exemplar Evaluation Programme, Edinburgh, The University of Edinburgh.

Funding: This article has drawn on a programme of independent research funded by NHS England. The views expressed are those of the author(s) and not necessarily those of the NHS, NHS England, or NHS Digital.

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Executive summary

The Global Digital Exemplar (GDE) Programme represents an ambitious attempt to achieve digital excellence and promote the wider uptake and optimisation of technologies across the National Health Service (NHS) in England. The core strategy of the GDE Programme consists of supporting digital transformation to develop exemplars of excellence in selected relatively digitally mature GDE provider organisations, followed by a strategy to disseminate these best practice models across the GDE Programme and then, it is hoped, to the wider NHS. The latter was pursued through three linked initiatives:

- Partnerships between GDE exemplar (hereafter GDE) sites and less digitally mature Fast Follower (FF) sites
- Production and circulation of documents (Blueprints) to capture learning about how excellence had been achieved in specific areas
- Establishment of a number of Learning Networks.

There are few precedents for such large-scale, concerted change programmes across diverse organisational settings in healthcare anywhere in the world.

Overall, GDE Programme policy has been successful in achieving its key strategic goals, namely: 1) promoting the achievement of digitally-enabled transformation of care and outcomes within GDE and FF sites by stimulating clinical engagement, securing top-level buy-in and wider support across provider organisations, supported by inter-organisational knowledge transfer 2) promoting the growth of knowledge networks that have helped to develop the foundations for a learning ecosystem to promote digital transformation across NHS England.

During the COVID-19 crisis, we had to temporarily pause data collection. We therefore focused on analysing data collected and consolidating findings over the past six months. This formative report focuses on reporting our findings in relation to the Programme's efforts to establish a digital health learning ecosystem in England. We include as Appendices (1–3) three draft papers that are being prepared for journal submission;¹ another three papers are at an advanced state of drafting.

We observed that formal processes put in place by the GDE Programme to initiate and reinforce sharing and learning have accelerated the growth of informal knowledge networking and helped to develop the foundations of a learning ecosystem. Formal networks were most effective where supported by informal networking motivated primarily by the mutual benefits of knowledge sharing. The benefits of networking were enhanced (and costs reduced) by geographical proximity, shared culture and patient populations, common technological functionality, regional and strategic alignments, and professional agendas.

Recommendations for policy and practice emerging from this work are:

¹ Cresswell K, Sheikh A, Krasuska M, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. The formative independent evaluation of a digital change programme in the English National Health Service: Study protocol for a longitudinal qualitative study (submitted to BMJ Open).

Cresswell K, Sheikh A, Krasuska M, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. How can health services establish digital health learning ecosystems? Insights from a qualitative evaluation of a national digital health change programme in English provider organisations (to be submitted to Lancet Digital Health).

Williams R, Sheikh A, Franklin BD, Lane W, Krasuska M, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Cresswell K. Blueprinting to promote inter-organisational learning in digital health – experiences from the National Health Service in England (to be submitted to the Journal of the American Medical Informatics Association).

- This attempt to create a national digital health learning ecosystem illustrates that formal top-down interventions (such as partnering arrangements, the production of knowledge repositories such as Blueprints, funding, and coordination activities) can stimulate the development of a learning ecosystem, but informal relationships (arising from these initiatives or emerging independently) are key for effectiveness and sustainability. Informal networks are however, hard to plan. It is difficult to anticipate which areas of knowledge sharing and networking will be most effective. Therefore, support should seek to assist informal structures for exchanging knowledge and experience where formal means have failed. These may include promoting secondments and consultancy to promote knowledge sharing through “social learning”.
- Labour and resource-intensive knowledge transfer (e.g. through networks) may be difficult to scale, but knowledge transfer through Blueprints alone, whilst scalable and low-cost, is not effective in isolation. There is therefore a need to develop a range of tools to promote knowledge transfer and draw on these flexibly depending on evolving needs.
- Central strategies cannot guarantee that effective informal knowledge sharing will take place and there is therefore a degree of uncertainty in relation to both intended and unintended outcomes. This needs to be acknowledged.
- There have been important processes of policy learning in developing, implementing, reviewing and improving programme management instruments in the course of the GDE Programme. It is now essential that policy makers draw on this learning going forward.
- There is now a risk of losing the collective memory and learning as well as dispersal of capabilities, particularly as attention has recently been diverted through COVID-19.

More generally, we have the following reflections on the overall lessons of the Programme:

- Like many previous digital transformation initiatives in the NHS, the Programme was launched and implemented within a very challenging timeframe. However, digital transformation represents a major and ongoing challenge. Rather than continue this pattern of episodic interventions, the priority going forward should be to ensure the cumulative development of digital change programmes and associated policy instruments and strategies and funding plans are within a longer timeframe.
- Policy intervention needs to be evolutionary, establishing ways to help link stakeholders with similarities, tools to facilitate communication, asking the stakeholders what would be useful to them, and creating a role for independent intermediaries.
- There is a need to build on existing local/regional initiatives and experience when conceptualising national programmes (as is happening in the Digital Aspirant Programme) but this shift needs designated emphasis (and associated time) on effective and thorough stakeholder engagement in planning policy before initiatives are launched. Understanding and leveraging regionally nuanced incentives and performance measures will be crucial in this context.

Background and context

Healthcare systems internationally strive for excellence. Excellence is often expressed through health systems achieving the “triple aim”: better outcomes, better value and better experience.² Policy initiatives throughout the developed world have sought to expedite the journey to achieve the triple aim through various digitisation strategies. These include for instance the Health Information Technology for Economic and Clinical Health (HITECH) Act in the United States (US), and Australia’s National Digital Health Strategy & Framework for Action.^{3,4}

However, these strategies have shown varying levels of success. For instance, the HITECH reform was successful in getting organisations to adopt Electronic Health Records (EHRs) but clinical benefits of these systems are difficult to demonstrate.⁵ Similarly, the envisioned large-scale EHR adoption through centralised procurement of systems in the English National Programme for Information Technology (NPfIT) in 2002 was successful in laying the infrastructure that has underpinned much of the subsequent developments, but yielded unintended consequences, with early EHR systems showing difficulty fulfilling organisational and user needs, which ultimately led to a change in strategic direction to allow more localised input in decision making.⁶ However, at least in England, digitisation without central direction between 2011 and 2016 was also not very successful as individual healthcare organisations had limited resources and capacity to implement and optimise digital systems. There was no widespread recognition that viewed HIT as an enabler for digital transformation resulting in a focus on IT deployment projects (viewing HIT as a ‘back office’ function) rather than wider service improvement strategies.⁷ In addition, the continued lack of standards utilisation continued to threaten the interoperability agenda.⁸

In 2016, the English government commissioned the US physician Robert Wachter to lead an independent review of the state and future strategic direction of digital health strategy in England.⁹ One of the key recommendations from this was to invest limited central resources selectively to create a cohort of digital centres of excellence. Consequently, NHS England's Global Digital Exemplar (GDE) Programme was conceived in 2017 with £395 million national investment designed to support “selected digitally advanced mental health, acute provider organisations, specialist provider organisations and ambulance provider organisations, who through funding and international partnership opportunities will become Exemplars over the next two to three and a half years”.¹⁰ The underlying assumption was that digitally advanced sites would become international centres of excellence and create Blueprints of action and learning for later implementers. The idea of Blueprints was designed to help FF sites paired up with GDEs to leapfrog and accelerate the spread of this learning nationally. A £200 million expansion of the GDE Programme that involved inviting additional GDE and

² Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health affairs*. 2008 May;27(3):759-69.

³ Blumenthal D. Launching hitech. *New England Journal of Medicine*. 2010 Feb 4;362(5):382-5.

⁴ <https://conversation.digitalhealth.gov.au/framework-for-action>

⁵ Mennemeyer ST, Menachemi N, Rahurkar S, Ford EW. Impact of the HITECH act on physicians’ adoption of electronic health records. *Journal of the American Medical Informatics Association*. 2016 Mar 1;23(2):375-9.

⁶ Sheikh A, Cornford T, Barber N, Avery A, Takian A, Lichtner V, Petrakaki D, Crowe S, Marsden K, Robertson A, Morrison Z. Implementation and adoption of nationwide electronic health records in secondary care in England: final qualitative results from prospective national evaluation in “early adopter” hospitals. *Bmj*. 2011 Oct 17;343:d6054.

⁷ https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/A_digital_NHS_Kings_Fund_Sep_2016.pdf

⁸ <https://www.digitalhealth.net/2016/02/hunt-announces-4-2-billion-for-nhs-it/>

⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/550866/Wachter_Review_Accessible.pdf

¹⁰ <https://www.england.nhs.uk/digitaltechnology/connecteddigitalsystems/exemplars/>

FF provider organisations to the Programme was announced in late 2018.¹¹ Our team has been commissioned to evaluate the GDE Programme over a period of three years, with evaluation activities commencing in January 2018. We are also intimately involved in delivering the NHS Digital Academy, a related initiative also emerging from the Wachter report. The NHS Digital Academy is a virtual organisation training NHS staff in digital leadership.

In December 2019, health secretary Matt Hancock announced the NHS Digital Aspirant Programme to build on the GDE Programme.¹² Although no details have been released at the time of writing, this programme is intended to build digital transformation capacity across a wider range of NHS provider organisations and with smaller amounts of funding than the GDE Programme.

Methodology and progress of data collection

Design

We conducted an independent, longitudinal, qualitative, formative evaluation of the GDE Programme, exploring digital transformation and knowledge sharing in acute and mental health provider organisations participating in the GDE Programme. Our methods included a combination of in-depth semi-structured one-to-one and group interviews with relevant organisational stakeholders (managers and clinicians), documentary analyses of organisational strategic plans, and ethnographic fieldwork (non-participant observations of strategic meetings and site visits). This allowed us to gain insights into local knowledge, organisational context and progress, and formal and informal knowledge sharing. We also collected a range of national documents, observed national strategic meetings and conferences, and conducted in-depth interviews with national programme managers and system vendors. These helped us to explore national knowledge networks (both formal and informal) and linkages between organisations.

Provider organisations were conceptualised as case studies.¹³ We conducted in-depth studies of 12 organisations (A-M) as well as broader case studies of the remaining 24 organisations between 2018 and 2020. In-depth case studies were selected for maximum variation including different core technological systems, geographical locations and levels of digital maturity. Detailed methods are described in our study protocol.¹⁴

Analysis

We combined inductive and deductive methods, drawing on a theory-informed, sociotechnical coding framework.¹⁵ Lead researchers (SH, MK, HN) initially analysed a range of themes including formal and informal knowledge flows in the in-depth case studies and then tested and validated these emerging findings against emerging issues from the broader case studies. We then integrated emerging results with accounts of the wider macro-environmental landscape from policy, commercial and independent

¹¹ <https://www.digitalhealth.net/2018/08/nhs-england-planning-further-waves-of-global-digital-exemplars/>

¹² <https://www.digitalhealth.net/2019/12/matt-hancock-announces-new-programme-to-help-nhs-trusts-go-digital/>

¹³ Crowe S, Cresswell K, Robertson A, Huby G, Avery A, Sheikh A. The case study approach. *BMC medical research methodology*. 2011 Dec;11(1):100.

¹⁴ Cresswell K, Sheikh A, Krasuska M, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. The formative independent evaluation of a digital change programme in the English National Health Service: Study protocol for a longitudinal qualitative study. *BMJ Open* (submitted).

¹⁵ Cresswell K, Williams R, Sheikh A. Developing and Applying a Formative Evaluation Framework for Health Information Technology Implementations: Qualitative Investigation. *Journal of Medical Internet Research*. 2020;22(6):e15068.

stakeholders and tested these against case study data.¹⁶ Narrative accounts were produced collectively and through discussion in team meetings, where we paid most attention to emerging tensions and conflicting findings. The current analysis focused on integrating different strands of enquiry relating to formal and informal learning and knowledge networks across the GDE Programme and within the wider macro-environmental context. In doing so, we also identified the role and effectiveness of various intermediaries.

Ethical approval

This work was a service evaluation. It received institutional ethical approval from the School of Social and Political Science at The University of Edinburgh, UK.

Publications in preparation and published in academic peer-reviewed journals

We have published the following to date:

- Cresswell K, Sheikh A, Krasuska M, Heeney C, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW. Reconceptualising the digital maturity of health systems. *The Lancet Digital Health*. 2019 Sep 1;1(5):e200-1.
- Krasuska M, Williams R, Sheikh A, Heeney C, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Cresswell K. Technological capabilities to assess digital excellence in hospitals in high performing healthcare systems: an international eDelphi exercise (accepted for publication in the *Journal of Medical Internet Research*).
- Cresswell K, Sheikh A, Franklin BD, Krasuska M, Nguyen HT, Hinder S, Lane W, Mozaffar H, Mason K, Eason S, Potts HW. Theoretical and methodological considerations in evaluating large-scale health information technology change programmes. *BMC Health Services Research*. 2020 Dec;20:1-6.
- Cresswell K, Sheikh A, Krasuska M, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. The formative independent evaluation of a digital change programme in the English National Health Service: Study protocol for a longitudinal qualitative study (submitted to *BMJ Open*, see Appendix 1).

The following manuscripts are in preparation:

- Cresswell K, Sheikh A, Krasuska M, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. How can health services establish digital health learning ecosystems? Insights from a qualitative evaluation of a national digital health change programme in English provider organisations (to be submitted to *Lancet Digital Health*, see Appendix 2).
- Williams R, Sheikh A, Franklin BD, Lane W, Krasuska M, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Cresswell K. Blueprinting to promote inter-organisational learning in digital health – experiences from the National Health Service in England (to be submitted to the *Journal of the American Medical Informatics Association*, see Appendix 3).
- Krasuska M, Williams R, Sheikh A, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Cresswell K. Qualitative national evaluation of the English Global Digital Exemplar Programme - diversity of local contexts, processes and outcomes in hospitals as a

¹⁶ Patton MQ. *Qualitative research & evaluation methods: Integrating theory and practice*. Sage publications; 2014 Oct 29.

result of large scale health information technology change (to be submitted to the Journal of the American Medical Informatics Association).

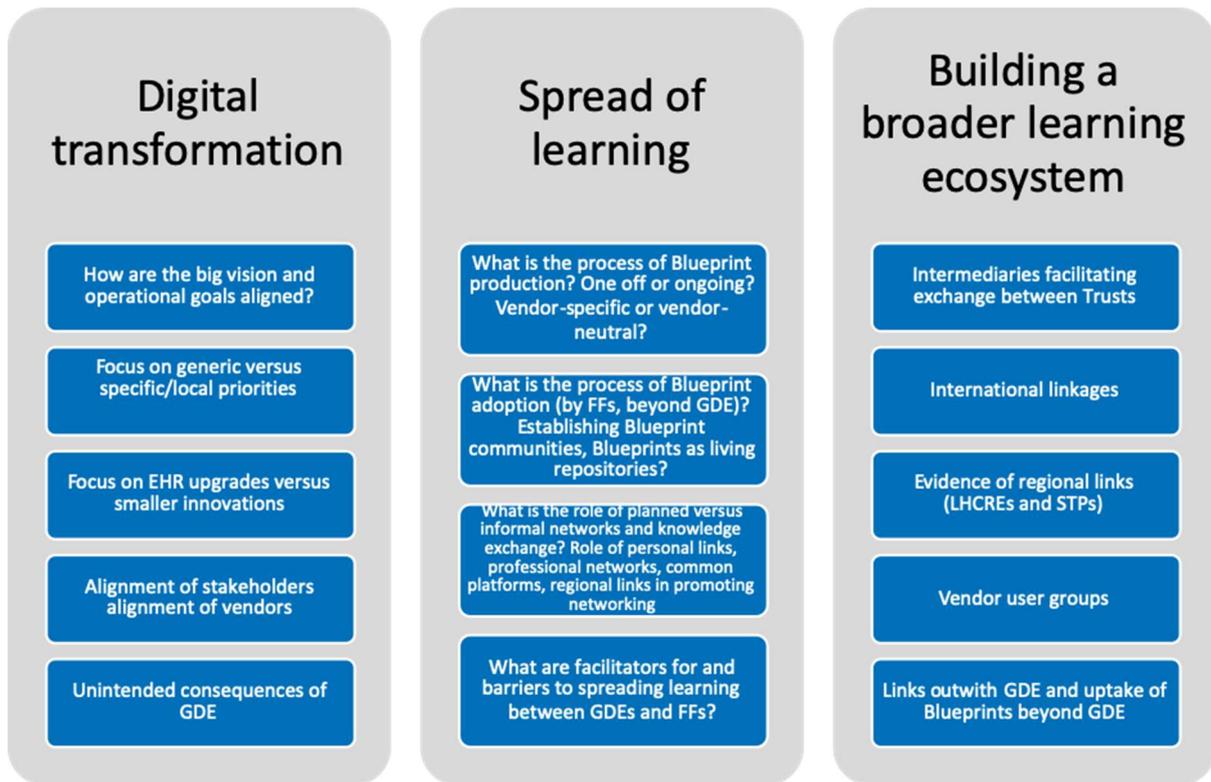
- Hinder S, Cresswell K, Krasuska M, Sheikh A, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Potts HW, Williams R. Creating a learning economy through health information technology enabled change programmes – a qualitative national evaluation of the English Global Digital Exemplar Programme (to be submitted to BMJ Health and Care Informatics).
- Nguyen H, Cresswell K, Krasuska M, Sheikh A, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. Folk theory of the electronic health record market - (dis)analogy between the EHR and enterprise resource planning (ERP) market (to be submitted to Social Studies of Science).

Since the last report, we have presented at Digital Health Rewired on the 4th March 2020 in London, and Dr Cresswell has led a workshop on Blueprinting at the HETT. We have also written up our findings specifically relating to Blueprinting (see Appendix 4) and have presented these to members of the Blueprinting Steering Group.

Conceptual framework

Figure 1 illustrates our key lines of enquiry. We have grouped these around three themes: *digital transformation* within GDE/FF sites; *spread* anticipated under the GDE Programme between GDEs and FFs; and the broader networks and knowledge flows that may contribute towards *building a broader learning ecosystem*.

Figure 1: Key lines of enquiry



Findings

We conducted 341 one-to-one and 116 group interviews, observed 86 meetings, and analysed 245 documents in 36 participating provider organisations (Tables 1 and 2, Appendix 1 for data by site). We also conducted 56 high-level interviews with policymakers and vendors, conducted 84 observations of national meetings, workshops, and conferences, and analysed 80 national documents.

Table 1: Our dataset

Data collected in the in-depth case study sites (GDE: Global Digital Exemplar; FF: Fast Follower)		
12 provider organisations	Total 8 GDEs: acute GDEs (6), mental health GDEs (2) Total 4 FFs: acute FFs (3), specialist FFs (1)	224 one-to-one interviews 67 group interviews 104 documents 67 meetings observed
Data collected in the broad case study sites		
24 provider organisations	Total 15 GDEs: acute GDEs (10), mental health GDEs (5)	117 one-to-one interviews 49 group interviews

	Total 9 FFs: acute FFs (9)	141 documents 19 meetings observed
Data collected elsewhere		
56 high-level interviews with policy makers and vendors Non-participant observations of 84 national meetings, workshops, and conferences 80 documents		

Table 2: Description of the sample in the wider GDE Programme landscape

	Included in – in-depth studies	Included in broader studies	Omitted due to late admission to Programme	Omitted due to FF merging with GDE	Total
Overall number of GDEs (Excluding ambulance GDEs) – 16 acute and 7 mental health	8	15	0	0	23
Overall number of FFs – 17 acute and 8 mental health	4	9	9	3	24
Totals	12	24	9	3	48

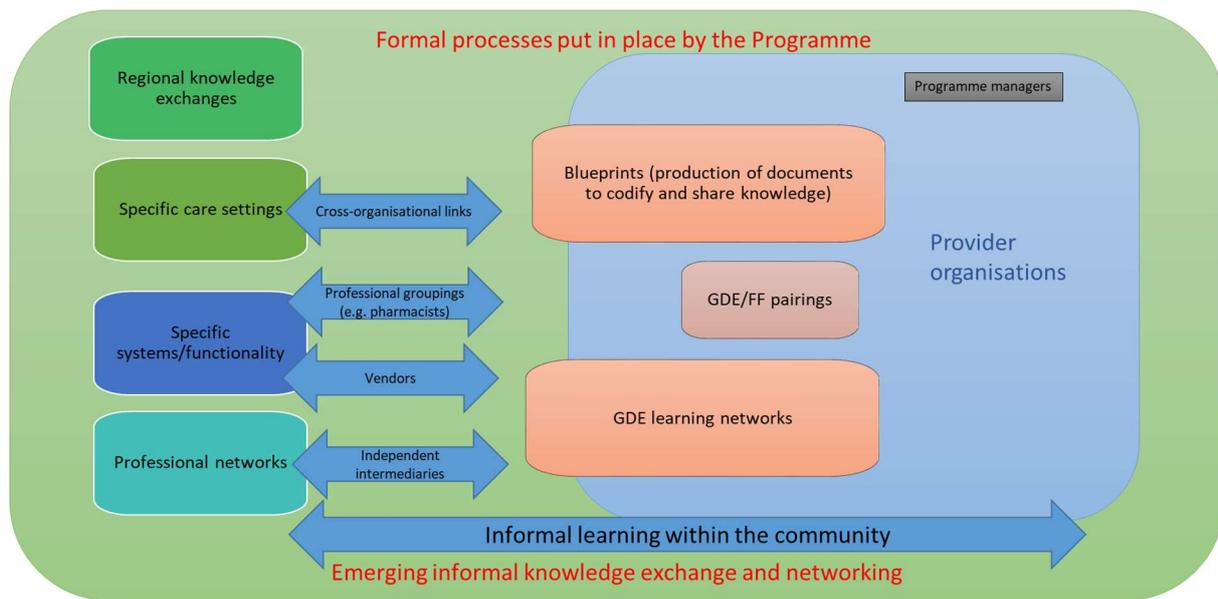
Note: the number of overall Global Digital Exemplars (GDEs) and Fast Followers (FFs) differ from those included in our study as there were some mergers and delays in start dates that meant that we did not include some provider organisations

In our broader sample, 19 pairings of GDEs/FFs had a common core system and 15 organisations were in the same local strategic groupings (including so-called “Sustainability and Transformation Partnerships” (STPs) to coordinate collaborations of healthcare organisations and local authorities building consensus on transformation priorities and plans to deliver these). 11 pairings of GDEs and FFs in the broader sample had pre-existing positive relationships.

In our 12 in-depth case studies, six pairings were located in same local strategic grouping, 10 had the same core system as their FF, and six had pre-existing positive relationships.

Figure 2 illustrates the emerging formal and informal learning and knowledge exchange processes, knowledge exchange forms, and key intermediaries in the Programme.

Figure 2: Formal and informal learning and knowledge exchange processes in the GDE Programme



Overall, our work indicates that these initiatives, combined with the status of being part of the GDE Programme, appear to have promoted a burgeoning learning culture across digitally engaged provider organisations and GDE/FF pairs, with increased sharing of knowledge and experience among organisations. All but five provider organisations in our sample described involvement in networking activities, sharing knowledge/experience and learning from others. We also observed some evidence of the increasing development of a learning ethos in the NHS reinforced by these processes.

“...we’re starting to share what we’re doing, in a demonstrable way, and start to see it, and it was quite powerful.” (Site 14, Non-clinical Digital Leader, broader case study)

“[Provider organisation] had spent about a year building paediatric meds. And they said here, you can have it. So that’s a year’s work, that’s non-trivial. They just simply gave it to us. Now would that have happened two years ago? Three years ago? I’m not sure...So there are people sharing things of real value, real cost, real-time, real value with each other, which is excellent. So are we creating new knowledge by that, I’m not sure. Are we sharing and optimising that knowledge? Very definitely.” (Site L, Chief Information Officer, in-depth case study)

Evolving formal processes to promote a national digital health learning ecosystem

Several linked formal initiatives to facilitate knowledge transfer were designed and implemented within the tight GDE Programme launch timeframe and were further elaborated in the light of experience. Formal mechanisms encouraged and were in turn strongly supported by the burgeoning of informal networking and sharing of knowledge and experience. These developments led to changes in the strategic focus of the Programme. For example, the strategy associated with the production and distribution of Blueprints grew to become a key component of the learning ecosystem, accompanied by a changed conception of the process of Blueprinting as the user community (provider organisations) became actively engaged in developing the mechanisms for their production, distribution and use. The initial conceptualisation of Blueprints as passive containers of information to support accelerated procurement of validated technologies evolved towards a view of ‘Blueprinting’ as a prelude for direct interactions between emerging communities of practice (those with a common interest in procuring/implementing/optimising a particular technology). In this way, Blueprinting changed from an activity of capturing digitisation knowledge in artefacts that could then be widely disseminated, to

a means of facilitating informal networking. They served as an overview of new developments and provider organisations used them as a way to establish contact with others and structure discussions.

“[Blueprinting]’s supposed to be not just about taking and adopting, it’s to open up conversations.” (Site 8, Non-clinical Digital Leader, broader case study)

The evolving Blueprinting model largely overtook the centrally-driven GDE learning networks. However, some learning networks, notably those that tackled specific functionality and were driven by specific professional groups (e.g. hospital electronic prescribing and medicines administration; HEPMA), were very successful in attracting and sustaining participation and became national communities of practice.

“...all the GDE groups that work on prescribing, we’re having monthly phone calls and meetings ...” (Site H, Senior Manager, in-depth case study)

The uneven outcomes of the GDE/FF pairings also highlighted the importance of informal networking and revealed some of the factors driving or inhibiting this. Generally, we found that adoption of a common core system (such as for electronic health records and HEPMA), prior relationships, geographical proximity, and regional alignment were in most instances beneficial for knowledge sharing and networking.

“Clinically, I think it’s fantastic, and organisationally and operationally with [GDE], because you’ve got the same system and we’re taking a lot of their content that they’re developing and then we copy it.” (Site B, CMIO, in-depth case study)

Other facilitators included common technological functionality as organisations with the same vendor often faced similar challenges. Sharing of lessons could contribute to avoiding repeating mistakes. There was also scope to transfer more or less wholesale detailed elements of systems configuration – removing the need to replicate onerous coding work and speeding up implementation (a process that was facilitated by the growth of user groups around the major platform suppliers).

“...that has been happening...the knowledge sharing, especially about those organisations with similar systems, oh, you’ve just done that, so we’ll go and look at it, you’ve done that, we’ll take this.” (Site G, Senior Manager, in-depth case study)

The GDE Programme encouraged links between users and with vendors including formation of user groups. In some instances, organisations also reported increased leverage over system vendors and joint procurement.

“...working with other GDEs has...given us a bigger voice to talk to suppliers, it’s given us an opportunity to introduce new people into the market, and then share that experience with others.” (Site F, Chief Information Officer, in-depth case study)

We also observed that national activities in many instances helped to initiate and sustain informal networking. It was this informal networking that, in most cases, maximised the effectiveness of formal inter-organisational knowledge sharing processes and ensured their sustainability.

“...nothing is really very formal any more, they will pick up the phone and phone [other GDE] and ask how they are doing it. So, it’s those informal relationships that I think are really beneficial.” (Site B, GDE Programme Staff, in-depth case study)

Although informal processes constituted a large and effective part of knowledge sharing and networking, these varied significantly among participating provider organisations. Analysing these differences

provided insights into the facilitators and barriers at work. In addition, participants frequently mentioned having a similar organisational ethos and culture, similar (or the same) patient populations, regional strategic alignment, and geographical proximity as facilitators. Digital strategy alignments were mentioned by three pairings in the broader case study sites, five pairings reported a merger or managerial alignment, and three pairings referenced operational alignments.

“...we’re a similar size [organisation] with a similar footprint of patients with similar economic and geographical pressures, so that’s really helpful.” (Site C, Chief Nursing Informatics Officer, in-depth case study)

Specific care settings facing common challenges were also facilitators for informal inter-organisational networking and knowledge sharing. We, for instance, observed productive knowledge exchanges amongst mental health providers (initiated by a national effort to promote a mental health learning network). These were often self-organised, brought together by common needs and purpose.

However, we also observed some exceptions where organisational status conflicts inhibited knowledge sharing (for example one site was concerned about reputational risk if their partner performed poorly). Some organisations were also unhappy to be cast as “followers” (especially where they felt they possessed or would soon attain greater capability than their GDE). There was pressure to shift towards a partnership model as opposed to a leader-follower relationship to encourage two-way exchange and thereby take advantage of the FF leap-frogging their GDE’s systems.

Mediators facilitating knowledge transfer across the wider health system

Some key knowledge exchange mediators facilitated knowledge exchanges outwith provider organisations participating in the GDE Programme. These included system vendors who coordinated networking among national organisations with the same system (e.g. through user groups, pilot site visits, connecting key individuals to work together across organisations) and promoted connections with international organisations with the same system.

“[Place in the US] was one we met through [vendor], because they’re a [vendor] client, and [name], who’s their CCIO, came here, and again we’ve kept in touch with them.” (Site 19, Chief Information Officer, broader case study)

Professional networks also played an important role. These allowed members with a common interest to get together, and to exchange ideas, challenges and lessons learnt in a neutral space. They also allowed national professional leads (e.g. pharmacists and nurses with national remits) with an established leadership position and clinical credibility to play an intermediary role. Particularly successful were occupational groupings that aligned their professional interest with enhancing practice through digitisation. For example, pharmacists were actively involved in knowledge networks around HEPMA, and a community of nurses produced a critical care Blueprint.

We also observed the development of specialist digital change managerial communities that facilitated informal networking in GDE communities. An example here included a national network of chief clinical information officers and other digital health professionals called the Digital Health Networks.(39)

“There’s an outfit called Digital Health Networks... and they run a series of forums...it’s an online community that’s growing all the time, and is exchanging ideas very productively.” (Site C, Clinical Digital Lead, in-depth case study)

Another example was the NHS Digital Academy, a national programme to develop digital health leadership capability in the NHS.(31) 50 participants from 29 different GDE provider organisations studied at the NHS Digital Academy during the time of our data collection.

“...the Digital Academy have really shown that it’s phenomenally important...we’ve had loads of conversations, over dinner and things...about what they’re doing, what we’re doing...and, actually, that’s been really beneficial because otherwise we probably wouldn’t have found time to have those conversations.” (Site C, Clinical Digital Lead, in-depth case study)

Relative costs and efforts associated with knowledge sharing

Mutual benefits of shared learning and an ethos of public health benefit facilitated emerging small-scale exchanges. The biggest barrier to knowledge sharing cited in our sample was competing demands on time, including the priorities of providing day-to-day care.

“...it’s [knowledge sharing] one of those things that you need to make time for and we’re all really busy in our day-to-day roles...” (Site D, Chief Nursing Informatics Officer, in-depth case study)

Knowledge sharing through informal networking is demanding of people’s time and offers fewer obvious opportunities for economies of scale, than, for example, circulating documents. There were some concerns that the cost of networking this would threaten the sustainability of sharing activities, particularly as GDE Programme funding came to an end.

Individuals and organisations benefitted from learning, not simply by receiving information/learning but also could experience reputational benefits through increased organisational status and individual expert careers. Networking and knowledge sharing were enhanced where the costs of learning were minimised and the benefits maximised. However, issues emerged where there was asymmetry between knowledge providing and knowledge receiving for organisations making this informal mutuality difficult to sustain. This was, for example, an issue where provider organisations engaged with large numbers of adopters and knowledge sharing took a lot of resources.

Nationally organised activities somewhat mitigated barriers, by reducing the cost of knowledge sharing to provider organisations. Different kinds of national intervention played a catalytic role. Critical factors here included stimulating discussion topics/shaping agendas, setting up webinars and knowledge sharing work, and curating artefacts for sharing. There were, however, some concerns that these sharing activities may not be sustainable when central financial support ends.

“...we’ve had the capacity to go out and talk to other organisations across the UK which we’ve done...and the project team have the capacity and the ability to do that. We would never have been able to do that pre-GDE.” (Site E, GDE Programme Staff, in-depth case study)

Implications for policy

- There is a need to build on existing local/regional initiatives and experience when conceptualising national digital change programmes. This will require designated emphasis (and associated time) on effective and thorough stakeholder engagement in planning policy before initiatives are launched. Understanding and leveraging regionally nuanced incentives and performance measures will be crucial in this context.
- Digitisation and digital maturity need to be recognised as a regulatory metric and as an indication of clinical management and best practice.

- Protected time and investment needs to be a requirement for local/regional investment built in to policy incentives and regulation.

Conclusions

Our analysis in this period has focused on attempts by the GDE Programme to establish new knowledge transfer mechanisms, and through this a broader digital health learning ecosystem across the NHS. There are few if any precedents worldwide for this path breaking development.

Programme managers rapidly designed and launched an interlocking set of innovative formal knowledge transfer mechanisms in an attempt to initiate a national digital health learning ecosystem. These did not necessarily work in the manner and to the degree anticipated but nevertheless did achieve an impact in supporting the development of a learning ecosystem. Formal learning mechanisms and processes were most successful where supported by informal networks. GDE Programme managers revised their methods of intervention in the light of these experiences. There were important processes of policy learning (e.g. around monitoring and Blueprinting). As the GDE Programme comes to an end, there is a risk that these lessons (and the associated programme management tools and capabilities) will be lost.

The GDE Programme has made a major contribution to the recent upsurge in knowledge transfer across the NHS. Formal knowledge transfer mechanisms have prompted and in turn been powerfully reinforced by a dramatic growth in informal learning among organisations. These seem to have provided the foundations for the emergence of a digital health learning ecosystem in the context of supportive broader environment, which also included the establishment of NHS Digital Academy, the strengthening of digital transformation roles and the increasing salience of online sectoral and professional networks.

There is growing interest in the formation of inter-organisational learning ecosystems in healthcare, but whilst the critical ingredients/components are known, they cannot be readily achieved through conventional top-down planning structures. Support instead needs to be deployed in a flexible way that enables participants to co-design the mechanisms. National mechanisms to stimulate knowledge sharing need to be flexible to align them with emerging, changing needs and may be sustained through informal networking driven by mutual benefits of knowledge exchange. Benefits are most immediate and greatest where there is strong convergence between group members in their organisational and technological setting and goals such that the costs of learning are minimised and the benefits of learning/relevance of knowledge is maximised. Recent concerted efforts to deploy digital solutions in the face of the COVID-19 pandemic reinforce this point.

Most importantly, a digital health learning ecosystem needs time to be established and lessons learned need to be retained. This calls for evolving strategic and policy frameworks that are shaped by a mixture of top-down and bottom-up input, and trusting relationship between those that facilitate knowledge exchanges and those involved in actively sharing and using that knowledge. Central to this will be the drive to improve patient care and health outcomes.

Appendix 1 – The formative independent evaluation of a digital change programme in the English National Health Service: Study protocol for a longitudinal qualitative study

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Abstract

Introduction: Many countries are launching large-scale, digitally enabled change programmes as part of efforts to improve the quality, safety and efficiency of care. We have been commissioned to conduct an independent evaluation of a major national change programme, the Global Digital Exemplar (GDE) Programme, which aims to develop exemplary digital health solutions and encourage their wider adoption by creating a learning ecosystem across English National Health Service (NHS) provider organisations.

Methods and analysis: This theoretically-informed, qualitative, longitudinal formative evaluation comprises five interrelated work packages. We will conduct a combination of 12 in-depth and 23 broader qualitative case studies in GDE sites exploring digital transformation, local learning and mechanisms of spread of knowledge within the Programme and across the wider NHS. Data will be collected through a combination of semi-structured interviews with managers, implementation staff (clinical and non-clinical), vendors and policy makers, plus non-participant observations of meetings, site-visits, workshops, and documentary analysis of strategic local and national plans. Data will be analysed through a combination of inductive and deductive methods, beginning with in-depth case study sites and testing the findings against data from the wider sample and national stakeholders.

Ethics and dissemination: This work is commissioned as part of a national change programme and is therefore a service evaluation. We have ethical approval from the University of Edinburgh. Results will be disseminated at six-monthly intervals to national policymakers, and made available via our publicly accessible website. We will also identify lessons for the management and evaluation of large-scale evolving digital health change programmes that are of international relevance.

Article summary

Strengths and limitations of this study:

- A strength is that we will attempt to balance depth and breadth through conducting both detailed embedded case studies and “lighter touch” studies in a broader sample of provider organisations.
- The formative nature of the work means that the research team is planning to play an active role in shaping implementation strategy and the ongoing implementation of the GDE Programme, presenting a significant strength in terms of relevance and verification for decision-makers.
- A limitation is that the qualitative nature of the study can provide only limited insights into outcomes emerging during the course of the programme and further change over longer timeframes than the evaluation. It may also be difficult to disentangle the impact of the GDE Programme from other transformation initiatives running concomitantly.

Introduction

Healthcare systems internationally strive for excellence. Excellence in health systems today is increasingly conceptualised in terms achieving the “triple aim” of better health outcomes, better value and better patient experience.(1) Policy initiatives throughout the economically-developed world have sought to speed up the journey to achieve these challenging goals through various digitisation strategies. These include for instance the Health Information Technology for Economic and Clinical Health (HITECH) Act in the United States (US), the National Programme for Information Technology (NPfIT) in England and Australia’s National Digital Health Strategy & Framework for Action.(2-4)

However, these strategies have shown varying levels of success. For instance, although the HITECH reform was successful in getting organisations to adopt electronic health records (EHRs), this and other studies have largely failed to demonstrate clinical benefits from these systems.(5) Similarly, the envisioned large-scale EHR adoption through centralised procurement of systems in the NPfIT in 2002 yielded unintended consequences, with early EHR systems showing difficulty fulfilling organisational and user needs, which ultimately led to a change in strategic direction in favour of more localised decision making.(4) Digitisation without central direction between 2011 and 2016 was also not very successful in England, as individual healthcare organisations had limited resources and capacity to implement and optimise digital systems.(6) Projects had focused on deployment rather than wider service improvement and a lack of standardisation also threatened the interoperability agenda.(7)

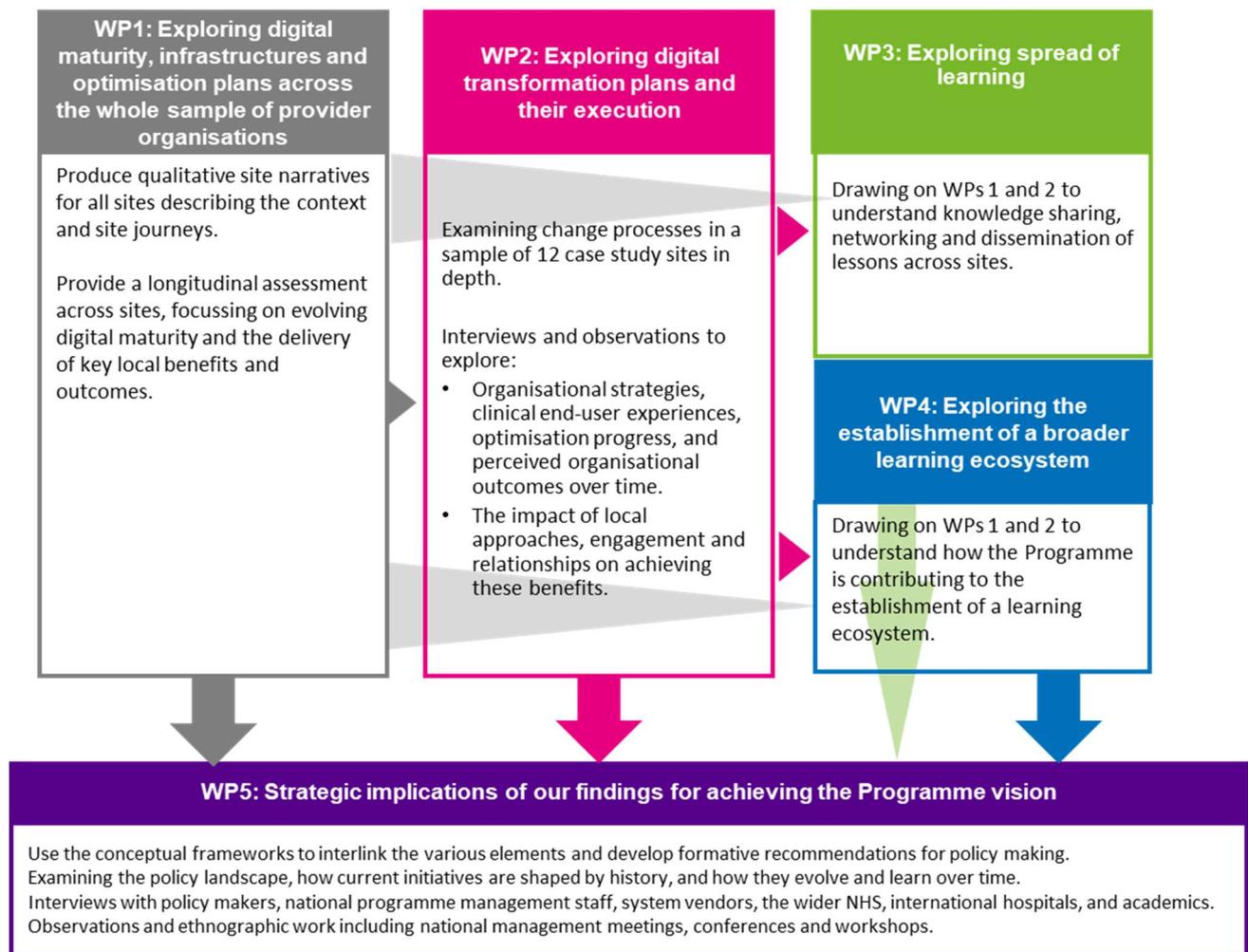
In 2016, the UK Government therefore commissioned the US physician Robert Wachter to lead an independent review of the state and future strategic direction of digital health strategy in England.(8) One of the key recommendations from this was to selectively invest available resources to create a cohort of digital centres of excellence. Consequently, in 2017, NHS England launched a flagship GDE Programme, with a further £200 million expansion announced in 2018.(9) The GDE Programme is a £395 million national investment designed to support selected digitally advanced provider organisations through funding and partnership opportunities to become Exemplars over two to three and a half years.(10) These provider organisations in the GDE Programme cover a variety of care settings including acute care, specialist care, mental health, and ambulance services. The underlying assumption was that digitally advanced sites would become international centres of excellence and create best practice models and learning for later implementers. GDE provider organisations (henceforth referred to as GDEs) were paired with somewhat less mature Fast Follower (FF) provider organisations to apply these advances. GDEs and FFs would capture best practice models and lessons in “Blueprints”, which would be disseminated within and beyond the Programme to accelerate the spread of this learning nationally. NHS England commissioned our team to evaluate this initiative.

The aim of our work is to conduct a formative evaluation of the GDE Programme. This includes exploring digital transformations in GDEs, the spread of learning among GDEs and FFs, and the establishment of a broader learning ecosystem. We will work jointly with NHS England and GDEs/FFs to discuss the implications of our findings and help the GDE Programme in achieving its vision. This will help to ensure that appropriate infrastructure and leadership is in place for sites to achieve international digital excellence.

Methods and analysis

We will conduct a longitudinal qualitative formative evaluation, where GDEs and FFs will be conceptualised as case studies.(11) Our work will take place in five complementary work packages (WPs), summarised in Figure 1.

Figure 1: High-level overview of our methods in each of five work packages (WPs)



Setting and participants

There are a total of 23 GDEs and 25 FFs in the Programme. We will collect in-depth data from a subset of 12 sites, and high-level data from the remainder. The in-depth sites will be sampled for maximum variation to represent a range of settings (e.g. acute, mental health, specialist) core EHR infrastructures, geographical locations, sizes, implementation timelines, and levels of digital maturity. A combination of GDEs and FFs will be included. Individual participants will include programme management staff within provider organisations (clinical and non-clinical), system vendors, and national stakeholders (e.g. programme managers and policy makers).

Overall study design

We will undertake in-depth qualitative investigations in 12 provider organisations purposefully selected from all acute, specialist and mental health GDEs and FFs (WP2 in Figure 1). Ambulance organisations will be excluded as these were out of scope for this commission. We will complement these in-depth sites with more selective data collection across the entire sample of GDEs and FFs (WP1 in Figure 1), in order to balance depth of findings with the breadth of insights required to draw meaningful conclusions. Work in study sites will be complemented by data collection from the wider healthcare community, policy makers, vendors, and the international community (WP5 in Figure 1).

We will use qualitative methods (comprising semi-structured interviews, observations and documentary analysis) to gather data on technology selection, implementation and adoption, change management strategy, governance processes and stakeholder engagement. We will also seek to explore the impact of contextual factors on change processes to facilitate the identification of critical success factors and dependencies so that we can provide outputs that have practical application to accelerate uptake and impact locally and nationally.

Analytical framework

A conceptual/analytical framework and methodology informed by pertinent contemporary theoretical developments is important to guide the research and generate generalisable insights for policy and practice. We will therefore draw on a pragmatic application of a number of theories (Box 1). This approach has been successfully applied in our previous work and enables us to build on existing knowledge through obtaining theoretical insights (and thereby allowing generalisations) without neglecting the more immediate need to provide formative strategic input.(4)

Box 1: Conceptual approaches that we propose to draw on (13-15)

Sociotechnical considerations – paying attention to social, technological and organisational processes and exploring how these influence each other over time.

An evolutionary perspective encompassing the evolving technology lifecycle – technology implementation, adoption and optimisation unfolds gradually over time offering opportunities for learning. These need to be examined over extended timeframes.(16)

Information infrastructures - how technologies emerge and how they together form “systems of systems”.(17)

Our formative evaluation will provide insights into how the continuing development of the GDE Programme may be enhanced to promote positive impacts on provider digitisation and patient outcomes. We will work closely with policy makers to develop a detailed understanding of the existing stakeholders, policy landscape, and evolving approaches to Programme management, so that we can avoid duplicating the significant efforts made by programme management to monitor substantive outcomes. This detailed understanding of processes will help us to refine our overall approach, focusing on emerging local and national priorities whilst being mindful of implementation timelines.

We now describe the methods used in each of the WPs in more detail.

WP1 - Exploring digital maturity, infrastructures and optimisation plans across all provider organisations taking part in the GDE Programme

Objectives

GDEs and FFs are at various stages of system implementation and optimisation, with a range of different information infrastructures in place. In this WP, we seek to make assessments surrounding the success of the GDE Programme and gain insights into progress (or lack of).

Design

In this WP, we will collect qualitative descriptive data from the acute and mental health GDEs and FFs that are not selected for WP2 in-depth case studies.

Sampling

We will include all acute and mental health GDEs and FFs in this WP and purposefully sample members of the local programme team who have insights into existing systems and strategies (including chief information officers and their GDE management teams). Sites will be approached through our existing

contacts at Arden and GEM Commissioning Support Unit, who are part of our team and already have established gatekeeper contacts.

Data collection

Data collection will consist of gathering and analysing a range of documentation including Funding Agreements detailing provider organisations' transformation plans, strategies and digital maturity assessments and conducting a series of one-to-one in-depth semi-structured face-to-face or telephone interviews, group interviews (where preferred by sites) and site visits (see Box 2 for indicative topic guides). We will produce summaries describing the organisational context, technological systems, and digital strategies in each site. In order to assess individual journeys over time and to capture a longitudinal dimension, we will visit sites at the start of their GDE programme and re-visit sites at least six months after the implementation of GDE-related systems to gain insights into the evolving digital maturity and the delivery of key local benefits and outcomes.

Box 2: High-level interview guide

Background

- Background and role of interviewee(s) (WP1, WP2)
- Digital trajectory/journey before Programme (WP1, WP2)

Strategy

- Details of change/implementation strategy and benefits realisation strategy (WP1, WP2)
- Implementation approach (resources, leadership, engagement, training, sustainability) (WP1, WP2)

Implementation progress

- Details of new digital functions being introduced as part of Programme and other current/recent changes (WP1, WP2)
- Progress in implementing these (WP1, WP2)
- Issues arising in implementation (WP1, WP2)

Overall thoughts on Programme (rationale, aims, how it has gone so far and what could be done better) (WP2)

Benefits realisation and reporting (WP2)

- Benefits achieved through functionalities
- Challenges in realising these benefits
- Facilitators for achieving benefits

Blueprinting

- Overview of Blueprint production and use (WP1, WP2)
- Experiences of the Blueprinting process (challenges, areas for improvement) (WP2)

Knowledge management, networking and learning (formal and informal)

- Existing networks/learning and key stakeholders (within Programme and outside Programme) (WP1, WP2)
- Relationship between FF and GDE organisations (WP1, WP2)
- Experiences and perceptions on what knowledge networks are most useful and why (WP2)
- Other relationships/sources of information (WP2)
- Perception of how national support can promote knowledge exchange and networking (WP2)

Vendors (WP2)

- Relationship with vendors
- Views on national digital health infrastructure

Lessons learnt and way forward

- Key lessons learnt to date (WP1, WP2)
- Perceptions around what support is needed (WP 2)
- Best ways to spread learning (WP 2)
- View on the sustainability of benefits (WP 2)
- Perception of if/how benefits have been realised (WP 2)
- Unintended consequences (WP 2)

WP2 - Exploring digital transformation plans and their execution

Objectives

To measure progress in a more focused way, we will examine change processes and specific clinical outcomes in selected settings in-depth.

Design

We will use a combination of qualitative interviews and non-participant observation of strategic meetings to explore organisational strategies, clinical end-user experiences, implementation/use/optimisation progress, and perceived individual/organisational benefits/outcomes over time (Box 2).

Sampling

This WP is concerned with getting an insight into change processes in a sample of 12 purposefully selected case study sites, aiming for maximum variation. Within each site, we will sample participants purposefully to represent a range of viewpoints (e.g. different clinical and managerial backgrounds) and levels of seniority. Gatekeepers will be approached to help us establish initial contacts and we will snowball sample based on these. As participants will need to have insights into the GDE Programme, we expect to focus sampling on members of local strategic committees and IT management staff. We will stop recruiting new participants when no new themes are emerging and when we have reached thematic saturation.(18)

Data collection

Data collection will consist of a combination of one-to-one semi-structured face-to-face or telephone interviews, group interviews (where preferred by participants), observations of GDE-related meetings and workshops, and collection of documents. Designated lead researchers will collect data in in-depth case study sites in order to allow them to immerse themselves in the setting.

Researchers will audio-record interviews and group interviews and prepare accompanying field notes. A professional transcribing service will produce transcripts of these recordings. Interviews will allow us to gain detailed insights into participant attitudes towards the Programme, their expectations, local complexities, perceived benefits, unexpected consequences, challenges experienced, and lessons learnt.

Lead researchers will conduct non-participant observations either in person or online. This approach will allow us to understand dynamics within sites (e.g. when observing meetings of local management groups). During observations, researchers will take detailed field notes relating to content, social dynamics, and their own impressions, by considering the observation within the wider context of the overall evaluation work.

In addition to interviews and observations, we will also collect local documents that will allow us to understand strategies and implementation/optimisation plans. We will use these as contextual background reading to inform interview topic guides and interpretations of observations.

WP3 - Exploring spread of learning

Objectives

To explore knowledge sharing and dissemination of lessons and networking activity across GDE and FF sites.

Design

We will undertake secondary analysis of data collected in WPs 1 and 2 to explore mechanisms associated with the spread of knowledge. It will draw on qualitative data collected in WPs 1 and 2 to extract spread and sharing of knowledge between sites through formal and informal mechanisms produced through targeted programme activities identified in the analysis of documents. Key lines of enquiry will include exploring instances where knowledge transfer and spread was perceived as successful/unsuccessful and exploring the underlying reasons why.

WP4 - Exploring the establishment of a broader learning ecosystem

Objectives

Here, we seek to understand how the Programme is contributing to the establishment of a wider digital health learning ecosystem within and beyond the GDE Programme, including both the formal knowledge transfer mechanisms planned under the Programme and informal knowledge exchanges that may emerge.

Design

Secondary analysis of formal and informal means of sharing knowledge identified in WP3 and of data collected in WPs 1 and 2 to examine the formation and operation of learning and knowledge networks across the GDE Programme and with the wider NHS and other communities. Key lines of enquiry will include examining stakeholder experiences and overall patterns to address the (variable) dynamism of learning, and the incentives for and barriers to effective knowledge sharing.

WP5 - Strategic implications of our findings for achieving the Programme vision

Objectives

This final WP is concerned with the integration and dissemination of findings from the evaluation. We will work to connect the results from WPs 1-4, with a view to mapping out the wider overall picture and establishing the enduring themes that offer useful insights to those who will plan, manage, and participate in future digital health deployments.

Design

This WP will be a qualitative longitudinal study comprising qualitative interviews, observations and collection of documents. Discussions with key stakeholders will examine how historical and contextual factors shape the processes underway and help explicate implications of emerging findings for policy.

Sampling

In this final WP, we will engage with a wide range of stakeholders including policy makers, national programme management staff, system vendors, the wider NHS, international hospitals and partner organisations, and academics. These will be recruited with the help of key national gatekeepers in our Steering Group or approached directly by us via publicly available email addresses.

Data collection

We will conduct one-to-one semi-structured interviews with researchers taking detailed field notes. In addition, we will also conduct ethnographic fieldwork including attending all national programme management meetings, and national conferences and workshops that are related to the GDE Programme. Collection of national strategic plans will complement interviews and observations. This WP will help us position our findings within the existing policy landscape and within the history of digital change in the NHS. It will also allow exploring evolving strategies and changes over time. We will use our conceptual frameworks to interlink the various elements and develop formative recommendations for policymaking.

Data analysis

Data analysis will be iterative and feed into subsequent data collection, using a combination of deductive and inductive methods.(19) We will develop a theory-informed coding framework (drawing on categories developed in our ongoing work) in which lead researchers will code qualitative data from all WPs, whilst allowing additional categories to emerge.(20) This will be achieved by each researcher coding an initial sample of transcribed interviews, and then collectively developing additional emerging categories. We will use NVivo software Version 11 to facilitate the process of coding qualitative data.(21)

During three-monthly intensive analysis meetings with the wider team (i.e. all of the authors), we will discuss emerging findings and distil implications for policymaking. These will then be collated and synthesised for feedback to the Steering Group of the evaluation, which comprises senior national programme managers and internationally renowned academics. The role of this group will be to consider this formative feedback regularly and (where relevant) incorporate insights into strategic decision making. Members will also help to direct the research towards areas where it can achieve maximum impact.

Analysis meetings will initially have a relatively broad focus, with increasing depth over time, focusing in on issues identified as important by the Steering Group and the research team. In line with the aims of this work, we will initially explore digital transformation within sites, before analysing spread of learning across GDE and FF sites, and then analyse how the Programme has helped (or not) to establish a wider learning digital health ecosystem. We will focus on challenges and unanticipated consequences in most detail. The in-depth case studies will allow us to get detailed insight into local dynamics that we will then test across the wider sample, seeking confirming and disconfirming evidence.

Ethics and dissemination

This work is a service evaluation of a national programme and therefore does not require review by an NHS research ethics committee. We received institutional ethical approval from The School of Social and Political Science Research Ethics Committee at The University of Edinburgh, UK. We will adhere to good practice and relevant ethical guidelines in obtaining verbal informed consent for participation, as well as anonymising individuals and sites prior to any dissemination. Data will be stored on university servers.

We will submit written reports of our emerging findings to our quarterly Steering Group meetings. We will also seek to publish the written reports on our publicly accessible website.(22) In addition, we will develop a detailed publication strategy for validating and disseminating key findings in academic peer reviewed journals.

Strengths and limitations

Conducting a combination of broad and in-depth case studies will allow us to balance breadth and depth. A further strength is the formative nature of this work, where the research team will seek to play an active role in shaping the strategy and ongoing implementation of the GDE Programme. However, a limitation is that the qualitative methods used for formative evaluation are unlikely to provide detailed substantive information about the impact/eventual outcomes of the programme (which may be difficult to disentangle from the impact of other initiatives). We may also encounter difficulties as the GDE Programme is still unfolding and may be subject to delays and/or changes in direction. This may require flexibility in the implementation of the evaluation design.

Contributions to the literature

Although digital health change programmes are increasingly large scale, there is a dearth of evidence around how these often evolving programmes can be managed and evaluated in order to maximise their benefits.⁽²³⁾ The initiative being studied represents the largest attempt to create a concerted digital learning ecosystem. There may be a missed opportunity to learn from previous large-scale initiatives both nationally and internationally.⁽²⁴⁾ For example, the English NHS has been involved in a range of initiatives to promote digitisation with varying levels of success over the last 20 years but key tensions, for example around balancing national and local ownership and priorities, have not yet been resolved.⁽⁴⁾ This work will, we hope, help to address this gap and also allow to identify factors which may impede or accelerate digitisation, characteristics of learning, knowledge flows and associated networks.

Our evaluation will also contribute to discussions around conceptualising digital maturity, a concept that has to date been poorly defined but is needed by policymakers and programme managers to establish baselines and demonstrate progress of change initiatives.⁽²⁵⁾ We hope to advance the literature in defining the concept, highlight emerging issues, and develop implications for measuring digital maturity in hospitals.

In-depth case studies will further help to shed light on ongoing tensions in the process of digital transformation and associated contexts, mechanisms and outcomes.⁽²⁶⁾ Of particular interest will be areas where there are no identified “recipes for success” such as leadership, clinical engagement, vendor market management, and governance.⁽¹⁵⁾

The evaluation will also identify internationally relevant lessons that may inform attempts to establish digital health learning ecosystems elsewhere, drawn from this programme as the first national attempt to create a concerted national digital health learning ecosystem. Organisational learning in health systems and knowledge flows have received little attention within the healthcare domain to date, but this area is likely to gain importance as concerted efforts to develop learning ecosystems will increase internationally in order to promote learning and accelerate digitally enabled change.

Conclusions

The GDE Programme is the first concerted effort to develop a national digital health-learning ecosystem. Our real-time national evaluation of this initiative provides an important opportunity to feed research findings into policymaking and thereby maximise impact.

Contributors: KC, RW and AS conceived this paper. KC and RW led the drafting of the manuscript and all authors commented on drafts of the manuscript.

Conflict of interests: 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, unrelated to this paper.

Funding: This article has drawn on a programme of independent research funded by NHS England. The views expressed are those of the author(s) and not necessarily those of the NHS, NHS England, or NHS Digital. 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, the NIHR or the Department of Health and Care.

Acknowledgements: We gratefully acknowledge the input of the Steering Group of this evaluation.

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Appendix 2 - How can health services establish digital health learning ecosystems? Insights from a qualitative evaluation of a national digital health transformation programme in English provider organisations

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Abstract

Background: The English Global Digital Exemplar (GDE) Programme is one of the first concerted efforts to create a digital health learning ecosystem across a national health service.

Aims: To explore mechanisms supporting or inhibiting exchange of digital transformation knowledge.

Methods: We conducted a formative qualitative evaluation of the GDE Programme. We used semi-structured interviews with clinical, technical and managerial staff, national programme managers and network leaders; non-participant observations of knowledge transfer activities through attending meetings, workshops and conferences; and documentary analysis of policy documents. Data were thematically analysed drawing on a theory-informed sociotechnical coding framework. We used a mixture of deductive and inductive methods, supported by NVivo to facilitate coding.

Results: We conducted 341 one-to-one and 116 group interviews, observed 86 meetings, and analysed 245 documents in 36 participating provider organisations. We also conducted 56 high-level interviews with policymakers and vendors, conducted 84 observations of national meetings, workshops, and conferences, and analysed 80 national documents.

Formal processes put in place by the GDE Programme to initiate and reinforce transfer and learning have accelerated the growth of informal knowledge networking and helped establish the foundations of a learning ecosystem. However, formal networks were most effective where supported by informal networking. Benefits of networking were enhanced (and costs reduced) by geographical proximity, shared culture and context, common technological functionality, regional and strategic alignments, and professional agendas.

Conclusions: Strategic decision makers can stimulate effective knowledge transfer in large-scale digital health transformation initiatives. Knowledge exchange is most effective where it is sustained through informal networking driven by the mutual benefits of sharing knowledge and learning. Policy interventions to enhance incentives and reduce barriers to sharing across the ecosystem may be more productive than promoting particular knowledge transfer mechanisms.

Introduction

Digital transformation is now central to most health system strategies as governments around the world seek to address the challenges associated with demographic shifts and the need for sustainable care provision to ageing populations with complex long-term conditions, let alone unanticipated developments such as COVID-19.(1,2) While policymakers and implementers generally agree on the potential of health information technology (HIT) to improve safety, quality and efficiency of care, strategies for procurement, implementation and optimisation vary significantly across settings.(3-5) Large-scale HIT-enabled transformation programmes have been variable in their successes and there is no agreed strategy on how best to achieve digital transformation of care at scale. (6-9)

Researchers have identified key contextual factors and also some common issues that appear to play an important role across settings. These include, for example, a clearly articulated, shared national vision, healthcare professional engagement, balancing national and local priorities, and strategic leadership.(10,-12) One aspect that has received limited attention to date is the transfer of knowledge and learning, although this is arguably key for wider system transformation as it can help settings learn from each other. This in turn may help to mitigate risks by avoiding repetition of mistakes and thereby save money and minimise potential threats to patient safety and quality of care. Concerted adoption might reduce inefficiencies of fragmented one-off implementations by encouraging learning across communities of adopters and increasing their influence over system development.

Scholars have used various terms to describe the learning that occurs across different organisations. We use the notion of *learning ecosystem* to describe the learning that occurs formally and informally between different parts of the system and across organisations.(13) This notion is distinct from learning health systems, where organisations use digital infrastructure to share information needed to improve healthcare decision making and outcomes. It highlights that knowledge and experience of a technology implementation is particularly valuable for members of other organisations contemplating similar change (and also for example vendors and policymakers).(14) The term *learning ecosystem* is a feature of public health systems, and differs from the term *learning economy* that emerges in commercial healthcare settings around hospitals and their vendors.

There is a large body of literature exploring the process of knowledge transfer between technology vendors and users in commercial settings.(15-18) This work highlights the importance of various coupling mechanisms between technology developers and users.(14) Various intermediaries play a key role in this context by bridging gaps, translating and facilitating information flows between different stakeholder groups.(19,20) In addition to formal organisational links (e.g. vendor-hosted user groups), informal networking, driven by the benefits of knowledge transfer, can be particularly important in communicating “sticky” information (information that is hard to acquire and intimately linked to the context of use).(21) There is also a large body of literature discussing user-to-user sharing of knowledge, but this focuses mainly on consumer products or open source applications.(22,23)

Inter-organisational learning relating to digital transformation in healthcare settings has received very limited attention to date.(24,25) Although there are some local examples of attempts to promote digital health related knowledge exchange among healthcare organisations, these are often not systematically evaluated and poorly theorised.(26,27) We seek to address this gap.

After a national review of HIT strategy by Robert Wachter,(28) National Health Service (NHS) England committed £595 million to support the development of a selected group of digitally mature provider organisations and then promote wider uptake of HIT by facilitating learning among implementing organisations, recognising the benefits of reusing implementation experience to improve the effectiveness of implementations and reduce costs. This Global Digital Exemplar (GDE) Programme is one of

the first concerted national attempts to create a digital health learning ecosystem (as described by our participants). We were commissioned to evaluate this programme.(29,30)

We aimed to explore under what circumstances organisations most effectively share procurement/implementation/optimisation knowledge, and to identify how strategic decision makers may best promote effective knowledge transfer relating to digital technology in healthcare settings.

Methods

Setting

The GDE Programme comprised a systematic attempt to develop a planned approach to promote the establishment of a digital health learning ecosystem. This was supported by related national initiatives, including professional training and education.(31) Specific mechanisms designed to achieve this included:

1. **GDE/Fast Follower pairings:** Pairing digitally advanced provider organisations (called GDEs) with partner organisations that were intended to learn from and follow GDEs (Fast Followers; FFs) throughout the duration of the Programme to formalise learning relationships.
2. Establishing a series of national **learning networks** to promote knowledge transfer among participating provider organisations and across the wider NHS.
3. **Blueprinting:** Asking all participating provider organisations to produce documents (Blueprints) capturing implementation/adoption/optimisation experience to help other organisations.

Design

We conducted an independent, longitudinal, qualitative, formative evaluation of the GDE Programme, exploring digital transformation and knowledge transfer in acute and mental health provider organisations participating in the GDE Programme. Our methods included a combination of in-depth semi-structured one-to-one and group interviews with relevant organisational stakeholders (managers and clinicians), documentary analyses of organisational strategic plans, and ethnographic fieldwork (non-participant observations of strategic meetings and site visits). This allowed us to gain insights into local knowledge, organisational context and progress, and formal and informal knowledge transfer. We also collected a range of national documents, observed national strategic meetings and conferences, and conducted in-depth interviews with national programme managers and system vendors. These helped us to explore national knowledge networks (both formal and informal) and linkages between organisations.

Provider organisations were conceptualised as case studies.(32) We conducted in-depth studies of 12 organisations (A-M) as well as broader case studies of the remaining 24 organisations between 2018 and 2020. In-depth case studies were selected for maximum variation including different core technological systems, geographical locations, different organisational types (acute, mental health), and levels of digital maturity. Detailed methods are described in our study protocol.(33)

Analysis

We combined inductive and deductive methods, drawing on a theory-informed, sociotechnical coding framework.(34) Lead researchers (SH, MK, HN) initially analysed formal and informal knowledge flows in the in-depth case studies and then tested and validated these emerging findings against emerging issues from the broader case studies. We then integrated emerging results with accounts of the wider macro-environmental landscape from policy, commercial and independent stakeholders and tested these against case study data.(35) Narrative accounts were produced collectively and through discussion in team meetings, where we paid most attention to emerging tensions and conflicting findings.

We have published elsewhere detailed empirical accounts of the operation of individual learning components initiated through the Programme (including GDE/FF relationships and Blueprinting).(36,37) The current analysis focused on integrating different strands of enquiry relating to formal and informal learning and knowledge networks across the GDE Programme and within the wider macro-environmental context. In doing so, we also identified the role and effectiveness of various intermediaries. We have used the Consolidated Criteria for Reporting Qualitative Studies (COREQ) guidelines here.(38)

Ethical approval

This work was a service evaluation. It received institutional ethical approval from the School of Social and Political Science at The University of Edinburgh, UK.

Results

We conducted 341 one-to-one and 116 group interviews, observed 86 meetings, and analysed 245 documents in 36 participating provider organisations (Tables 1 and 2, Appendix 1 for data by site). We also conducted 56 high-level interviews with policymakers and vendors, conducted 84 observations of national meetings, workshops, and conferences, and analysed 80 national documents.

Table 1: Our dataset

Data collected in the in-depth case study sites (GDE: Global Digital Exemplar; FF: Fast Follower)		
12 provider organisations	Total 8 GDEs: acute GDEs (6), mental health GDEs (2) Total 4 FFs: acute FFs (3), specialist FFs (1)	224 one-to-one interviews 67 group interviews 104 documents 67 meetings observed
Data collected in the broad case study sites		
24 provider organisations	Total 15 GDEs: acute GDEs (10), mental health GDEs (5) Total 9 FFs: acute FFs (9)	117 one-to-one interviews 49 group interviews 141 documents 19 meetings observed
Data collected elsewhere		
56 high-level interviews with policy makers and vendors Non-participant observations of 84 national meetings, workshops, and conferences 80 documents		

Table 2: Description of the sample in the wider GDE Programme landscape

	Included in – in-depth studies	Included in broader studies	Omitted due to late admission to Programme	Omitted due to FF merging with GDE	Total
Overall number of GDEs (Excluding	8	15	0	0	23

ambulance GDEs) – 16 acute and 7 mental health					
Overall number of FFs – 17 acute and 8 mental health	4	9	9	3	24
Totals	12	24	9	3	48

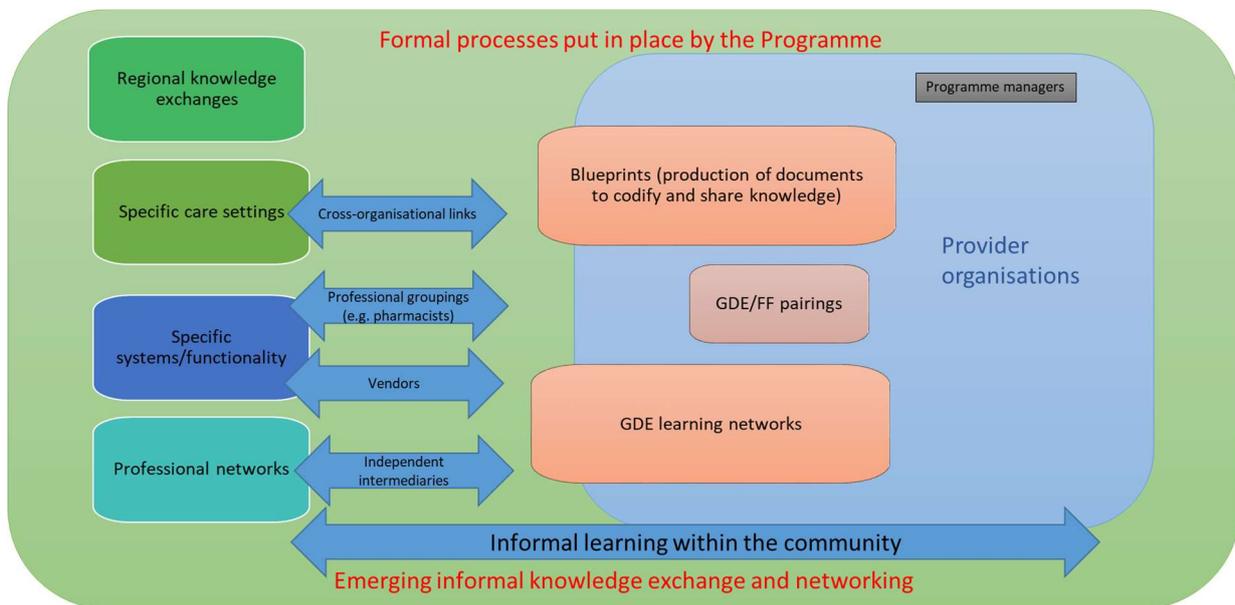
Note: the number of overall Global Digital Exemplars (GDEs) and Fast Followers (FFs) differ from those included in our study as there were some mergers and delays in start dates that meant that we did not include some provider organisations

In our broader sample, 19 pairings of GDEs/FFs had a common core system and 15 organisations were in the same local strategic groupings (including so-called “sustainability and transformation partnerships” (STPs) to coordinate collaborations of healthcare organisations and local authorities building consensus on transformation priorities and plans to deliver these). These local strategic groupings were developing in parallel to the Programme. 11 pairings of GDEs and FFs in the broader sample had pre-existing positive relationships.

In our 12 in-depth case studies, six pairings were located in the same local strategic grouping, 10 had the same core system as their FF, and six had pre-existing positive relationships.

Figure 1 illustrates the emerging formal and informal learning and knowledge exchange processes, knowledge exchange forms, and key intermediaries in the Programme.

Figure 1: Formal and informal learning and knowledge exchange processes in the GDE Programme



Overall, our work suggests that these initiatives, coupled with the broader impetus generated by the GDE Programme, have promoted a burgeoning learning culture across digitally engaged provider organisations and GDE/FF pairs, with increased sharing of knowledge and experience among organisations. All but five provider organisations in our sample described involvement in networking activities, sharing knowledge/experience and learning from others. We also observed some evidence of the emergence of a learning ethos in the NHS reinforced by these processes.

“...we’re starting to share what we’re doing, in a demonstrable way, and start to see it, and it was quite powerful.” (Site 14, Non-clinical Digital Leader, broader case study)

“[Provider organisation] had spent about a year building paediatric meds. And they said here, you can have it. So that's a year's work, that's non-trivial. They just simply gave it to us. Now would that have happened two years ago? Three years ago? I'm not sure...So there are people sharing things of real value, real cost, real-time, real value with each other, which is excellent. So are we creating new knowledge by that, I'm not sure. Are we sharing and optimising that knowledge? Very definitely.” (Site L, Chief Information Officer, in-depth case study)

Evolving formal processes to promote a national digital health learning ecosystem

Several linked formal initiatives to facilitate knowledge transfer were designed and implemented within the tight GDE Programme launch timeframe and were further elaborated in the light of experience. Formal mechanisms encouraged and were in turn strongly supported by the burgeoning of informal networking and sharing of knowledge and experience. These developments led to changes in the strategic focus of the Programme. In particular, the strategy associated with the production and distribution of Blueprints grew to become a key component of the learning ecosystem, accompanied by a changed conception of the process of Blueprinting as the user community (provider organisations) became actively engaged in developing the mechanisms for their production, distribution and use. Blueprints were initially conceived as repositories of the extensive information needed for rapid procurement and implementation of validated technologies that could then be widely disseminated. However provider organisations used them as an initial introduction to a topic and then as a way to establish contact with the players to tap their experience through direct contacts through email exchanges, phone calls and site visits. In this way, Blueprinting changed from an activity of capturing digital transformation knowledge in artefacts to a means of facilitating informal networking.

“[Blueprinting]’s supposed to be not just about taking and adopting, it’s to open up conversations.” (Site 8, Non-clinical Digital Leader, broader case study)

The Blueprinting Steering Group recently relaunched the online platform, radically reconceptualising Blueprints as “a structured collection of knowledge assets and associated methodology for using them” with new search tools and formats (for example “a Blueprint on a page”).⁽³⁹⁾ The evolving Blueprinting model largely overtook the centrally-driven GDE learning networks. However, some learning networks, notably those that tackled specific functionality and were driven by specific professional groups, were very successful in attracting and sustaining participation and became national communities of practice. Particularly successful were occupational groupings that aligned their professional interest with enhancing practice through digital transformation. For example, pharmacists were actively involved in knowledge networks around hospital electronic prescribing and medicines administration (HEPMA), and a community of nurses produced a critical care Blueprint.

“...all the GDE groups that work on prescribing, we’re having monthly phone calls and meetings ...” (Site H, Senior Manager, in-depth case study)

The uneven outcomes of the GDE/FF pairings also highlighted the importance of informal networking and revealed some of the factors driving or inhibiting this. Generally, we found that adoption of a common core system (such as for electronic health records and HEPMA), prior relationships and geographical proximity, and regional alignment were in most instances beneficial for knowledge sharing and networking.

“Clinically, I think it’s fantastic, and organisationally and operationally with [GDE], because you’ve got the same system and we’re taking a lot of their content that they’re developing and

then we copy it.” (Site B, CMIO, in-depth case study)

Other facilitators included common technological functionality as organisations with the same vendor often faced similar challenges. Sharing of lessons could contribute to avoiding repeating mistakes. There was also scope to transfer more or less wholesale detailed elements of systems configuration – removing the need to replicate onerous coding work and speeding up implementation (a process that was facilitated by the growth of user groups around the major platform suppliers).

“...that has been happening...the knowledge sharing, especially about those organisations with similar systems, oh, you’ve just done that, so we’ll go and look at it, you’ve done that, we’ll take this.” (Site G, Senior Manager, in-depth case study)

The GDE Programme encouraged links between users and with vendors including formation of user-groups. In some instances, organisations also reported increased leverage over system vendors and joint procurement.

“...working with other GDEs has...given us a bigger voice to talk to suppliers, it’s given us an opportunity to introduce new people into the market, and then share that experience with others.” (Site F, Chief Information Officer, in-depth case study)

We also observed that national activities in many instances helped to initiate and sustain informal networking. It was this informal networking that, in most cases, maximised the effectiveness of formal inter-organisational knowledge transfer processes and ensured their sustainability.

“...nothing is really very formal any more, they will pick up the phone and phone [other GDE] and ask how they are doing it. So, it’s those informal relationships that I think are really beneficial.” (Site B, GDE Programme Staff, in-depth case study)

Although informal processes constituted a large and effective part of knowledge transfer and networking, these varied significantly among participating provider organisations. Analysing these differences provided insights into the facilitators and barriers at work. In addition, participants frequently mentioned having a similar organisational ethos and culture, similar (or the same) patient populations, regional strategic alignment, and geographical proximity as facilitators. Digital strategy alignments were mentioned by three pairings in the broader case study sites, five pairings reported a merger or managerial alignment, and three pairings referenced operational alignments (e.g. shared clinical pathways/networked models of care).

“...we’re a similar size [organisation] with a similar footprint of patients with similar economic and geographical pressures, so that’s really helpful.” (Site C, Chief Nursing Informatics Officer, in-depth case study)

Specific care settings facing common challenges were also facilitators for informal inter-organisational networking and knowledge transfer. We, for instance, observed productive knowledge exchanges amongst mental health providers. Here an informal group of provider organisations perceived that they had common needs and purposes (that might be overlooked by larger acute hospitals) and began to organise informal collaboration around the GDE Programme.

However, we also observed some exceptions where organisational status conflicts inhibited knowledge sharing (for example one organisation was concerned about reputational risk if their partner performed poorly). Some organisations were also unhappy to be cast as “followers” (especially where they felt they possessed or would soon attain greater capability than their GDE). There was

pressure to shift towards a partnership model as opposed to a leader-follower relationship to encourage two-way exchange and thereby take advantage of the FF leap-frogging their GDE's systems.

Mediators facilitating knowledge transfer across the wider health system

Some stakeholders acted as knowledge exchange mediators, facilitating knowledge exchanges out-with as well as between provider organisations participating in the GDE Programme. These included system vendors who coordinated networking among national organisations with the same system (e.g. through user groups, pilot site visits, connecting key individuals to work together across organisations) and promoted connections with international organisations with the same system.

"[Place in the US] was one we met through [vendor], because they're a [vendor] client, and [name], who's their Chief Clinical Information Officer, came here, and again we've kept in touch with them." (Site 19, Chief Information Officer, broader case study)

Professional networks also played an important role. These allowed members with a common interest to get together, and to exchange ideas, challenges and lessons learnt in a neutral space.

We also observed the development of specialist digital transformation managerial communities that facilitated informal networking. An example here included the formation of an informal national network of Chief Clinical Information Officers and amongst a range of online and face-to-face networking activities organised by an independent a community of digital health professionals through the Digital Health Networks.(40)

"There's an outfit called Digital Health Networks... and they run a series of forums...it's an online community that's growing all the time, and is exchanging ideas very productively." (Site C, Clinical Digital Lead, in-depth case study)

Another example was the NHS Digital Academy, a national programme to develop digital health leadership capability in the NHS.(31) 50 participants from 29 different GDE provider organisations studied at the NHS Digital Academy during the time of our data collection.

"...the Digital Academy have really shown that it's phenomenally important...we've had loads of conversations, over dinner and things...about what they're doing, what we're doing...and, actually, that's been really beneficial because otherwise we probably wouldn't have found time to have those conversations." (Site C, Clinical Digital Lead, in-depth case study)

Relative costs and efforts associated with knowledge transfer

The mutual benefits of shared learning and an ethos of public health benefit facilitated emerging small-scale exchanges. The biggest barrier to knowledge transfer cited in our sample was competing demands on participants' time, particularly given the priorities for health professionals to provide day-to-day care.

"...it's [knowledge transfer] one of those things that you need to make time for and we're all really busy in our day-to-day roles..." (Site D, Chief Nursing Informatics Officer, in-depth case study)

Knowledge sharing through informal networking is demanding of people's time and offers fewer obvious opportunities for economies of scale, than, for example, circulating documents. There were some concerns that the cost of networking this would threaten the sustainability of sharing activities, particularly as GDE Programme funding came to an end.

Individuals and organisations benefitted from learning by receiving information/learning. They could also experience reputational benefits that could improve organisational status and strengthen individual expert careers. Networking and knowledge transfer were enhanced where the costs of learning were minimised and the benefits maximised. However, issues emerged where there was asymmetry between knowledge providing and knowledge receiving for organisations making this informal mutuality difficult to sustain. This was, for example, an issue where provider organisations engaged with large numbers of adopters and knowledge transfer took a lot of resources.

Nationally organised activities somewhat mitigated barriers, by reducing the cost of knowledge transfer to provider organisations. Different kinds of national intervention played a catalytic role. Critical factors here included stimulating discussion topics/shaping agendas, setting up webinars and knowledge transfer work, and curating artefacts for sharing. There were, however, some concerns that these sharing activities may not be sustainable when central financial support ends.

“...we’ve had the capacity to go out and talk to other organisations across the UK which we’ve done...and the project team have the capacity and the ability to do that. We would never have been able to do that pre-GDE.” (Site E, GDE Programme Staff, in-depth case study)

Discussion

Summary of findings

The GDE Programme has made a major contribution to the upsurge in knowledge transfer across the NHS. The combination of its formal learning mechanisms and processes to initiate a national digital health learning ecosystem promoted systemic learning, but were most successful where supported by informal networks. Formal knowledge transfer mechanisms did not necessarily work in the ways planned; these evolved over time and prompted a dramatic growth in informal learning among organisations and specialist communities. There were also important processes of policy learning in the course of the GDE Programme.

Strengths and limitations

We have conducted a national formative evaluation of a first-of-type digitally-enabled national transformation programme and collected a large qualitative dataset from a range of settings and data sources. Our research design, combining in-depth with broader data collection, allowed us to balance the depth and breadth of insights. We achieved this by analysing change processes and mechanisms of knowledge transfer in detailed studies of selected provider organisations, whilst testing these emerging findings in a wider range of settings and placing them within the national context of the Programme. In doing so, we gained rich insights into how knowledge transfer takes place in an evolving inter-organisational learning ecosystem. However, this work is based on one national case study, and the findings need to be interpreted with caution. We also did not measure progress in quantitative terms. As our work took place in a public managed health system, associated values/motivations may affect generalisability to private providers. Our sample was purposive and focused on clinical leaders and managers, and did not capture the perspectives of a broader range of frontline staff. This may be particularly important, considering that our findings highlight the central role of informal networking. We have captured perceptions of the importance of informal channels but have had limited opportunity to drill down to examine the spread and operation of networking amongst those at the coalface of providing care. Our fieldwork examined knowledge transfer from within sites within the GDE Programme providing and receiving information, but not organisations outside the Programme. There is also an overall difficulty of capturing informal knowledge exchanges, and a risk that attempts to monitor these will overlook important informal knowledge transfer processes.

Integration of findings with the current literature

Our findings add to the sparse existing empirical literature exploring learning ecosystems and inter-organisational knowledge transfer in digital transformation in healthcare.(24,41,42) This work highlights the complexity of the healthcare landscape, involving multiple users and producers of knowledge, driven by various and at times conflicting motivations. (24,41,42) As a result, there is no recipe for successful knowledge transfer in innovation ecosystems and scholars have argued that it is the overall constellation rather than the presence of particular individual factors that determine success.(43) The more informal networking and knowledge transfer becomes, the more organic and self-sustaining it is. Therefore, knowledge transfer and learning cannot be fully centrally-planned. It needs to be managed between central programme management and participating organisations.

Understanding the ways various stakeholder groups offer their knowledge, and acquire and use it, and relative efforts and benefits of using and producing knowledge can help to facilitate knowledge transfer.(42) In doing so, our work supports the notion that knowledge transfer is a complex and dynamic process, characterised by collaboration as well as competition, and various forms of learning.(44) The literature highlights the need for national guidance to stimulate the establishment of a learning ecosystem,(42) but there is limited evidence on how this may be achieved and how health systems can organise knowledge transfer more effectively. We here provide a starting point of how to address these issues. For example, geographical proximity, communal needs, and technological and cultural similarity can promote inter-organisational knowledge transfer, particularly where they enable existing links between organisations and individuals.(45,46)

Insights from studies of learning economies in commercial settings are likely to have limited applicability to health and in particular public health as contexts and underlying processes differ. For example, health system stakeholders are often motivated to exchange knowledge to contribute to public good and patient care, whilst commercial organisations are likely to be motivated primarily by profit. Nevertheless, there are some areas of convergence that indicate that some underlying processes are generic. Existing work shows that knowledge transfer across organisations can be achieved using different mechanisms including: databases and codified documents (supporting the importance of the Blueprinting process);(47) workshops and meetings;(48) task forces, visits, and personnel transfers (supporting the importance of informal visits);(49-51) formation of user communities;(52) and formation of alliances (supporting the importance of GDE/FF partnerships).(53)

Our results also support existing work highlighting the importance of informal networks and that implementation and optimisation experience is hard to codify and transfer.(54-56) Although different mechanisms have different effectiveness in knowledge transfer,(57) the most effective way to transfer tacit knowledge is through people interacting and perhaps moving between settings or establishing communities of practice.(58-60) Although Blueprints, as repositories of formal knowledge, can help lower entry costs for neophytes, they need to be supported by complex informal networking-based approaches that promote different types of learning.(61-63)

Work on innovation ecosystems has shown that efforts invested by stakeholders need to yield perceived benefits to sustain knowledge transfer.(64) However, there is not always a direct relationship between costs and benefits for individual stakeholders in large-scale digital health learning ecosystems. For instance, the first organisation to implement a specific system is likely to be in demand initially as other adopters will seek to learn from their experience. In theory, late implementers will be able to catch up and even overtake early adopters, who will then be able to benefit from their experience in system optimisation and upgrade. However this may take some time to accrue.

In private health services there seem to be stronger opportunities for those with crucial hybrid clinical/technical implementation expertise to develop their careers. The weaker formal market in the public health sector may be because those who acquire such experience tend to stay rooted in their clinical roles and staff transfers are inhibited by existing bureaucratic structures.(65) Yet, the professionalisation and growth of new hybrid clinical IT roles creates a virtuous cycle. It motivates people to share knowledge and develop expertise and reputation, and it also makes this kind of experience-based learning tradeable.

We have also identified the important emerging role in knowledge transfer of various intermediaries. This intermediary role is often carried out by people enabled by their location and attitude rather than through formally managed planned arrangements.(19,66,67) Vendors frequently bring their users together to obtain insights into the context of use of their offerings, which helps them to refine and market these.(68) Users can exploit these fora to network and share experience together and also thereby secure greater influence over product enhancement as well as over the strategies adopted by vendors.(69) Professional groupings and some independent organisations geared towards mediating knowledge exchange, are also effective form of intermediaries, as they do not have conflicting interests and therefore do not seek to control members' activities (allowing knowledge to flow more freely).(70)

Implications for policy, practice and research emerging from this work

This ground-breaking attempt to create a national digital health learning ecosystem illustrates that formal top-down interventions (such as partnering arrangements, the production of artefacts such as Blueprints, funding, and coordination activities) can stimulate the beginnings of a learning ecosystem, but informal relationships (arising from these initiatives or emerging independently) are key for effectiveness and sustainability.(71,72) Informal networks are however, hard to plan and knowledge transfer and networking is hard to anticipate. Therefore, support should seek to assist the informal knowledge markets where formal means have failed. These may include promoting secondments and consultancy to promote knowledge transfer through "social learning".

Central strategies cannot, however, guarantee that effective informal knowledge transfer will take place and there is therefore a degree of uncertainty in relation to both intended and unintended outcomes. Policy intervention needs to be evolutionary, establishing ways to help link stakeholders with similar concerns and needs, offering tools to facilitate communication, asking the stakeholders what would be useful to them, and encouraging/sustaining the activity of independent intermediaries.(19,58)

Conclusions

There is growing interest in the formation of inter-organisational learning ecosystems in healthcare, but whilst the critical ingredients/components are known, they cannot be readily achieved through conventional top-down planning structures.

National mechanisms to stimulate knowledge sharing need to be flexible to align them with emerging, changing needs and may be sustained through informal networking driven by mutual benefits of knowledge exchange. Benefits are most immediate and networking most readily sustained where there is strong convergence between group members in their organisational and technological setting and goals such that the costs of learning are minimised and the benefits of learning/relevance of knowledge is maximised. Recent concerted efforts to deploy digital solutions in the face of the COVID-19 pandemic reinforce this point.(73)

Most importantly, a digital health learning ecosystem needs time to be established and lessons learned need to be retained. Labour- and resource-intensive knowledge transfer (e.g. through networks) may be difficult to scale, but knowledge transfer through Blueprints alone, whilst scalable and low-cost, is not effective in isolation.

This calls for evolving strategic and policy frameworks that are shaped by a mixture of top-down and bottom-up input, and it needs a trusting relationship between those that facilitate knowledge exchanges and those involved in actively sharing and using that knowledge. Central to this will be the drive to improve patient care and health outcomes.

Contributors: KC and RW conceived this paper. KC and RW led the drafting of the manuscript and all authors commented on drafts of the manuscript.

Conflict of interests: 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, unrelated to this paper.

Funding: This article has drawn on a programme of independent research funded by NHS England. The views expressed are those of the author(s) and not necessarily those of the NHS, NHS England, or NHS Digital. 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, the NIHR or the Department of Health and Care.

Acknowledgements: We gratefully acknowledge the input of the participants and the Steering Group of this evaluation.

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Appendix 1 – data by site

Site ID	Interviews		Observations		Documents	
	Broader Study	In-depth Study	Broader Study	In-depth Study	Broader Study	In-depth Study
A	20	16	5	1	4	
B	7	9	3	2	1	7
C	19	10	1	2	3	1
D	8	19	2	3	4	4
E	12	20	1	5	2	5
F	6	23	3	2	2	2
G	9	19	1	17	4	35
H	6	8	3	1	4	2
I	7	17	3	7	4	9
J	2	10	3		1	3
L	8	15	2		1	4
M	6	15			1	1
1	4				3	
2	10		2		3	
3	6		1		4	
4	10				8	
5	7		3		3	
6	7		1		4	
7	7		1		6	
8	6				8	
9	9		1		8	
10	10		1		2	
11	7				10	
12	10				8	
13	7				4	
14	7				10	
15	7				9	
16	4		1		4	
17	7		2		5	
18	5		1		5	
19	4				9	
20	5				9	
21	11		1		8	
22	5		2		7	
23	8		2		3	
24	3				1	
Total	276	181	46	40	172	73
	457		86		245	



Appendix 3 – Using Blueprints to promote inter-organisational knowledge sharing in digital health initiatives – a qualitative exploration of a national change programme in English hospitals

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Abstract

Background: The Global Digital Exemplar Programme (GDE) is a national attempt to promote knowledge sharing relating to digital health implementations across the English National Health Service (NHS). Blueprints (documents capturing implementation experience) were intended to facilitate this knowledge sharing

Aims: To explore how Blueprints have been conceptualised, produced, and used to promote inter-organisational knowledge sharing.

Methods: We conducted an independent national qualitative evaluation of the GDE Programme. Data collection consisted of a combination of semi-structured interviews with implementation staff and clinical leaders in provider organisations, non-participant observation of meetings, and collection of documents. We also attended a range of national meetings and conferences, interviewed national programme managers, and analysed a range of policy documents. Our analysis drew on sociotechnical principles, combining deductive and inductive methods.

Results: Data collected consisted of: 508 interviews, observation of 163 meetings, and analysis of 325 documents. We found little evidence of Blueprints being adopted in the manner originally conceived by programme managers but proved effective in different ways to those planned. As well as providing a helpful initial guide to a topic, we found that Blueprints are serving as a method of identifying relevant expertise that paved the way for subsequent discussions and exchanges amongst provider organisations. The primary value of Blueprinting therefore seemed to be its role as a networking tool. Members of different organisations came together in developing, sustaining and applying Blueprints through bilateral conversations and, in some circumstances, fostering informal communities of practice.

Conclusions: Blueprints may be effective in facilitating knowledge sharing between healthcare organisations, but only if they are accompanied by other methods to promote knowledge transfer.

Introduction

Although there is now an international drive to implement health information technology (HIT) at scale, there is currently limited understanding of how to achieve adoption of best practice solutions at scale, and also on how to share the information and knowledge needed for this.^{17 18} The existing empirical literature on knowledge transfer between healthcare organisations is limited, and most evidence comes from commercial settings.^{19 20 21 22} Here, studies have shown that sharing of codified knowledge through documents can save time, but the effectiveness of knowledge transfer depends on the task at hand.²³

The Global Digital Exemplar (GDE) Programme represents an ambitious and path breaking attempt to establish a digital health learning ecosystem at national scale.²⁴ It sought to advance digital transformation in digitally mature provider organisations (hereafter GDEs) and then ensure that successful improvements were shared across the GDE Programme and more widely across the English National Health Service (NHS). A key mechanism for achieving knowledge sharing was intended to be through the production of Blueprints: the Programme’s architects envisaged that GDE sites would ‘*partner with other hospitals as their Fast Followers (FFs) and develop Blueprints that take the insights and deployment experience of the GDEs and core technical “build” of their system, and work with these FF organisation to implement Blueprints*’.²⁵ Avoiding the cost of each organisation ‘learning from scratch’, Blueprints were proposed as the key vehicles for conveying the knowledge needed to select and implement ‘proven’ models of change.

The notion of Blueprints is derived from manufacturing standardised products, and there is to date no empirical evidence that this model will succeed with health service digitisation.²⁶ Reflecting on the limited success of earlier centralised national programmes to spread good practice across the NHS, an influential 2016 national review by Robert Wachter argued that to harness the power of Health IT you cannot “*simply follow a recipe or a checklist*”; instead this kind of “*adaptive change*” requires “*substantial and long-lasting engagement between those implementing the changes and the individuals tasked with making them work*”.²⁷ A 2020 National Audit Office report on Digital transformation in the

¹⁷ Hendy J, Reeves BC, Fulop N, Hutchings A, Masseria C. Challenges to implementing the national programme for information technology (NPfIT): a qualitative study. *Bmj*. 2005 Aug 4;331(7512):331-6.

¹⁸ Blumenthal D. Launching hitech. *New England Journal of Medicine*. 2010 Feb 4;362(5):382-5.

¹⁹ Brady T, Tierney M, Williams R. The commodification of industry applications software. *Industrial and Corporate Change*. 1992 Jan 1;1(3):489-514.

²⁰ Koch C. ERP Software packages: Between mass-production communities and intra-organizational political processes. In *Technological change and organizational action 2003 Sep 2* (pp. 70-90). Routledge.

²¹ Mozaffar H. Entangled Biographies: A Multi-Biographical Approach in Study of User Communities Around Information Infrastructures. In *ECRM 2018 17th European Conference on Research Methods in Business and Management 2018 Jul 1* (p. 287). Academic Conferences and publishing limited.

²² Mozaffar H. User communities as multi-functional spaces: innovation, collective voice, demand articulation, peer informing and professional identity (and more). In *The new production of users 2016 Apr 20* (pp. 219-246). Routledge.

²³ Haas MR, Hansen MT. Different knowledge, different benefits: Toward a productivity perspective on knowledge sharing in organizations. *Strategic management journal*. 2007 Nov;28(11):1133-53.

²⁴ <https://www.england.nhs.uk/digitaltechnology/connecteddigitalsystems/exemplars/>

²⁵ Matthew Swindells and Will Smart, Blog (Digital) “Progressing the acute Global Digital Exemplar” <https://www.england.nhs.uk/blog/progressing-the-acute-global-digital-exemplar/> 6 November 2017. Last sampled 1 May 2020

²⁶ Hanseth, Ole and Bygstad, Bendik (2015), ‘Flexible generification: ICT standardization strategies and service innovation in health care’, *European Journal of Information Systems*, 1–19

²⁷ National Advisory Group on Health Information Technology in England, (2016). Making IT work: Harnessing the power of health information technology to improve Care in England. (Wachter Review). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/550866/Wachter_Review_Accessible.pdf

NHS raised concerns that Blueprints “*might not be enough to spread good practice... to other Trusts as intended.*”²⁸

We were commissioned to conduct an independent formative evaluation of the GDE Programme.²⁹ In this paper we explore the production and uptake of Blueprints and their contribution to knowledge transfer among GDE and FF provider organisations.

Methods

The detailed methodology for the independent qualitative evaluation of the GDE Programme is described in a separate protocol.³⁰

Setting

Data collection took place longitudinally between March 2018 and March 2020. We sampled 12 provider organisations for maximum variation (e.g. size, type, location, core system provider) and conceptualised these as in-depth case studies.³¹ These were designed to provide in-depth insights into local processes and contexts. We also collected more limited periodic data in a further 24 provider organisations to confirm and supplement emerging findings. This helped us to test emerging findings in in-depth case studies in a wider range of sites.

Data collection

We conducted a series of ethnographic non-participant observations of local meetings and practices and interviews over an extended timeframe with key stakeholders involved in each in-depth case study site. These explored how Blueprints were produced and used as part of the GDE Programme, and how this affected provider organisations (Box 1).

Box 1: Topic guide exploring the production and use of Blueprints

- Overview of Blueprint production and use
- Experiences of the Blueprinting process (challenges, areas for improvement)
- Who has used Blueprints and how have they found them useful?
- Practical examples of use
- What ways of use have been found to be most productive?
- What could be changed to maximise their benefits?

In order to gain insights into the wider strategic landscape, we also conducted a series of interviews with key stakeholders including NHS policy makers, national programme management staff, system vendors, the wider NHS, international hospitals and partner organisations, and academics.

²⁸ National Audit Office (2020) Digital Transformation in the NHS, Report by the Comptroller and Auditor General HC317 Session 2019-2021 15 May 2020. Available online at : <https://www.nao.org.uk/report/the-use-of-digital-technology-in-the-nhs/> last sampled 11 June 2020

²⁹ <https://www.ed.ac.uk/usher/digital-exemplars>

³⁰ Cresswell K, Sheikh A, Krasuska M, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. The formative independent evaluation of a digital change programme in the English National Health Service: Study protocol for a longitudinal qualitative study. *BMJ Open* (submitted).

³¹ Crowe S, Cresswell K, Robertson A, Huby G, Avery A, Sheikh A. The case study approach. *BMC medical research methodology*. 2011 Dec 1;11(1):100.

Interviews were digitally-recorded, transcribed by a professional transcriber and coded with the help of NVivo software by the research team.³²

Analysis

Analysis began with induction from the corpus of in-depth ethnographic interviews to explore the detailed mechanisms and processes involved in producing and using Blueprints. Emerging themes were fed back into subsequent data collection to test emerging findings and we developed an analytical narrative through a series of intensive analysis workshops with the wider research team, paying particular attention to contradicting findings and emerging tensions.

Coding and analysis were informed by a sociotechnical understanding of the implementation of HIT and an earlier body of related research addressing social learning processes in technological change in other settings.^{33 34}

Ethical approval

We obtained institutional ethical approval from the School of Social and Political Science at The University of Edinburgh, UK.

Results

Our data consisted of 457 interviews, 86 observations, and analysis of 245 documents in 36 provider organisations (see Table 1). We also conducted 51 interviews, observed 77 meetings and collected 80 documents with other stakeholders.

Table 1: Data collected

	Interviews	Observations	Documents
In-depth case study sites (12)	291	67	104
Broader case study sites (24)	166	19	141
Wider data collection	51	77	80
Total	508	163	325

From Blueprints to Blueprinting: the evolving conceptualisation of Blueprints over time

The concept of Blueprints changed over time, as they were developed and used. They were initially conceived as tools to help standardise products and processes, where a few specific sites would develop, test and optimise models for digital change that would then be rolled out to hundreds of sites.³⁵

³² <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>

³³ Williams, Robin James Stewart, Roger Slack (2005) *Social Learning in Technological Innovation: Experimenting with Information and Communication Technologies*, Edward Elgar: Aldershot

³⁴ Cresswell K, Williams R, Sheikh A. Developing and Applying a Formative Evaluation Framework for Health Information Technology Implementations: Qualitative Investigation. *Journal of Medical Internet Research*. 2020;22(6):e15068.

³⁵ Stevens, Laura (2017), 'GDEs should remove need for procurements, says Swindells', *Digital Health* 7 July 2017

<https://www.digitalhealth.net/2017/07/gdes-will-change-procurement-models-swindells/>

This view of standardised procurement was borrowed from the construction and engineering industries where the term Blueprint refers to a method for accurately copying technical drawings by making contact prints on light sensitive paper.³⁶

Following engagement with Blueprint producers and users from GDE and FF sites, a strikingly different conception emerged of how Blueprints may become a vehicle for knowledge transfer - as *“live documents that drive people wanting to benefit from GDE experiences to seek further information”*.³⁷ It highlights that Blueprints *“can be viewed through a range of lenses”*, in part due to the differing requirements of ‘different audiences’ (hospital boards, CIOs, implementation and clinical teams). Boards, for example, might look for technology agnostic Blueprints, while technology implementation teams would find value in technology specific Blueprints.³⁸ Thus Blueprints would be *“story-like – a compelling narrative of actions and events...”* that could *“instruct without dictating [and] accommodate the adaptive component of change”*. This points to significant process of policy learning in the course of the GDE Programme involving policymakers and Trusts.

However, these competing conceptions and changes over time in the model of how Blueprints would convey learning created difficulties for the provider organisations charged with implementing the Blueprinting concept. Site A flagged a key uncertainty about the intended role of the b,Blueprint, noting that *“right at the very beginning it wasn’t clear”* whether the intention was that sites would produce a *“high level piece”* with generally applicable lessons on how to achieve a digital change or a more detailed specific prescriptive guidance on *“how you do it”* for implementing that change within a particular technology platform. Many sites flagged that their initial implementation experiences would be rooted in their particular organisational and technological context. As a result, the lessons drawn in their Blueprints were liable to be technology and organisation specific. This would increase their relevance/value for similar sites but would limit their transferability. Thus Site C’s IM&T Lead flagged that they could produce specific guidance that would be *“immediately available”* for other sites working with the same platform, as it *“doesn’t have to be redone from scratch and I think that has huge value”*. Likewise, Site A’s digital hospital lead noted that for another site with same version of their platform *“I could send them the actual configuration that they could import”*. While technology-specific Blueprints might have great relevance to organisations with similar technology and processes – these might not be widely applicable or readily transferable to other sites. Site 20 noted that six of the GDE sites had adopted Cerner Millennium, which had created scope amongst this cohort to exchange very detailed platform specific configurations. Site L (a Cerner site) had been able to draw on workflows developed by another trust including sharing code through the Cerner platform: *“Taking the code that they’ve developed and using it in our Trust.”* In turn Site L had been approached by other Cerner sites platform who were able to adopt their Blueprint (for a specific function) – but noted that these lessons would be irrelevant for non-Cerner sites.

³⁶ see <https://en.wikipedia.org/wiki/Blueprint> (last sampled 10 June 2020) and PlanGrid, The History of Blueprints posted 12 April 2016 t <https://blog.plangrid.com/2016/04/the-history-of-blueprints/> (sampled 30 March 2020)

³⁷ Charnley, Paul (2018) Global Digital Exemplars: Blueprinting update and next steps, presentation for e-Health Week 15-16 May 2018 https://www.ehealthweek.himss-uk.org/sites/ehealthweek/files/sponsors/presentations/GDE_1/paul_chnarley_-_blueprinting.pdf last sampled 11 June 2020

³⁸ Thomas, Gareth and Charnley, Paul (2018) ‘What are blueprints and how will NHS trusts benefit?’, presentation to Health and Care Innovation Expo 5 Sept 2019 (part of Anon slideset entitled ‘Leapfrog: how Global Digital Exemplar Blueprints can accelerate your transformation’ <https://www.england.nhs.uk/expo/wp-content/uploads/sites/18/2018/09/13.30-Leapfrog.-how-Global-Digital-Exemplar-Blueprints-can-accelerate-your-transformation-T2K.pdf> last sampled 11 June 2020

The Chief Information Officer (CIO) in Site F felt that *“the Blueprint has to be contextual; ... unique to every care setting [in terms of systems and how my environment works] so to some extent it’s very difficult to take a Blueprint out and drop it somewhere”*. For example, *“a process I’d done on [specific application] that would only be really, really applicable to some other trust on [specific application]”*.

The production of Blueprints

There was widespread support across the GDE for the idea of Blueprints – at least in principle – driven by a shared commitment to the collective interest across the NHS and a consequent concern to support and share expertise and experience with those organisations that were not part of the GDE Programme. *“I think Blueprints are a great idea..... I’m very supportive of the Blueprint principle”* (Site A CCIO), *“a great concept”* (Site M, Senior Project Lead); *“the concept of Blueprinting is really positive”* (Site B, Digital Programme Manager); *“a tangible output out of GDE to support those sites that aren’t on GDE”* (Site B, Programme Manager).

The near unanimous enthusiasm for the principle of Blueprints was tempered, however, by equally prevalent doubts about whether the costs – in terms of the time and effort of organisation members producing them would be justified in relation to their benefits – in terms of how widely used and how useful Blueprints would be.

At the start of the Programme, when GDE sites were preoccupied with procuring and implementing new digital solutions, the production of Blueprints was often set aside for later. Site I Project Manager noted that *“we’ve been too busy doing it...to actually Blueprint it.”* The production of Blueprints only occurred after Site I had completed their GDE projects.

Many sites also emphasised the large amount of work required to create a Blueprint and associated documentation. Site I’s Digital Change Manager told us *“I didn’t really realise how big of a job it was going to be. And like trying to juggle that, as well as your day to day activity, that has been a challenge.”* In Site B the Chief Medicines Information Officer (CMIO) felt *“Blueprinting has taken a massive chunk of time”*, while the Clinical Transformation lead noted that writing the blueprinting document *“was taking over my life. It’s a huge amount of effort and work. ...the only way I could do it was I stayed late after work”*.

Notwithstanding these costs, the CCIO at Site I drew our attention to an unanticipated benefit of producing the Blueprint which had forced them *“to reflect on what you do. And, I’m sure there are a huge number of lessons that we’ve surfaced, having read the draft Blueprint, that will be really beneficial for other people.”* And this had also benefitted them: *“we’re sort of now retro-fitting some of our lessons, but forcing us to think about them, forces us to continue to go back and improve it”*. Given the time pressure and work required *“we probably wouldn’t have bothered, if we didn’t have to [interviewee emphasis] write a Blueprint.”*

The key issue was whether the investment in producing Blueprints would be worthwhile. This revolved critically around how widely adopted and useful Blueprints would be. Here the sites were far from convinced about their utility. Thus, Site F’s CIO judged that Blueprints were only *“useful to a very limited extent”*. Site C’s IM&T expressed concern that *“Blueprinting stuff is a waste of time, [be]cause, essentially, people are spending quite a lot of time writing stuff up, and it’ll sit in a library and the people who need to use it, won’t use it.”* As a result the investment may not be warranted: *“I’m not sure how much they’re actually used so, I think, there’s quite a lot of money and time going into things that are probably not sensible”* (Site C, IM&T). Similar concerns were expressed by Site I’s Project Manager about the effort invested in producing *“a 20,000 to 30,000 word document, that I don’t know who’s going to read.”*

Site B's IM&T Lead noted that the jury is still out *"about how useful they are"*. More work and better understanding would be needed to create Blueprints that would be widely adopted at *"scale and pace"* (CIO at Site L).

Use of Blueprints including unanticipated use as a networking tool

The vast majority of sites (27 out of 35 covered in case studies) did not report making use of Blueprints as vehicle for conveying the knowledge needed to implement a particular change. Two sites (10, 22) indicated that they were planning to use Blueprints in the future. Many other sites reported that they had reviewed the Blueprints but had not adopted them. Several observed that the Blueprints had arrived too late for them to adopt and were not aligned with the digital transformation journey they had by then developed.

Others found Blueprints from other sites useful. FF sites B and 23 had followed the approaches that their GDE had adopted and subsequently blueprinted (an observation that implies that the Blueprint itself was not the vehicle for their learning). They had not adopted Blueprints from other sites. Site 3 identified four specific Blueprints that they had learnt from, which helped them accelerate change and avoid mistakes.

"I have read a few and I found them ... actually quite useful. So I sort of changed my mind on them ... I've reviewed quite a number. I found [named Blueprint] very helpful.... some of them include costs, which is useful, to give us a steer on how much investment we might be needed before we start embarking upon them".

However, it is important to keep in mind that use is not the same as adoption. For instance, Site 14 decided against adopting a particular change after reading a Blueprint that was honest and candid about the difficulties and costs entailed.

Although there was little evidence that Blueprints in themselves were effective vehicles for knowledge transfer, they were widely recognised by GDE sites as having promoted networking activities within and beyond the GDE Programme. Blueprints were working in a different way to the original plans. Trusts reviewed them as an initial introduction to a particular area of change and then as a way of contacting the people involved. Thus, their main value was perceived to be as a networking tool.

As Site M GDE Project Manager noted: *"part of it is that you've got contact details and ... you undertake to make yourself available to other organisations.... So, it's a sort of networking tool"*.

The Head of Hospital at Site A suggested that Blueprints were *"just the distillation of often the conversations that we're having with lots of hospitals anyway"*. They could never *"be a truly one stop shop"* for other sites which, due to differing circumstances, would have different issues to raise. *"I view the Blueprints as a really good starting point ... but then there will always be some sort of follow up conversation"*. The CNIO at Site A also observed that *"the Blueprint is there just to start the conversation"* noting that seeing things was more useful for understanding than *"reading it on a piece of paper"*. Several sites (3, 9, 17, 18) shared this view that visits and interactive conversation were more valuable in transferring knowledge than a piece of paper, particularly in communicating important cultural factors.

Many other respondents observed that it was these contacts and visits that brought the greatest benefit. At Site D, the CNIO observed *"the most benefit you get is that contact with other people"*, while the CIO flagged benefit for us and others when trusts from *"come and visit us and we talk ... and share"*. This was in part because the Blueprint could only convey a limited amount of information. An

Allied Health Professional in Site C felt that Blueprints were not detailed enough from a user perspective: *“I’m not convinced there is enough detail to really drill down”* but noted that this was not a problem however: *“as long as they’ve got contact details... most people in this space are very willing to share and collaborate”*. A similar perspective from a Blueprint producer came from the Assistant Director of Programme Delivery at FF Site L who noted that *“There is a limit to how much technical stuff you can put on a Blueprint”*. Instead sites will *“get in touch with us and maybe come over and have a look at it”*. Sites visits were more effective because they provided an opportunity to address the differing circumstance of sites. In this way the production of a Blueprint served as a way to advertise who was working in a particular area.

Discussion

Summary of findings

We found limited evidence that Blueprints were being adopted and used in the way initially envisaged as a vehicle for the wholesale transfer of the knowledge needed to successfully implement a particular innovation. However our respondents drew attention to ways in which Blueprints were being used and proving useful in other ways. They were most successful where their role in formal knowledge transfer led on to and was supplemented informal knowledge networking and linking together stakeholders interested in a particular implementation.

Strengths and limitations

Our independent evaluation gave us an exceptional opportunity to examine Blueprinting from the viewpoint of those involved in producing them, who were also the intended early adopters. However, our evaluation research design, based primarily on intensive longitudinal case studies and annually-repeated broader case studies of GDE/FF sites, did not allow us to track knowledge transfer around individual Blueprints – including cycles of adoption and refinement of Blueprints and community formation around Blueprints.

It is however difficult to track the process and outcomes of knowledge transfer (and particularly informal knowledge transfer). There is therefore a risk that attempts to measure impacts will underestimate the benefit of Blueprinting activity. If evaluation methods revolve around a narrow conception of how Blueprints would be used and prove useful they may fail to capture the indirect benefits of diffuse, informal networking activities. We need also to consider that the lack of evidence about the use of Blueprints may, in part, be a methodological issue insofar as tracking their use is difficult – particularly amongst wider audiences beyond the GDE Programme.³⁹

Although Blueprints were being piloted in 2018, full-scale roll-out only took place in 2019 (rather late in the life of the GDE sites). Increasing uptake may be anticipated over time. Our broader case-study findings (second round completed in the summer of 2019) may overlook subsequent growth in uptake.

Integration of findings with the current literature

The evidence of effectiveness of documents to promote inter-organisational knowledge transfer is limited, particularly in healthcare.^{40 41 42} Our work supports the work in commercial settings that has

³⁹ The AHSN Network; GDE Learning Networks - Project Overview May v0.1. Slideset, title GDE Learning Networks project.

Slide 11: There’s learning happening that we can’t capture in our reporting

⁴⁰ Secundo G, Toma A, Schiuma G, Passiante G. Knowledge transfer in open innovation. *Business Process Management Journal*. 2019 Feb 4.

⁴¹ Stephanie L, Sharma RS. Digital health eco-systems: An epochal review of practice-oriented research. *International Journal of Information Management*. 2019 Nov 27:102032.

⁴² Haas

shown that codified knowledge and documents can be effective in some contexts,⁴³ but are unlikely to work in isolation and will be most effective when combined with other methods.^{44 45} These include ways to promote informal networking through face-to-face meetings, visits and personnel transfers, and promoting the formation of communities and alliances.^{46 47 48 49 50}

Our work further supports the notion that timing of using methods to promote inter-organisational knowledge transfer is important.⁵¹ The GDE Programme and the Blueprinting work was launched and implemented within an extremely short timeframe, which may have affected its effectiveness. For example, in the initial period, when GDE sites were preoccupied with procuring and implementing new digital solutions, the production of Blueprints was often set aside for later. Though commitments to produce Blueprints were included in the contracts that provider organisations had agreed with NHS England, detailed guidance about the content of Blueprints, drawing on pilots, did not come on stream until almost a year after ‘the clock started’ when GDE funding was released in July 2017.⁵² The challenges in designing and implementing change programmes in compressed timeframes repeats a pattern observed in earlier NHS change programmes such as the Vanguard Programme.⁵³

Implications for policy, practice and research emerging from this work

We found evidence of important policy learning taking place in the course of the Programme. For example, Blueprints were piloted and improved continuously, responding to feedback received from implementing organisations which, for example highlighted usability and access issues with the technology platform used for sharing them. New search tools and more accessible formats have recently been introduced – such as the ‘Blueprint on a Page’ and the library of potentially re-usable modular components (for example, information governance arrangements or a safety case) that might solve a particular problem for other adopter. These initiatives (taken after our fieldwork) will open up new pathways for knowledge utilisation.

⁴³ Haas

⁴⁴ Almeida P, Kogut B. Localization of knowledge and the mobility of engineers in regional networks. *Management science*. 1999 Jul;45(7):905-17.

⁴⁵ Rosenkopf L, Almeida P. Overcoming local search through alliances and mobility. *Management science*. 2003 Jun;49(6):751-66.

⁴⁶ Nonaka I, Byosiere P, Borucki CC, Konno N. Special Issue Knowledge in Organizations, Knowledge Transfer and Cooperative Strategies Organizational knowledge creation theory: A first comprehensive test. *International Business Review*. 1994;3(4):337-51.

⁴⁷ Gupta AK, Govindarajan V. Knowledge flows within multinational corporations. *Strategic management journal*. 2000 Apr;21(4):473-96.

⁴⁸ Inkpen AC, Dinur A. Knowledge management processes and international joint ventures. *Organization science*. 1998 Aug;9(4):454-68.

⁴⁹ Mozaffar H. User communities as multi-functional spaces: innovation, collective voice, demand articulation, peer informing and professional identity (and more). In *The new production of users 2016* Apr 20 (pp. 219-246). Routledge.

⁵⁰ Larsson R, Bengtsson L, Henriksson K, Sparks J. The interorganizational learning dilemma: Collective knowledge development in strategic alliances. *Organization science*. 1998 Jun;9(3):285-305.

⁵¹ Szulanski G, Ringov D, Jensen RJ. Overcoming stickiness: How the timing of knowledge transfer methods affects transfer difficulty. *Organization Science*. 2016 Apr;27(2):304-22.

⁵² Matthew Swindells and Will Smart, Blog (Digital) “Progressing the acute Global Digital Exemplar” <https://www.england.nhs.uk/blog/progressing-the-acute-global-digital-exemplar/> 6 November 2017. Last sampled 1 May 2020

⁵³ Checkland, K., Coleman, A., Billings, J., Macinnes, J., Mikelyte, R., Lavery, L., & Allen, P. (2019). National evaluation of the Vanguard new care models programme: Interim report: understanding the national support programme. University of Manchester. <https://www.necs.u.nhs.uk/wp-content/uploads/2019/07/2019-07-InterimReportNCM-ManchesterUniversity.pdf>

However, it is unlikely that Blueprints alone will be sufficient in promoting a digital health learning economy in the NHS. They are most likely to be successful when integrated with other mechanisms of knowledge transfer to promote systemic change. These include existing informal networks such as the NHS Digital Academy and the Digital Health Networks,^{54 55} and locally driven initiatives and structures that can promote the formation of communities of practice and alliances such as Local Health and Care Records and Integrated Care Systems.^{56 57}

Our work also highlights longer-term lessons about the benefits of developing transformation programmes in a cumulative manner that allows for incremental improvement of frameworks and programme management tools – in place of the currently entrenched pattern of a succession of new initiatives launched from scratch. Programme managers are acutely aware of the shortcomings surrounding short-term, episodic programmes – which they see as resulting from the exigencies of public sector budgeting and ministerial policy cycles. Though there have been attempts to develop longer term policy and funding frameworks, these difficulties are seen as a feature of the policy landscape that is not in their power to change and has to be lived with.

Conclusions

The use of documents to promote inter-organisational knowledge transfer in healthcare has not been attempted at this scale anywhere in the world, and it is not possible to make definite claims on effectiveness as there is no comprehensive insight into adoption as yet.

We found limited evidence that Blueprints were used and proving useful in the way envisaged as vehicles for wholesale transfer of implementation knowledge. We have drawn attention to important informal knowledge networking activities that have taken place around the blueprinting process. This suggests that Blueprinting has been effective as a knowledge networking tool (rather than the Blueprint serving as a direct vehicle for knowledge transfer), but need to be accompanied by other mechanisms to promote a digital health learning ecosystem.

Contributors: RW and KC conceived this paper. RW and KC led the drafting of the manuscript and all authors commented on drafts of the manuscript.

Conflict of interests: 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, unrelated to this paper.

Funding: This article has drawn on a programme of independent research funded by NHS England. The views expressed are those of the author(s) and not necessarily those of the NHS, NHS England, or NHS Digital. 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, the NIHR or the Department of Health and Social Care.

⁵⁴ <https://www.england.nhs.uk/digitaltechnology/nhs-digital-academy/>

⁵⁵ <https://www.digitalhealth.net/join-the-digital-health-networks/>

⁵⁶ <https://digital.nhs.uk/blog/transformation-blog/2019/so-what-is-a-local-health-and-care-record-anyway>

⁵⁷ <https://www.england.nhs.uk/integratedcare/integrated-care-systems/>



Acknowledgements: We gratefully acknowledge the input of the participants and the Steering Group of this evaluation.

Appendix 4 - Report on Blueprints and Blueprinting in the GDE Programme

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Version 4

18 June 2020

Executive Summary

The Global Digital Exemplar Programme (GDE) is a national attempt to promote knowledge sharing relating to digital health implementations across the English National Health Service (NHS). Blueprints (documents capturing implementation experience) were intended to facilitate this knowledge sharing, initially between GDE and Fast Follower (FF) sites and then the wider NHS.

We report here on the production and uptake of Blueprints (BPs) among GDE and FF sites in the GDE Programme. Concerns have been expressed about the limited adoption of BPs (National Audit Office 2020) and whether, in this context, the costs of producing them were justified. Site members shared these concerns. Overall, we found little evidence of Blueprints being adopted in the manner originally conceived by programme managers. However, we also discovered that Blueprints are proving effective in different ways to those planned. As well as providing a helpful initial guide to a topic, we found that Blueprints are serving as a method of identifying relevant expertise that paves the way for subsequent discussions and exchanges amongst sites. The primary value of Blueprinting therefore seems to be its role as a *networking tool*. Members of different organisations are coming together in developing, sustaining and applying Blueprints through bilateral conversations and, in some circumstances, fostering informal communities of practice.

We also found evidence of important policy learning taking place in the course of the Programme. For example, Blueprints were piloted and improved continuously, responding to feedback received from implementing organisations which, for example highlighted usability and access issues with the technology platform used for sharing them. New search tools and more accessible formats have recently been introduced – such as the ‘Blueprint on a Page’ and the library of modular learnings (knowledge assets) - which may increase utilisation.

Key implications for policy to develop support mechanisms through informal networking and formal knowledge transfer mechanisms, include:

- It takes time to put into place instruments and to refine processes for sites and programmes (particularly where choices need to be discussed with policymakers and with managers and practitioners in hospital provider organisations). The compressed timeframe for designing, launching and implementing the GDE Programme gave little scope for these key issues to be addressed in the relatively short duration of the GDE Programme (e.g. to integrate selection of GDE/FF pairings and choice of Blueprint topics).
- The challenges faced in the GDE Programme of designing and implementing episodic change programmes and in compressed timeframes repeats a pattern that has been observed previously in the NHS (Checkland et al. 2019). There is a risk that processes and capabilities developed in the Blueprinting Programme may be lost if national drive and support ceases. Policy instruments for managing change programmes therefore need to be developed cumulatively and incrementally refined as part of national improvement frameworks and programme management practices.

Blueprints and Blueprinting in the GDE Programme

1. Introduction

The Global Digital Exemplar (GDE) Programme represents an ambitious and path breaking attempt to establish a learning ecosystem at national scale. It sought to advance digital transformation in 23 digitally mature hospital Trusts (hereafter GDE sites) and then ensure that successful improvements were shared across the GDE Programme and more widely across the English National Health Service (NHS). A key mechanism for achieving knowledge sharing was intended to be through the production of Blueprints: the Programme's architects envisaged that GDE sites would '*partner with other hospitals as their Fast Followers (FFs) and develop Blueprints that take the insights and deployment experience of the GDEs and core technical "build" of their system, and work with these FF organisation to implement Blueprints*'.ⁱ Blueprints came to be seen as the key vehicles for conveying the knowledge needed to select and implement 'proven' models of change. Wider uptake of tried and tested solutions within and beyond the GDE Programme was planned to be supported by the establishment of Learning Networks and a digital platform to disseminate Blueprints (Health and Care Innovation Expo, 2018).

In the context of enduring concerns about the limited success of earlier national programmes to spread good practice across the NHS, issues about the effectiveness of the Blueprinting process have become salient. A 2020 National Audit Office report on *Digital transformation in the NHS* expressed a view that Blueprints "might not be enough to spread good practice... to other Trusts as intended." (National Audit Office 2020:22).

This paper explores the origin of the concept of Blueprinting and how this evolved as the concept was taken up within the GDE programme. We pull together evidence about the production and uptake of Blueprints among GDE and FF Trusts. Overall, we found little evidence of Blueprints being adopted in the manner originally conceived by programme managers. However we identified other ways in which Blueprints were being used and proving useful – in particular as a networking tool. We are still in the early stages of this initiative however and are not yet able to assess recent efforts by the Blueprinting Steering Group to improve the uptake and use of Blueprint.

2. Methodology

The detailed methodology for the Independent Evaluation of the GDE Programme is described in a separate report (Cresswell et al. forthcoming).

This paper brings together detailed empirical evidence gathered from three sources:

- i. 12 *in-depth case studies* of Trusts involved in the GDE (Sites A–K) with a series of ethnographic observations and interviews conducted over an extended timeframe with key players involved in each site.
- ii. 23 *broader case-studies* of Trusts involved in the GDE (Sites 1-23) with lighter touch interviews conducted in short visits and by telephone and repeated annually.
- iii. A series of interviews with key stakeholders including NHS policy makers, national programme management staff, system vendors, the wider NHS, international hospitals and partner organisations, and academics.

Interviews were recorded, transcribed and coded by the research team. Coding and analysis were informed by our theoretical perspective – encompassing a sociotechnical understanding of the implementation of health information technology and an earlier body of related research addressing social learning processes in technological change in other settings (Williams et al. 2005).

Analysis began with induction from the corpus of in-depth ethnographic interviews to explore the detailed mechanisms and processes involved in producing and using Blueprints.

The second stage of empirical analysis explored whether this emerging picture was confirmed (or challenged) across the wider sample of broader case-studies.

This formative evaluation is conducted and reported at the earliest opportunity (though not quite in real time) of the operation and outcomes of a digital transformation programme that is still unfolding. Timescales are an important consideration in the GDE Programme and in our evaluation findings. Fieldwork in the in depth sites has been conducted longitudinally since March 2018 but was paused in March 2020 due to the Covid-19 pandemic. The broader case studies capture experience collected in two rounds of fieldwork (round 1 conducted through 2018; round 2 through June – September 2019).

We return to this topic at the start of Section 6 addressing the Use of Blueprints where we review *Methodological considerations in assessing the use of Blueprints* and again in section 7 when considering *Limitations*.

3. The (changing) conception of Blueprints in the GDE Programme

The origins of the Blueprint concept within the GDE Programme are not well documented. The term Blueprints does not, for example, appear in the Wachter Review (National Advisory Group on Health Information Technology in England, 2016), on which the GDE Programme was based. However, the concept of Blueprints already featured in discussions within the NHS prior to GDE.ⁱⁱ It had, for example, gained some currency within the NHS under the 2015 NHSE Vanguard Programme, which invited organisations to take “a lead on the development of new care models which will act as the Blueprints for the NHS moving forward and the inspiration to the rest of the health and care system”.ⁱⁱⁱ The term ‘Blueprint’ appears in the earliest pronouncements about the GDE Programme.^{iv} An early (March 2017) NHSE announcement highlights the role of Digital Exemplar hospitals:

“not only to become great, but to work with other acute Trusts to develop a Blueprint [our emphasis] that can be deployed to other hospitals, reducing the time and cost for further adoption. Our intention is that, in the future, hospitals won’t merely choose an IT vendor, they

will choose a hospital that they want to partner with and implement the same system, keeping the IT 80% the same and making only the 20% of changes that are absolutely necessary to meet local needs.”(NHS England 2017: p.65)

The engineers’ view of Blueprints (the ‘cookie-cutter’ model)

An authoritative series of blogs in this period by Matthew Swindells (NHS England’s National Director: Operations and Information) and Will Smart (Chief Information Officer [CIO] Health and Care in England, elaborated on these ideas. They called for standardisation around proven solutions as a way of reducing the time and cost of current procurement methods based on “point by point evaluation of systems” by individual Trusts, suggesting that this would deliver “discounted costs” from suppliers. “If the GDE Programme is successful and offers a range of proven partnerships and solutions, why would any hospital pick an unproven system?”.^v Swindells suggested that, with what he describes as a “cookie-cutter model” of Blueprints “nobody will run procurements to buy IT systems again.” Instead, Trusts “will run an evaluation” to select from existing proven Blueprints (Swindells, cited in Stevens 2017).

This conception was supported by senior programme managers who had joined NHSE with an industrial background in the automotive and aerospace sectors, who sought to achieve the kinds of standardisation of not just product designs but also processes that have been achieved in global manufacturing organisations. A few specific sites would develop, test and optimise models for digital change that would then be rolled out to hundreds of sites. This view of standardised procurement revolves round the original meaning of the term Blueprint, which arises in the construction and engineering industries in reference to a method for accurately copying technical drawings by making contact prints on light sensitive paper.^{vi}

Swindells’ idea of eliminating the need for Trusts to run competitive procurement exercises raised complex difficulties under competition law (Ramshaw 2017). There are more fundamental questions about whether this cookie-cutter model, derived from manufacturing standardised products, would succeed with health service digitisation (Hanseth and Bygstad, 2015, Williams 2015). In particular, the Wachter Review (National Advisory Group on Health Information Technology in England, 2016:36) had argued that to implement Health IT you cannot “simply follow a recipe or a checklist”; instead this kind of “adaptive change” requires “substantial and long-lasting engagement between those implementing the changes and the individuals tasked with making them work” (front-line users: whether healthcare professionals or patients).

Blueprint as networking tool: a live document that allows people to seek further information
A strikingly different conception of Blueprints, more in line with the concept of adaptive change, was subsequently articulated by the Blueprinting and Learning Network Steering Group, established in the summer of 2017. GDE Programme leaders brought external consultants and then leading GDE sites into this Group to develop the concept of Blueprinting and pilot their production over a five-month period (December 2017 – April 2018^{vii}). A set of *Frequently Asked Questions* produced by the Group notes that that previous “one size fits all” Blueprints (citing the National Programme for Information Technology which assumed that all organisations would follow a uniform approach) had limited impact, and argues instead that “it is important to highlight the different approaches to implementation that work in a local context.”^{viii} The Blueprinting Framework that was eventually developed by this group offers a sophisticated model of how Blueprints may become a vehicle for knowledge transfer - as “live documents that drive people wanting to benefit from GDE experiences to seek further information” (Charnley 2018). It highlights that Blueprints “can be viewed through a range of lenses”, in part due to the differing requirements of ‘different audiences’ (hospital boards, CIOs, implementation and clinical teams). As well as being applied at “varying levels”, Blueprints may have “different levels of abstraction” (Health Catalyst 2017). Boards, for example, might look for

technology agnostic Blueprints, while technology implementation teams would find value in technology specific Blueprints (Thomas and Charnley 2018).

A subsequent presentation (Health and Care Innovation Expo 2018) explicitly contrasts this evolving conception with the engineering view of blueprint as standardisation (Thomas and Charnley 2018).

What is a blueprint?	
A blueprint IS:	A blueprint is NOT:
<ul style="list-style-type: none"> • A record of a GDE/FF’s experience with digital innovation, centred on their key work activities and including lessons learned along the way. 	<ul style="list-style-type: none"> • A mandatory, ‘one-size-fits all’ guideline for every trust.
<ul style="list-style-type: none"> • Supporting information and artefacts that provide project details, examples, and tools. 	<ul style="list-style-type: none"> • A static collection of material that doesn’t evolve over time.
<ul style="list-style-type: none"> • A set of information that is searchable and filterable by different users, based on need. 	<ul style="list-style-type: none"> • Primarily a marketing instrument; rather, its purpose is to inspire, inform, and accelerate digital innovation in follower trusts through lessons learned (good and bad).
<ul style="list-style-type: none"> • Live document that allows people to seek further information 	<p><i>Source Thomas and Charnley 2018:8</i></p>

Thomas and Charnley’s presentation maps out a sophisticated account of Blueprints as an enabler of learning. Thus Blueprints would be “story-like – a compelling narrative of actions and events...” that could “instruct without dictating [and] accommodate the adaptive component of change”.

Today Blueprints are promoted by NHSE as “a structured collection of knowledge assets and associated methodology for using them...” [encompassing] “organisational leadership and culture, technical guidance, clinical and staff engagement as well as the people and processes required to deliver the benefits of technology”.^{ix, x}

There was thus remarkable shift in how Blueprints were conceived, from their initial conception as a vehicle for capturing and transferring knowledge needed for implementing tested digitisation models, to seeing them as a means for sharing *deployment experience* and as a *networking tool*. Although senior policymakers had espoused a ‘cookie-cutter’ view of Blueprints as a means of standardised procurement (derived from manufacturing engineering), this gave way to the strikingly different conception of Blueprinting emerging from the Trusts producing and using Blueprints.

This points to significant process of policy learning in the course of the GDE Programme involving policymakers and Trusts. However, as we see in the next section, this change created difficulties in relation to the implementation of the Blueprinting concept. There are policy dilemmas here: i) about how policy can be adaptive without creating confusion amongst its intended audiences – which may require greater investments in communication and engagement – and ii) about timescales – that the evolved policy may arrive too late to be implemented within short-term change programmes.

4. Implementing the Blueprinting concept within Trusts

Given these changes in the strategy and conception of Blueprints over time, it is perhaps understandable that mixed messages were picked up within GDE. Site A commented on the lack of clarity by the central team running the GDE Programme about what Blueprints were supposed to be doing (for example, as we see below, whether they were supposed to be generic or technology specific Blueprints) which “has made it [Blueprinting] difficult because it’s different things to different people”. The Chief Nursing Information Officer (CNIO) from Site D - noting that Blueprint documents varied in length from a few pages to 50 pages – asked: “are they supposed to be quick reference guides, points of contact or are they supposed to be that detailed?”

Although sites complained about lack of clear guidance about the content of Blueprints, they did this from inconsistent viewpoints. Thus, some sites complained about inflexibility in the Blueprinting process while others welcomed the flexibility in interpreting the guidelines. The Chief Clinical Information Officer (CCIO) from Site H welcomed that sites have been allowed “to define their own way of Blueprinting”. Site I’s CIO commented that, though “consistency is important”, there was too much rigidity in the Blueprinting process ‘about what sorts of things can be Blueprinted’ complaining that Blueprints too often had a technical focus and needed to give more attention to “human factors”.

Time pressures

The GDE Programme was launched and implemented within an extremely short timeframe as shown in table 1 below.

Table 1: GDE Programme Timeline

September 2016	First tranche of 12 Acute GDE sites announced ^{xi}
31 March 2017	4 further Acute GDE sites announced (NHS England 2017)
July 2017	Funding released for first round of GDEs. “The clock starts” ^{xii}
September 2017	7 Mental Health GDEs announced ^{xiii}
September 2017	18 FF Trusts announced ^{xiv}
Dec 2017 – April 2018	Blueprinting pilot ^{xv}
February 2019	Roll out of Blueprints (Downey 2019 a)
June 2019	Two -year GDE contracts begin to complete
March - May 2021	3.5 year GDE contracts begin to complete ^{xvi}

One by-product of the compacted timescale for launching the GDE Programme was the need to rapidly put in place various elements needed to support the establishment of an intricate, planned learning ecosystem. As a result, many elements needed to be worked out as the Programme was unfolding; some aspects were only finalised part-way into the Programme. This had particular consequences for the production and adoption of Blueprints.

In the initial period, when GDE sites were preoccupied with procuring and implementing new digital solutions, the production of Blueprints was often set aside for later. Though commitments to produce Blueprints were included in the contracts that sites had agreed with NHS England,^{xvii} detailed guidance about the content of Blueprints, drawing on pilots, did not come on stream until almost a year after ‘the clock started’^{xviii} when GDE funding was released in July 2017.

Site I Project Manager noted that “we’ve been too busy doing it, ... to actually Blueprint it.” The production of Blueprints only occurred after Site I had completed their GDE projects. The structure for producing and disseminating Blueprints “didn’t exist till fairly recently, and we were in the midst of doing stuff so we’re just about starting to write up blueprinting now.” [February 2019]

Site A noted that timing was particularly an issue for the ‘two-year GDEs’ which both started earlier and had a shorter duration. Two respondents at Site H (another of the two-year GDE sites) articulated a similar view and commented that they were being asked to produce Blueprints at the end of their GDE contract, when resources were running out. Having to write a Blueprint retrospectively was more difficult and, they feared, might undermine the quality of the documents produced. The Head of Hospital at Site A also noted that some elements might get lost when Blueprints are produced retrospectively: “some of that background in that Blueprint gets lost the further away the change was.... [as] we may not always remember why we made decisions”.

Site F also felt time pressures for producing Blueprints were limiting their quality. Site F CIO complained “they’re looking for ... Blueprints before we’ve developed anything”. As a result they might be incomplete, which will reduce their benefits. Site F IT Project Manager recalled that “we wanted it to be a good Blueprint,... the issue was rushing it to meet the deadline,... (we) still weren’t completely happy with what we’d submitted because we hadn’t had enough time”. An issue here is that, though the intended final audience for Blueprints was other trusts, the most immediate demand for Blueprints was articulated by NHSD/X, which needed to sign-off that Blueprints had been produced, and were of requisite quality, to meet contractual obligations (milestones) and release funding to the sites that produced them.

The selection of Blueprint topics

Time pressures also aggravated issues about the selection of Blueprint topics and the choice of GDE pairings with their initial FF users. The design of the GDE Programme had revolved around the expectation that Blueprints could be “rolled out” in the first instance to FF sites.^{xix} However this implied that there would be close alignment between GDEs and their FFs – in particular around the areas in which Blueprints were to be developed/adopted. In practice, given the exigencies of launching the GDE Programme which started with a competition to select GDE sites (2016, 2017) and then identify FFs (2017), the choice of Blueprints was not tightly integrated with the selection of GDE-FF pairings and only received detailed attention later. Site F CIO observed that some of the FFs that had been selected were not seeking to adopt the same digital change projects as their GDE – as a result the FF might not be well placed to adopt and validate a Blueprint. Site D CIO felt that the GDEs had been asked to pick areas for developing Blueprints before they understood what was involved in Blueprinting.

If the compressed timeframe of the GDE Programme was a challenge for the producers of Blueprints it was perhaps even more so for their intended initial adopters – the FF sites. The IM&T Lead for FF Site B complained that Blueprints arrived too late to be useful for them : “if a GDE has got a FF and you’re not that far behind in the Programme, then by the time your GDE has done that particular Blueprint you might have already started on your journey before that piece of paper comes.” This became an issue in relation to the use of Blueprints (discussed below).

The Blueprint infrastructure

Blueprints were launched in early 2019 (Downey 2019b). Additional work was carried out on the FutureNHS collaboration platform^{xx} that was used to disseminate Blueprints, as a response to criticisms from trusts about its usability and accessibility. Trusts welcomed these efforts to make it more user-friendly and accessible. Towards the end of the GDE Programme sites were becoming familiar with the Blueprinting process. The IT project manager at Site F noted that, though it took time to learn how to use the Blueprinting tool, “I’ve got the knack now”. After seeing a demonstration of

the changes to the platform they felt that they “like the principle... it was promising’. The CIO at Site J also commented favourably on the digital format: “I do like the digital platform that they've created around Blueprinting”.

The Blueprinting Steering Group continues to work to support the production and uptake of Blueprints, drawing on feedback from organisations within the GDE Programme, to make Blueprinting more effective. Recognising that people were not adopting Blueprints wholesale but were searching through this body of knowledge to solve specific problems they had created a library of potentially reusable modular components (for example a safety case or a data protection case that might solve a particular problem for an adopter). They have also created shorter, more accessible formats: a “Blueprint on a page” (a move which, arguably, reinforces one of the ways we found BPs were proving useful as an initial introduction to a topic and networking tool). These initiatives, launched in June 2020, after our fieldwork, pave the way for greater utilisation of this knowledge resource ^{xxi}

5. The Production of Blueprints

Different understandings of Blueprints

Given the already mentioned competing conceptions and changes over time in the model of how Blueprints would convey learning it is perhaps not surprising that various sites interpreted the guidance differently.^{xxii} Many respondents drew our attention to the competing conceptions at the heart of Blueprinting proposals. Thus, Site A observed that “right at the very beginning it wasn't clear” whether the intention was that sites would produce a “high level piece” on a digital change or a more specific “set of tools” and prescriptive guidance on “how you do it” for implementing that change within a particular technology platform.

Some suggested the ambiguity might be resolved by creating hybrid or multi-layer Blueprints encompassing multiple components catering for various audiences.

- *Hybrid*: Site I CCIO noted that Blueprints contained both generic lessons and product-specific elements.
- *Multilayer*: Site A CCIO suggested there should be “two types of Blueprints”.... “Supplier-agnostic Blueprints that talk about change management” and also “a second layer of Blueprint which says if you are going to do [named application] with [specific vendor] these are the bits you need to know”.

Most sites however seemed to focus on one or other of these two aspects, as we explore below.

Blueprints as a source of generic change management guidance

Some sites focused on capturing generic change management lessons. Thus Site B's Digital Programme Manager said: “I would focus on the challenge that we're trying to look at.... The barriers we came up against” rather than technical aspects. A Senior Manager at Site M had used Blueprints and found that they helped you “get some direction”, providing “some level of guidance to where you should start and what seems to have worked or not worked at certain sites (rather than relying on suppliers with their vested interests).

Technology and organisation specific Blueprints

Other sites flagged that their initial implementation experiences would be rooted in their particular organisational and technological context. As a result, the lessons drawn in their Blueprints were liable to be technology and organisation specific – increasing their relevance/value for similar sites but somewhat limiting their transferability. Thus, Site I Senior Systems Specialist was sceptical about the value of their solutions in other sites with different technology systems and organisation processes (though some specific elements (e.g. training plans) might be transferable.

Site C's IM&T Lead flagged that they could produce specific guidance that would be "immediately available" for other sites working with the same platform. As a result it "doesn't have to be redone from scratch and I think that has huge value". Likewise, Site A's digital hospital lead noted that for another site with same version of the platform "I could send them the actual configuration that they could import". While technology-specific Blueprints might have great relevance to organisations with similar technology and processes – these might not be widely applicable or transferable to other sites: these lessons might not travel well. Site 20 noted that six of the GDE sites had adopted Cerner Millennium, which had created scope amongst this cohort to exchange very detailed platform specific configurations. Site L (a Cerner site) had been able to draw on workflows developed by another trust including sharing code through the Cerner platform: "Taking the code that they've developed and using it in our Trust.^{xxiii}" In turn Site L had been approached by other Cerner sites platform who were able to adopt their Blueprint (for a specific function) – but noted that these lessons would be irrelevant for non-Cerner sites.

The Chief Information Officer (CIO) in Site F felt that "the Blueprint has to be contextual; ... unique to every care setting [in terms of systems and how my environment works] so to some extent it's very difficult to take a Blueprint out and drop it somewhere". For example, "a process I'd done on [specific application] that would only be really, really applicable to some other trust on [specific application]". In their Blueprints, "what we were trying to do is to make them absolutely applicable to any other trust, if at all possible. And that's been a hard piece of work to do."

However, if Blueprints are context-specific, their success or failure in particular contexts may depend on what Site A's digital hospital lead characterised as 'hypotheticals' – things you wouldn't ever put into a Blueprint. "your knowledge of how you did it may apply to them if you understood their context". To establish these there "would need to be a conversation.

Producing Blueprints had thus forced sites to think about the transferability of their local experiences. Thus, Site H CIO noted that "you learn that there are some things that are portable... But even with sites with the same EPR [electronic patient record] providers as ourselves... it's not like you can give them a configuration ... because they have built the system slightly differently... So, I think the value is in the story and the high-level presentation and the approach to how you might implement a pathway and what the challenges might be."

Supplier-agnostic Blueprints

Site B's IM&T Lead questioned whether Blueprints are useful if divorced from the context in which they emerged, noting: "There's lots of debate going on around blueprinting and how beneficial it is to have a piece of paper to tell you what to do without the context wrapped around it. Their Programme Manager had a slightly different take on the same issue – arguing that "what's really important is that you don't make it system specific" but noted that this "is quite hard because ... we build it in a certain way because that's the way [technology platform] is set up". Site A, Head of Hospital, having shared their Blueprint with 4-5 other organisations, concluded that it would be helpful to "take the system out of it" to make Blueprints vendor-agnostic. "I wonder if we could take the system out of it and actually treat the components of it more agnostically". Site F CIO cautioned against the idea "that we're going to create something that's absolutely applicable to all care settings."

These observations replicate key finding from earlier studies in the enterprise software market, that establishing which elements of implementation experience are technically and organisationally contingent (identifying the hypotheticals) involves a considerable effort - collating, digesting, applying and refining lessons across different contexts across a community of adopters (Pollock and Williams 2009, Hyysalo 2010). As the Head of Clinical Engagement at Site L, though the international vendors

“had the skills, I suppose, and the knowledge to just... take something from one site and put it in another” these were “skills that we need to develop internally, in order to do that”.

The costs and benefits of blueprinting

General support for Blueprints

There was widespread support across the GDE for the idea of Blueprints – at least in principle – driven by a shared commitment to the collective interest across the NHS and a consequent concern to support and share expertise and experience with those organisations that were not part of the GDE Programme. “I think Blueprints are a great idea..... I’m very supportive of the Blueprint principle” (Site A CCIO), “a great concept” (Site M Senior Project Lead); “the concept of blueprinting is really positive” (Site B Digital Programme Manager); “a tangible output out of GDE to support those sites that aren’t on GDE” (Site B Programme Manager).

Sites embraced the benefits of getting away from the “not invented here” syndrome. The CCIO at Site H emphasised “getting organisations to accept that they don’t have to reinvent things... get sites to adopt things which are good but not perfect for them.” Site J CIO likewise argued: “I think its good ... not to reinvent the wheel... because great ideas occur throughout the NHS.... It’s making sure people know about these things... how we can try and, I’ll use the word force which is probably not the right word, encourage people not to create their own version of something.” However, trusts also wanted to retain autonomy to select and configure systems around their particular priorities. Site H CIO drew attention to particular political rivalries between trusts in a region that had encouraged some trusts not to come to them but to do things in their own way.

This near unanimous enthusiasm for the principle of Blueprints was tempered, however, by equally prevalent doubts about whether the costs – in terms of the time and effort of organisation members producing them would be justified in relation to their benefits – in terms of how widely used and how useful Blueprints would be. We explore these in turn.

The considerable (time and effort) costs of producing Blueprints

Many sites emphasised the large amount of work required to create a Blueprint and associated documentation. Site I’s Digital Change Manager told us “I didn’t really realise how big of a job it was going to be. And like trying to juggle that, as well as your day to day activity, that has been a challenge.” In Site B the Chief Medicines Information Officer (CMIO) felt “Blueprinting has taken a massive chunk of time”, while the Clinical Transformation lead noted that writing the blueprinting document “was taking over my life. It’s a huge amount of effort and work. ...the only way I could do it was I stayed late after work”.

Site D’s deputy CCIO estimated that their first Blueprint (a huge document on Electronic Prescribing and Medicines Administration [EPMA]) took one person 6 weeks to complete. The work was divided between several people and amounted in all to 100-150 hours. The deputy CCIO involved recalled the effort of typing 50,000 words.

Notwithstanding these costs, the CCIO at Site I drew our attention to an unanticipated benefit of producing the Blueprint which had forced them “to reflect on what you do. And, I’m sure there are a huge number of lessons that we’ve surfaced, having read the draft Blueprint, that will be really beneficial for other people.” And this had also benefitted them: “we’re sort of now retro-fitting some of our lessons, but forcing us to think about them, forces us to continue to go back and improve it”. Given the time pressure and work required “we probably wouldn’t have bothered, if we didn’t have to [interviewee emphasis] write a Blueprint.”

Would this investment in producing Blueprints be justified in terms of their utility/use

The key issue was whether the investment in producing Blueprints would be worthwhile. This revolved critically around how useful Blueprints would be – and here the producers were far from convinced about their utility. Thus, Site F’s CIO judged that Blueprints were only “useful to a very limited extent”. Site C’s IM&T expressed concern that “Blueprinting stuff is a waste of time, [be]cause, essentially, people are spending quite a lot of time writing stuff up, and it’ll sit in a library and the people who need to use it, won’t use it.” As a result the investment may not be warranted: “I’m not sure how much they’re actually used so, I think, there’s quite a lot of money and time going into things that are probably not sensible” (Site C IM&T). Similar concerns were expressed by Site I’s Project Manager about the effort invested in producing “a 20,000 to 30,000 word document, that I don’t know who’s going to read.”

Although Site F’s IT Project Manager was “a bit sceptical about how useful it’s going to be for somebody to come along and look at these documents”, they felt that that “it’s okay but as long as it’s value-adding”. Conversely, the CNIO at Site D observed that “The Blueprints took a lot of resource to complete and actually I would question who has actually looked at it.” The effort spent would be “OK ... as long as it’s value adding”. Later, when pushed on whether they had found the Blueprints useful at all they answered “No, not really, if I’m honest.”

These observations raise questions about the use of that bear upon whether the investment in producing Blueprints is justified and also whether Blueprinting will be sustainable/sustained when the GDE Programme ends.

6. The Use of Blueprints

Methodological considerations in assessing the use of Blueprints

This evaluation and other studies (National Audit Office 2020; Blueprinting Steering Group 2020) found rather little evidence that Blueprints were being widely used and proving effective in the manner initially envisaged as a vehicle for delivering the substantive knowledge needed to implement a similar system in another hospital. However, our respondents pointed out various other ways in which Blueprinting activity had been useful. In particular they had proved to be a very effective networking tool – and this seemed to be where their main benefits had materialised.

We need also to consider that the lack of evidence about the use of Blueprints may, in part, be a methodological issue insofar as tracking their use is difficult – particularly amongst wider audiences beyond the GDE Programme.^{xxiv} The processes by which knowledge is transferred and exploited are complex. A body of earlier studies questions linear models of research impact that presume knowledge, once disseminated will alter policy and practice (Bechhofer et al. 2001). There is a risk that poorly designed methodologies, based on an incorrect understanding of how Blueprints will be useful, will underestimate their impact.

The reported finding from a recent survey (Blueprinting Steering Group 2020) that “80% [of] respondents have not adopted a blueprint” raises questions about what is seen to constitute ‘adoption’. If adoption of a Blueprint is narrowly conceptualised in terms of an organisation following wholesale the advice it contains, this may overlook ways in which Blueprints were used and proved useful. We report below the trust (Site 14) that decided against adopting a particular change after reading a Blueprint that was honest and candid about the difficulties and costs entailed. More generally there was considerable evidence that trust members found Blueprints helpful first as an introductory guide^{xxv} and then as a networking device – advertising who has expertise on a topic for subsequent discussion. These beneficial uses of Blueprints might not be described as representing their ‘adoption’. The benefits of Blueprints as a networking tool may not be readily observed. Attempts to make these informal networking processes and benefits visible – for example by

requesting trusts to complete “Adoption and benefits tracking” procedures, if onerous, might paradoxically inhibit Trusts from accessing these resources.

Our evaluation methodology allowed us to enquire into the perceived use and utility of Blueprints by members of GDE and FF sites (which were their producers and their initial intended adopters). Given the limited evidence of use of Blueprints in our 12 in-depth study sites (A-L), we explore in detail evidence from the 23 broader case-study sites (1-23). The former reflect evidence up to the cessation of fieldwork in March 2020 due to the Covid-19 epidemic. The latter capture the state of affairs up until the second round of broader case-studies conducted between June and September 2019.

Evidence of the use of Blueprints

The vast majority of sites – 27 out of 35 covered in our in-depth and broader survey case-studies – did not report making use of Blueprints as vehicle for conveying the knowledge needed to implement a particular change.

We first review evidence of the direct use of Blueprints in the following paragraphs.

Charnley (2019) records how his trust, Wirral, had been able to draw on Cambridge’s Bar- Coded Medicine Administration (BCMA) Blueprint. We should note, however, that this was one of the pilot Blueprints, produced earlier and widely circulated though the Programme. As Paul Charnley is joint chair of the Blueprinting Steering Group, he had direct access to its creation and, perhaps, a strong motive to encourage its adoption. Sites 4 and 13 also reported using this Blueprint. Site 14 considered using this Blueprint but decided against adopting it based on the honest and candid detail it provided which had allowed them to avoid repeating difficulties and wasting money. We will return to this issue below to review more evidence that Blueprints may be useful not simply through their adoption!

FF sites B and 23 had followed the approaches that their GDE had adopted and subsequently blueprinted (an observation that implies that the Blueprint itself was not the vehicle for their learning). They had not adopted Blueprints from other sites.

Site 3 identified four specific Blueprints that they had learnt from. However they stressed that although Blueprints could help them accelerate change and avoid mistakes, they were just a starting point for further conversation. As we see below Blueprints were useful and used but not in the way initially anticipated.

Two sites (10, 22) indicated that they were planning to use Blueprints in the future. Many other sites reported that they had reviewed the Blueprints but had not adopted them. Several observed that the Blueprints had arrived too late for them to adopt and were not aligned with the digital transformation journey they had by then developed.^{xxvi}

Perceived utility of Blueprints

We first review the experience of our FFs – the intended initial sites in which Blueprints were to be adopted.

Site M’s Senior Manager was initially sceptical about Blueprints (like others fearing these would be documents people never read) but had found Blueprints from other sites useful: “I have read a few and I found them ... actually quite useful. So I sort of changed my mind on them I’ve reviewed quite a number. I found [NAMED BLUEPRINT] very helpful.... some of them include costs, which is useful, to give us a steer on how much investment we might be needed before we start embarking upon them”. Other, more junior, managers from Site M explained how they had found other organisations’ Blueprints useful: “it’s not a manual for how to implement any of these systems... from beginning to end”... it’s a bit of a snapshot... It won’t be enough... to guide you through implementing something quite complex... but then I wasn’t sure it was meant to be that”.

Site L had not yet used other sites' Blueprints – but were planning to draw on specific clinical pathways developed by another trust which used the same EHR platform, rather than build these themselves as they had taken a lot of work to develop.

The views of GDE sites were rather similar. The CCIO at Site I reported that it had shared knowledge with its FF which had implemented change on the basis of their advice, but noted however that this was provided while they were writing the Blueprint: the Blueprint itself was not the vehicle for knowledge transfer.

Many sites expressed doubts whether Blueprints would enable knowledge transfer across the country at scale and pace (e.g. CCIO at Site H). For example, Site B's IM&T Lead noted that the jury is still out "about how useful they are". More work and better understanding would be needed to create Blueprints that would be widely adopted and prove helpful (e.g. CIO at Site L). The supplier to Site J suggested that "there is still work to be done to create meaningful Blueprints... in terms of the visibility for the Blueprints, their applicability, the practical support that's required to make them work on the ground".

The Deputy CIO at Site D didn't "see any evidence of how the Blueprints are going to be used" and "the fear is that they're just going to end up with lots of documents that sit on a shelf." However they were "keen to share" and noted that there was a lot of interest in a Blueprint they were producing: "We have been asked to share draft copies; we've been asked to become a buddy site" for another site procuring the same solution. Site H also reported other sites contacting them about their Blueprints (speaking in the period before the Blueprint platform had been created - evidence that points to the influence of informal networking – a point we return to below).

The role of Blueprints as a networking tool

Though there was little evidence that Blueprints in themselves were effective vehicles for knowledge transfer, they were widely recognised by GDE sites as having promoted networking activities within and beyond the GDE Programme. Blueprints were working in a different way to the original plans. Trusts reviewed them as an initial introduction to a particular area of change. However, their main value was perceived to be as a networking tool.

As Site M GDE Project Manager noted: "part of it is that you've got contact details and ... you undertake to make yourself available to other organisations.... So, it's a sort of networking tool".

The Head of Hospital at Site A suggested that Blueprints were "just the distillation of often the conversations that we're having with lots of hospitals anyway". They could never "be a truly one stop shop" for other sites which, due to differing circumstances would have different issues to raise. "I view the Blueprints as a really good starting point ... but then there will always be some sort of follow up conversation". The CNIO at Site A also observed that "the Blueprint is there just to start the conversation" noting that seeing things was more useful for understanding than "reading it on a piece of paper". Several sites (3, 9, 17, 18) shared this view that visits and interactive conversation were more valuable in transferring knowledge than a piece of paper, particularly in communicating important cultural factors.

Many other respondents observed that it was these contacts and visits that brought the greatest benefit. At Site D, the CNIO observed "the most benefit you get is that contact with other people", while the CIO flagged benefit for us and others when trusts from "come and visit us and we talk ... and share". This was in part because the Blueprint could only convey a limited amount of information. An Allied Health Professional in Site C felt that Blueprints were not detailed enough from a user perspective: "I'm not convinced there is enough detail to really drill down" but noted that this was not a problem however: "as long as they've got contact details... most people in this space are very willing

to share and collaborate”. A similar perspective from a Blueprint producer came from the Assistant Director of Programme Delivery at FF site L who noted that “There is a limit to how much technical stuff you can put on a Blueprint”. Instead sites will “get in touch with us and maybe come over and have a look at it”. Sites visits were more effective because they gave a chance to address the differing circumstance of sites.

In this way the production of a Blueprint served as a way to advertise who was working in a particular area. Site 3 had likewise reviewed the library to identify Blueprints which might add value to their plans and find out who wrote them. They then approached the authors as contacts for a conversation.

Discussions here yielded different recommendations about the form and content of a Blueprint. Site 4 felt that Blueprints should be seen “as a story of the learning rather than a step by step instruction manual” (as local variations will mean particular aspects are not valid or practical). Site 5 observed that current Blueprints take a long time to read and might be presented in a more succinct way as a list of key points. Site 1 felt that one-page summaries would be an improvement and Site 14 suggested using videos.

Sustainability

Work is needed to develop Blueprints and also to update and maintain them. Blueprints capture state of the art at particular moment in an ongoing process of technical and service innovations. The Blueprinting Steering Group had noted that “Traditional blueprints document a point in time and quickly become outdated” and proposed an approach that sees blueprints as “live artefacts that develop in line with the advances of digital maturity in the authoring sites”.^{xxvii} Site A Head of Hospital reinforced these views, noting that a Blueprint could rapidly become outdated. After a certain number of years, you might need to retire them. Work is needed to keep them ‘fresh’. However, if Blueprints were recognised as ‘an evolving conversation ... then the amount of hours you would need to evolve them constantly grows’, adding: “I just don’t know how sustainable that is in the long term”.

These ongoing costs of maintaining a Blueprint raises questions about how this activity will be resourced/incentivised. The CCIO of Site H also warned “If it’s not funded then it can’t continue”.

Michael Fisher, CCIO of Royal Liverpool and Broadgreen University Hospitals NHS Trust, (cited in Downey 2019b) “I think if the Blueprints are left as static documents they will be useless. Actually what the Blueprint should be is more of a consultancy service”. The Deputy CIO at Site D similarly warned that “Organisations don’t have the time or the resource to keep them updated and they just become a, sort of, archaic library of information”.

Alternative mechanisms for sharing/applying knowledge

The production, distribution and consumption of Blueprints seemed to play an important role in catalysing this – informal and sometimes formal - knowledge networking. Players across the GDE Programme were keen to explore new ways to support knowledge transfer through new forms of engagement. These included:

Organising interactive Blueprinting events: The Digital Hospital Director at Site A had organised a live Blueprinting event - that was “live, interactive, talked about the journey, talked about what you need to think about, the complexities... you print live”.

Set up short term secondments: Site H CCIO “I don’t think you do it by creating a document... you do it by getting people to move between sites ... to share experiences... whether it’s a short term secondment whether it’s a day’s innovation group”

Create a discussion forum: Site H CIO noted the value of site visits and argued that it would be more effective to put resources into a discussion area of Forum “it would make a massive difference really”.

Rather than just transferring documents these centred around promoting direct interactions and linkages between people, including moving people (and their embodied knowledge and experience [Fleck 1997]) between organisations, which they believed provided a more effective way of transferring knowledge and experience. However networking and person to person contacts are demanding of time and effort. They are costly to scale up. This posed a challenges as staff are “all knee deep in their day to day job” (Site 19). Site M senior project lead felt constrained venturing out too far “cause I had too much to do in my own job, and it was conflicting priorities.” Site F Project Support felt a simple-to-administer mechanism was needed to free up staff to take part in site visits “because it’s taking you away from your role here’.

Consultancy services: Site 20 also suggested that GDE sites might act as a consultancy to help others adopt Blueprints and in this way secure feedback from new adopters that would help them strengthen and develop their Blueprints. Site 13 had suggested that “NHSX probably should be supporting a ... consultancy system where people who have actually been potentially involved in the delivery of stuff that they describe in the Blueprint are released for a period. And that builds to go and speak to and consult, provide a consultancy to institutions that want to implement something.”

Some anticipated that consultancy type relationships might provide a way to sustain more intensive engagement on a commercial basis. The Senior Project Lead at FF site M – concerned about the lack of engagement with their GDE - took the unusual step of employing the consultant their GDE had used, who, though costly (£750/day) “brought a lot of experience to the table from what [the GDE] did right and what they did wrong”.

Site C IM&T suggested that vendors might take over this knowledge transfer role. Rather than “employ a bunch of consultants to write it up into a Blueprint that looks nice” they suggested “directing best practice back into the technology that’s being sold by the supplier”, noting that their EPR vendor had already “incorporated the best bits into their new ... kit” – something also observed in Site C, Site I and Site H where the CIO noted that their supplier was “very keen ... [to exploit their specific Blueprint] as a commercial offering”.

An alternative exploitation pathway arose in Site E which had developed a Blueprint for a novel digital health service that their Trust had developed. They sustained this service by making it available to other Trusts on a commercial basis.

The resort to external commercial provision raised issues about who owns and is able to charge for the Intellectual Property. Several sites (e.g. Site F and Site 8) had shared locally created application configurations with other Trusts without charge. In contrast, the CIO at Site D expressed concern that organisations and individuals who had invested a lot of work on developing a model for a Blueprint are now being “asked to give that knowledge and framework away to everybody else”. To make these activities sustainable, some mechanism for recognising and rewarding these investments might be helpful. There were also concerns about others exploiting the IP. Site L CIO also noted that their innovations were being incorporated into their (US based) vendor’s offering and sold on “without any intellectual property returned to the UK”. However, as the Head of Hospital at Site A noted, an application might draw upon diverse suppliers - EHR platform, devices and applications - raising issues about who would own and control its exploitation.

7. Limitations

Our independent evaluation gave us an exceptional opportunity to examine Blueprinting from the viewpoint of those involved in producing them, who were also the intended early adopters. However, our evaluation research design, based primarily on intensive longitudinal case studies and annually-repeated broader case studies of GDE/FF sites, did not allow us to track knowledge transfer around individual Blueprints – including cycles of adoption and refinement of Blueprints and community

formation around Blueprints. Our evidence here is supplemented by complementary evaluation activities conducted by the Blueprinting Steering Group.

We have noted the limited evidence that Blueprints have been used and proved useful in the way envisaged as vehicles for knowledge transfer. We have drawn attention to important informal knowledge networking activities that have taken place around the blueprinting process. This suggests that Blueprinting has been effective as a knowledge networking tool (rather than the Blueprint serving as a direct vehicle for knowledge transfer). We emphasise that it is difficult to track the process and outcomes of knowledge transfer (and particularly informal knowledge transfer).

Although Blueprints were being piloted in 2018, full-scale roll-out only took place in 2019 (rather late in the life of the GDE sites). Increasing uptake may be anticipated over time. Our broader case-study findings (second round completed in the summer of 2019) may overlook subsequent growth in uptake. The June 2020 relaunch of the Blueprinting platform, with new search facilities that open up new pathways for knowledge utilisation, took place after our fieldwork. Our findings should be revisited and supported by further work (a further round of fieldwork in the final year of the Independent Evaluation of GDE will provide some scope to address this).

Our methodological reflections (discussed under *Methodological considerations in assessing the use of Blueprints*) highlight the risk that attempts to measure impacts will underestimate the benefit of Blueprinting activity. If evaluation methods revolve around a narrow conception of how Blueprints would be used and prove useful they may fail to capture the indirect benefits of diffuse, informal networking activities. Requirements to document networking activity to create evidence of the utility of Blueprints might have unintended consequences if they divert energy away from and thereby impede informal networking.

8. Conclusions and implications for policy and practice

Lessons regarding building a learning ecosystem

The outcomes of the Blueprinting process were uneven; they were most successful where their role in formal knowledge transfer was supported by informal knowledge networking (e.g. EPMA) and the formation of communities of expert practice.

We found limited evidence that Blueprints were being adopted and used in the way initially envisaged as a vehicle for the wholesale transfer of the knowledge needed to successfully implement a particular innovation. This raised questions about whether the substantial costs of producing and maintaining Blueprints could be justified. However our respondents drew attention to ways in which Blueprints were being used and proving useful in ways that differed from initial conceptions of a Blueprint as a repository for the transfer of procurement and implementation knowledge.

Blueprints are serving as a networking tool – a signpost to people with expertise – enabling follow-up conversations, visits and more intense forms of collaboration (e.g. where experienced staff provided consultancy support for neophytes). Attempts to evaluate the Blueprinting Programme need to take into account these informal as well as formal contributions (though such informal learning may easily be overlooked)

The shorter and simpler Blueprinting formats recently developed by the Blueprinting Steering Group (such as the “Blueprint on a page”) - could provide these benefits of introducing a topic and supporting networking and community formation within the NHS at somewhat lower cost. Recognising that sites were using the Blueprinting platform to hunt down solutions to specific problems the Blueprinting Steering Group has relaunched the Blueprinting platform as a library of modular potentially re-usable learning components supported by more powerful search tools. These initiatives (taken after our fieldwork) will open up new pathways for knowledge utilisation.

Policy learning

We found evidence of important policy learning taking place in the course of the GDE Programme, linked to the work of policymakers and trusts in the Blueprinting Steering Group in piloting and improving tools and templates for producing Blueprints templates – and addressing usability and access issues with the technology platform for disseminating them. They have achieved a radical reconceptualization of the role that blueprints could play as “a structured collection of knowledge assets and associated methodology for using them”.^{xxviii}

However, developing this sophisticated knowledge transfer model took time. As this work was only initiated five months ‘after the clock started’ with the GDE Programme, these enhancements arrived mid-way through the GDE Programme. The very tight timescales for GDE sites gave them little opportunity to take the newly produced Blueprints on board.

These observations have implications for programme management.

- i) It takes time to put into place instruments and to refine processes for sites and programmes (particularly where choices need to be discussed with policymakers and with managers and practitioners in hospital trusts). The compressed timeframe for designing, launching and implementing the GDE Programme gave little scope for these key issues to be addressed in the relatively short duration of the GDE Programme (e.g. to integrate selection of GDE/FF pairings and choice of Blueprint topics).
- ii) Our observation about the challenges in designing and implementing change programmes in compressed timeframes repeats a pattern observed in earlier NHS change programmes such as the Vanguard Programme [Checkland et al. 2019]).
- iii) This highlights longer-term lessons about the benefits of developing transformation programmes in a cumulative manner that allows for incremental improvement of frameworks and programme management tools – in place of the currently entrenched pattern of a succession of new initiatives launched from scratch. Programme managers are acutely aware of the shortcomings surrounding short-term, episodic programmes – which they see as resulting from the exigencies of public sector budgeting and ministerial policy cycles. Though there have been attempts to develop longer term policy and funding frameworks, these difficulties are seen as a feature of the policy landscape that is not in their power to change and has to be lived with.
- iv) There is a risk that with the cessation of GDE Programme, and the transfer of institutional responsibility, the current trajectory will be interrupted, programme management capabilities will be dispersed and key lessons lost.

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ⁱ Matthew Swindells and Will Smart, Blog (Digital) "Progressing the acute Global Digital Exemplar"

<https://www.england.nhs.uk/blog/progressing-the-acute-global-digital-exemplar/> 6 November 2017. Last sampled 1 May 2020

ⁱⁱ The NHS has a history of producing 'how to guides' e.g. from its Modernisation Agency. The NHS Improvement website currently offers 97 'Improvement Guides'. <https://improvement.nhs.uk/resources/> last sampled 13 May 2020.

ⁱⁱⁱ NHS England (2015) *NEW CARE MODELS: Vanguard - developing a blueprint for the future of NHS and care services*

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^{iv} Matthew Swindells and Will Smart, 'We must make IT compelling for clinicians' Blog (Digital) <https://www.england.nhs.uk/blog/we-must-make-it-compelling-for-clinicians/> 31 October 2017 last sampled 1 May 2020

^v Matthew Swindells and Will Smart, 'Future Development in Global Digital Exemplars' Blog (Digital) <https://www.england.nhs.uk/blog/future-development-in-global-digital-exemplars/> 15 November 2017

^{vi} see <https://en.wikipedia.org/wiki/Blueprint> (last sampled 10 June 2020) and PlanGrid, The History of Blueprints posted 12 April 2016 t <https://blog.plangrid.com/2016/04/the-history-of-blueprints/> (sampled 30 March 2020)

^{vii} Health Catalyst and its partners [PWC and Freshwater] were appointed [Dec 2017] to develop a methodology and framework. Jan 2018 four GDE sites were appointed to as pilots to test different aspects :

Cambridge – Bar-Coded Medicine Administration	Luton and Dunstable – A&E setting
Royal Liverpool and Broadgreen – e-Sepsis	Birmingham – Mental Health

Also outlines the process for Blueprint identification, development, quality assurance, adoption and benefits tracking and periodic refresh Global Digital Exemplars: Blueprinting update and next steps, presentation for *e-Health Week* 15-16 May 2018

https://www.ehealthweek.himss-uk.org/sites/ehealthweek/files/sponsors/presentations/GDE_1/paul_chnley_-_blueprinting.pdf

^{viii} *Global Digital Exemplars – Blueprinting: Frequently Asked Questions (FAQs)* (internal GDE document, version 1.0 no date; circulated December 2017)

^{ix} Global Digital Exemplar Blueprints

<https://www.england.nhs.uk/digitaltechnology/connecteddigitalsystems/exemplars/gde-blueprints/> last sampled 1 May 2020

^x *Global Digital Exemplars – Blueprinting: Frequently Asked Questions (FAQs)* (internal GDE document, version 1.0 no date; circulated December 2017)

^{xi} New plans to expand the use of digital technology across the NHS, *GOV.UK*

<https://www.gov.uk/government/news/new-plans-to-expand-the-use-of-digital-technology-across-the-nhs>

Department of Health and Social Care and The Rt Hon Jeremy Hunt MP, posted 7 September 2016

This announcement coincided with the publication (delayed by the EU referendum purdah) of the Wachter Report (National Advisory Group on Health Information Technology in England, 2016). Jeremy Hunt, ‘Professor Wachter’s Review of Information Technology in Healthcare’, House of Commons: Written statement - HCWS134

<https://www.parliament.uk/business/publications/written-questions-answers-statements/written-statement/Commons/2016-09-07/HCWS134/>

^{xii} Agreements with initial GDE sites were in place from December 2016/January 2017> However the start of the first round of sites was delayed awaiting release of funds. Matthew Swindells and Will Smart, Blog (Digital) “Progressing the acute Global Digital Exemplar”

<https://www.england.nhs.uk/blog/progressing-the-acute-global-digital-exemplar/> 6 November 2017. Last sampled 1 May 2020

^{xiii} NHS England, Mental Health Global Digital Exemplars

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^{xiv} Hoeksma, Jon, 18 NHS hospital ‘fast follower’ trusts named *Digital Health* 11 September 2017

<https://www.digitalhealth.net/2017/09/18-nhs-hospital-fast-followers-named/>

^{xv} Global Digital Exemplars: Blueprinting update and next steps, presentation for *e-Health Week* 15-16 May 2018

https://www.ehealthweek.himss-uk.org/sites/ehealthweek/files/sponsors/presentations/GDE_1/paul_chnarley_-_blueprinting.pdf

^{xvi} source: GDE site funding agreements. North Tyne & Wear Mental Health Trust is the latest to complete in August 2022

^{xvii} Site 7 recalled that “They put blueprinting in as a vague concept that you sign up to”. As a result production of Blueprints appeared to sites as “additional bits of work”.

^{xviii} Matthew Swindells and Will Smart, Blog (Digital) “Progressing the acute Global Digital Exemplar”

<https://www.england.nhs.uk/blog/progressing-the-acute-global-digital-exemplar/> 6 November 2017. Last sampled 1 May 2020

^{xix} The NHS Long Term Plan January 2019 p.96 section 5.23. A new wave of Global Digital Exemplars will enable more trusts to use world-class digital technology and information to deliver better care, more efficiently. The continued roll-out of GDE blueprints to more Fast Followers will ensure the NHS achieves maximum value by reducing duplication and sharing systems between organisations where possible based on open standards and interoperability

<https://www.longtermplan.nhs.uk/wp-content/uploads/2019/01/nhs-long-term-plan-june-2019.pdf>

^{xx} The NHS Future collaboration platform was developed in 2016 alongside the earlier Vanguard and information governance programmes. Geraint Lewis NHS England Blog, ‘A network to support the new models of care with information governance’

31 October 2016 <https://www.england.nhs.uk/blog/geraint-lewis-3/> last sampled 4 May 2020

^{xxi} <https://discourse.digitalhealth.net/t/new-blueprinting-platform/13015> posted 4th June 2020

Here we also draw upon feedback from members of the Blueprinting Steering Group.

^{xxii} For example we were told by respondents at Site 17 that they found it difficult to develop a Blueprint when they were not sure who the audience is (which for example affected the level of detail required: additional elements might be needed for Trusts that were not part of GDE). Site 14 made a similar observation - noting that, for example, a CEO and project manager would want different kinds of information – called for different levels of Blueprints, targeted to meet the needs of particular users.

^{xxiii} Site L Head of Clinical Engagement “So we’re downloading their code and things like that. Taking the code that they’ve developed and using it in our Trust.

[Interviewer: And how does that link to the Cerner code? Is that...?]

It’s Cerner code, yes. They’ve done work in Cerner and then we’re sharing it. So there’s a site that Cerner produces, uCern where they, different sites upload code and things and then we can download it and use it for ourselves. So it’s a sharing, a way of sharing information. So we’re not redoing it all the time. So they’ve done all that build and now we’ve been able to just download it down into our site.

^{xxiv} The AHSN Network; GDE Learning Networks - Project Overview May v0.1. Slideset, title GDE Learning Networks project.

Slide 11: There’s learning happening that we can’t capture in our reporting

We can see examples of the ways that events and resources are capturing learning that are hard for us to record. For example, one of the speakers at our May 14 event commented “I appear to have become very popular since Pete and I presented at the British Library last month and have had a number of calls with other Trusts ePMA leads...”. We’ve also started discussions on Futures where someone then responds by saying that they can help share knowledge ‘email me for more and to discuss’. It is great news that additional learning is being sparked and taking place over phone/email, but it’s difficult for us to track and measure.

^{xxv} A member of Blueprinting Steering Group suggested that Blueprints in this way could help create ‘informed consumers’ (informal discussion with authors, 3 July 2020).

^{xxvi} To summarise the body of specific observations illustrating this:

Site 2 “The Trust has reviewed a lot of Blueprints but has not yet adopted any. This is due to them not being appropriate, they are not aligned with timescales, being very system specific. The Trust has a very clear vision which does not require any Blueprints.”

Site 7 “The Trust has reviewed a lot of Blueprints but has not yet adopted any. This is due to them not being appropriate, they are not aligned with timescales, being very system specific. The Trust has a very clear vision which does not require any Blueprints.”

Site 9 The Trust have not used anyone else’s Blueprints as had their own clear action plan and a lot of work had been done by the time blueprinting material was made available

Site 11 The team have reviewed other Blueprints but have not found one that supports their work.

Site 19 “They have not adopted other Blueprints as they were developed and published a bit too late for them.”

^{xxvii} *Global Digital Exemplars – Blueprinting: Frequently Asked Questions (FAQs)* (internal GDE document, version 1.0 no date; circulated December 2017) FAQ 5 The advances in digital technology necessitate that ambitions and plans are constantly reviewed to ensure advances in technology and approach are exploited for patient and staff benefit. Traditional blueprints document a point in time and quickly become outdated. Our proposed approach to blueprinting sees them as live artefacts that develop in line with the advances of digital maturity in the authoring sites. A publication strategy will ensure the NHS has access to timely guidance and expertise.

^{xxviii} <https://www.england.nhs.uk/digitaltechnology/connecteddigitalsystems/exemplars/gde-blueprints/> last sampled 13 July 2020