



Second year report

# Independent Evaluation of the Global Digital Exemplar (GDE) Programme

Submitted to NHSX

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on behalf of GDE Evaluation team

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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 Trusts, followed by a strategy to disseminate these best practice models across the GDE Programme and then, it is hoped, to the wider NHS. This was aimed to be achieved through partnerships between GDE exemplar (hereafter GDE) sites and less digitally mature Fast Follower (FF) sites. It would include production and circulation of Blueprints to capture learning about how excellence had been achieved in specific areas and the 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 strikingly successful in achieving its key strategic goals, namely: 1) promoting the growth of knowledge networks that have helped establish 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 Trusts; and 2) creating the foundations for a learning ecosystem to promote digital transformation across NHS England.

### Prioritising the digital transformation agenda

Our data suggest that the GDE Programme has helped to make progress in prioritising the digital transformation agenda in GDE sites:

- Strategic alignment of dedicated GDE funding, and the associated requirement for internal matched funding, mobilised higher levels of resources than would have otherwise been available in some (especially smaller) Trusts' internal budgets within the timeframe. This made it possible for Trusts to bring forward plans for major investments, including major infrastructural renewals (e.g. implementation of new electronic health record (EHR) systems) that would not otherwise have been possible.
- Governance requirements put in place for the GDE Programme have strengthened existing governance and project management structures, delivered enhanced digital strategies aligned with corporate strategy and provided Board oversight of direction and delivery.
- Being selected for inclusion in the GDE Programme as one of the few Trusts recognised as 'Global Digital Exemplars' was associated with perceived prestige. This was promoted through special networking events with other sites and the highly regarded national profile of the Programme. This prestige facilitated organisational buy-in for digital transformation and increased GDE Trusts' negotiating power with vendors.
- The resources, governance structures and reputational benefits of being a GDE have together accelerated digital transformation.

There were, however, substantial variations among Trusts that seem to have affected the success of transformation. We are exploring these to gain more detailed insights into lessons surrounding local drivers and barriers that may have affected outcomes, and to draw more general lessons about running large digital transformation programmes in healthcare. It is important to keep in mind that GDE and FF sites already had many local facilitators in place before commencing with programme-related activities – clinical leadership, top-level buy-in, and engagement in the digital agenda was key in this respect. Most GDE sites were building on a strong foundation in terms of (relative) digital maturity. Many had benefitted from earlier Trust-led technology investment programmes and had in place elements of strong digital strategy and governance.

## Creating the foundations for a learning ecosystem

Compared to pre-GDE, there is now an increased capacity and willingness to learn at all levels. This includes Trusts and policy-makers, evidenced by the rapid growth of formal and informal knowledge exchange networks, and “kick-started” by the GDE Programme’s investment in a Learning Network and a collaborative on-line platform.

Planned learning activities established under the GDE Programme (through GDE/FF links, the production and distribution of Blueprints and established Learning Networks) and informal knowledge sharing have promoted the rapid growth of knowledge sharing within the GDE Programme and beyond. Although the GDE Programme contracts included commitments and a funding element to participate in knowledge exchange activities (and thereby provided a formal incentive to network), we found that effective knowledge exchange was most immediately motivated by reciprocal benefits accruing to participating organisations and individuals. It was facilitated where the benefits were maximised and where the costs were minimised. Adoption of a common EHR platform and geographical proximity were in most instances beneficial for knowledge sharing, but competition amongst Trusts could inhibit knowledge sharing. Prior relationships between GDE and FF sites was a second order factor - usually facilitating, but sometimes inhibiting knowledge sharing (e.g. when there was reputational and resource competition amongst Trusts). We also observed circumstances in which reputational benefits were inhibited e.g. where Trusts expressed concerns about reputational damage if its partner did not achieve its targets. Key efforts now need to focus on disseminating and building on this learning nationally and establishing mechanisms to promote knowledge flow between GDEs/FFs, Digital Aspirants and the wider NHS. This should build on informal relationships formed through the GDE Programme and “Blueprinting” as a process, where strategic partnerships are formed through various means including many-to-many, one-to-many, and one-to-one networking.

## Lessons for running a major transformation programme in healthcare

The GDE Programme and associated initiatives such as the NHS Digital Academy have led to increased capacity to achieve and manage change (including the development of digital leadership) both within NHS Trusts and in NHS Provider Digitisation Programme management. Our findings suggest that it is now crucial that existing expertise and experience is retained and harnessed by the NHS and not lost to the commercial sector. Changing Programme ownership and direction at national level brings potential for dissipation of effort and the capabilities developed (e.g. dismantling of digital transformation governance structures after the Programme has ended, and/or key staff involved (e.g. clinical project leads) reverting to prior roles rather than ensuring that their experience is reused and refined). Backfilling/secondments of key staff to enable the reuse of expertise can facilitate learning. Loss of organisational memory is a perennial risk where profound changes are pursued through short-term programmes.

The GDE Programme has also accumulated substantial experience in managing a system of coordinated learning at scale. There is a risk that important lessons learnt throughout the Programme are lost to future initiatives. For example, sites were initially asked to focus their plans on local goals, but over time the Programme sought to couple these to national goals (e.g. seen in relation to monitoring of progress where the Cora tool fulfilled national but not local requirements). Achieving a balance between the two is crucial going forward. Local programmes need to be planned and assessed in relation to meeting national objectives to ensure a move towards a national vision of healthcare for England.

Specific recommendations emerging from our work on managing evolving programmes include the following:

- There is a need to balance the evolving GDE vision with the achievement of milestones to demonstrate progress. Central to this is an appreciation that trajectories towards digital excellence may vary across localities and that all approaches have advantages and disadvantages (e.g. “Best-of-Breed” (BoB) approaches versus large integrated packaged applications). There is not one single pathway to “success”.
- Measures to demonstrate progress in meeting implementation timetables and demonstrating that funds have been effectively deployed are not the same as measures to demonstrate “success” in terms of changes in healthcare and patients outcomes. Measures need to align both local and national requirements and be open to various pathways in the digital journey.
- Flows of knowledge can be promoted and channelled to some degree through formal means (e.g. Blueprinting). However, our study flags the importance of bottom-up knowledge exchange, driven by the benefits of sharing, which often follow different paths than planned knowledge transfer. Support should seek to align formal support with organic, bottom-up networking to achieve the mutual strengthening of both.
- Retention of skills and knowledge is crucial going forward, ensuring that local knowledge and experience in digital transformation is re-used and refined through backfilling/secondment of key staff at local level. Local expertise now needs to be effectively harnessed to inform efforts in Digital Aspirant Trusts.
- As the Digital Aspirant Programme takes over from the GDE Programme, GDE status needs to be sustained in order to build on previous successes.
- Programme level learning and experience must also be retained and reused. National leadership needs to ensure that lessons throughout this Programme are effectively disseminated and incorporated into policy-making.
- There is a need for more proactive engagement with suppliers, a need to negotiate better deals on behalf of Trusts, and to facilitate the sharing of knowledge and insights regarding the procurement process to encourage Trusts to shift from a local functionality-based procurement focus to a more strategic one.
- More broadly, there is a need to recognise that the GDE Programme is an important but only small step towards achieving digital transformation in the NHS. It is not sufficient on its own and needs to be seen in the context of the long timeframes needed to realise benefits. In line with this, there is a need for integrated long-term planning. While change may need to be delivered through shorter-term programmes, these need to be linked together and build on each other strategically.

## 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.<sup>1</sup> Policy initiatives throughout the developed world have sought to speed up 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.<sup>2,3</sup>

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 have not been demonstrated yet.<sup>4</sup> Similarly, the envisioned large-scale EHR adoption through centralised procurement of systems in the English National Programme for Information Technology (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 to allow more localised input in decision making.<sup>5</sup> 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.<sup>6</sup> There was further a lack of standards utilisation threatening the interoperability agenda, and a focus on IT deployment projects rather than wider service improvement strategies.<sup>7</sup>

In 2016, the English 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.<sup>8</sup> One of the key recommendations from this was to invest limited existing resources selectively to create a cohort of digital centres of excellence. Consequently, NHS England’s flagship Global Digital Exemplar (GDE) Programme was conceived in 2017 with £395 million national investment designed to support “selected digitally advanced mental health, acute Trusts, specialist Trusts and ambulance Trusts, who through funding and international partnership opportunities will become Exemplars over the next two to three and a half years”.<sup>9</sup> 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 was announced in late 2018.<sup>10</sup> Our team has been commissioned to evaluate this initiative 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

<sup>1</sup> Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. *Health affairs*. 2008 May;27(3):759-69.

<sup>2</sup> Blumenthal D. Launching hitech. *New England Journal of Medicine*. 2010 Feb 4;362(5):382-5.

<sup>3</sup> <https://conversation.digitalhealth.gov.au/framework-for-action>

<sup>4</sup> 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.

<sup>5</sup> 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.

<sup>6</sup> [https://www.kingsfund.org.uk/sites/default/files/field/field\\_publication\\_file/A\\_digital\\_NHS\\_Kings\\_Fund\\_Sep\\_2016.pdf](https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/A_digital_NHS_Kings_Fund_Sep_2016.pdf)

<sup>7</sup> <https://www.digitalhealth.net/2016/02/hunt-announces-4-2-billion-for-nhs-it/>

<sup>8</sup> [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/550866/Wachter\\_Review\\_Accessible.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/550866/Wachter_Review_Accessible.pdf)

<sup>9</sup> <https://www.england.nhs.uk/digitaltechnology/connecteddigitalsystems/exemplars/>

<sup>10</sup> <https://www.digitalhealth.net/2018/08/nhs-england-planning-further-waves-of-global-digital-exemplars/>

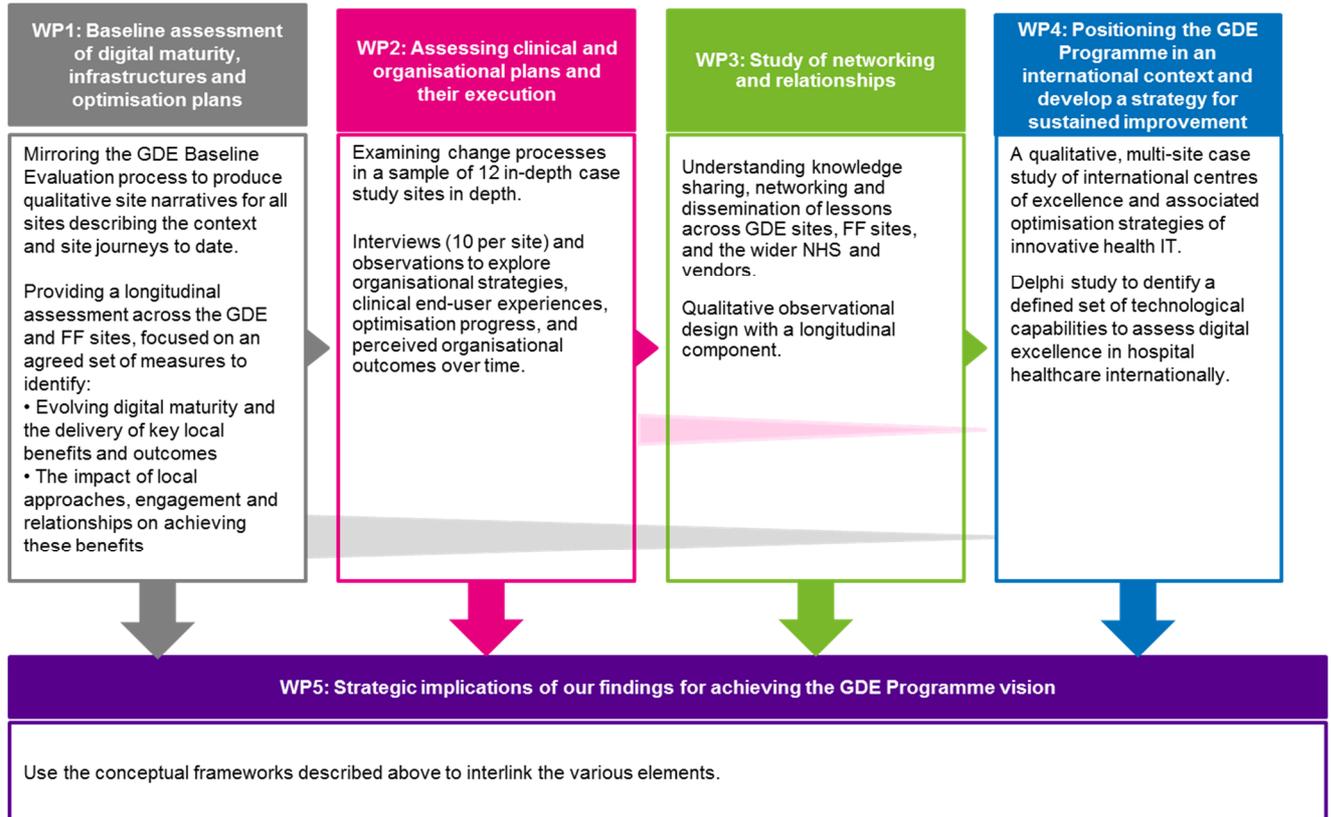
Wachter report. The NHS Digital Academy is a virtual organisation training NHS staff in digital leadership.

In December 2019, health secretary Matt Hancock announced the NHS Digital Aspirant Programme to build on the GDE Programme.<sup>11</sup> 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 Trusts.

## Methodology and progress of data collection

An overview of the methods employed to evaluate the GDE Programme is presented in Figure 1.

**Figure 1: Overview of methods**



Data collection activities to date have included the following:

- We have completed two baseline rounds of visits to all sites, interviewing key stakeholders and observing site meetings and digital deployments.
- Our researchers have conducted 57 visits to in-depth case study sites and conducted 183 interviews in 12 case study sites (see Table 1 for a description of in-depth case study sites and data collected to date).
- We have conducted 44 interviews and collected GDE Funding Agreements in 22 sites for our baseline study (see Table 2 for a description of baseline study sites and data collected to date).
- We have conducted 50 high-level interviews with policy makers.

<sup>11</sup> <https://www.digitalhealth.net/2019/12/matt-hancock-announces-new-programme-to-help-nhs-trusts-go-digital/>

- We have observed 110 meetings, workshops, and conferences both at in-depth case study sites and exploring policy/strategy connections.
- We have conducted a Delphi exercise to establish consensus surrounding a defined set of technological capabilities to assess digital excellence
- We have held three interdisciplinary workshops:
  - GDE Programme Benefits Realisation Workshop: 18<sup>th</sup> June 2018 in London
  - GDE Programme/TechUK Workshop: How can we improve NHS procurement (8<sup>th</sup> May 2019 in London)
  - Research Workshop: International perspectives on emerging health information infrastructures (held 29<sup>th</sup> January 2019 in Edinburgh)

Publications in preparation and published in academic peer-reviewed journals include the following:

- 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 (submitted to the *Journal of Medical Internet Research*).
- Cresswell K, Sheikh A, Krasuska M, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. Theoretical and methodological considerations in evaluating large scale health information technology change programmes (to be submitted to *BMC Health Services Research*). See Appendix 1 for a draft.
- Krasuska M, Cresswell K, Sheikh A, Nguyen H, Franklin BD, Lane W, Mozaffar H, Mason K, Eason S, Hinder S, Potts HW, Williams R. Qualitative national evaluation of the English Global Digital Exemplar Programme - diversity of local contexts, processes and outcomes in hospitals as a result of large scale health information technology change (see Appendix 2, 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 (see Appendix 2, to be submitted to the *Journal of the Lancet Digital Health*).
- 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 (see Appendix 2, to be submitted to *Social Studies of Science*).

We also have given several presentations to external audiences:

- Feedback of formative findings to the GDE Network – 20<sup>th</sup> May 2019, online
- Feedback of formative findings to the GDE Network event – 20<sup>th</sup> November 2019, London
- Where next for Trusts on Best-of-Breed: build your own and interoperability – 23<sup>rd</sup> October 2019, Southampton

- GDE Evaluation presentation for Health Tech Newspaper Digital Week – 21<sup>st</sup> January 2020, online
- 4Words 2020 - Le parole dell'innovazione in sanità – 29<sup>th</sup> January 2020, Rome

The following presentation to external audiences is planned:

- Digital Health Rewired – 4<sup>th</sup> March 2020, London

We have also continued working with the NHS Digital Academy and asked Cohort 2 for their priority actions to create a learning economy in the NHS. The results are presented in Appendix 3.

During our work, we have periodically reported emerging findings to the Steering Group and these have been incorporated in policy making, where relevant. Examples include the focus on “Digital Aspirants” in the GDE extension, and the Blueprinting evaluation conducted by Atos.

**Table 1: Description of in-depth case study sites and data collected to date**

GDE/FF	Vendor/procurement configuration	Duration	Site characteristics	Core GDE activities	Data collected to date
<p>Eight GDEs (six acute, two mental health)</p> <p>Four FFs (three acute, one specialist)</p>	<p>Different systems: three have Cerner, one has Epic, one has Allscripts, one has Meditech, one has System C, one has RiO, one has TrakCare, one has BoB, one has Advance, one has Open Source IMS Maxims</p>	<p>Four have a 2-year duration</p> <p>Six have a 3.5-year duration</p> <p>Two have unknown duration</p>	<p>Various levels of digital maturity, various geographical locations, various levels of existing local relationships, implementation strategies varied from 'Big Bang' to incremental</p>	<p>GDE provided an opportunity to achieve already present digital agenda; EHR implementation/optimisation was a frequent core GDE activity, some sites have badged multiple projects as GDE, in many instances part of a bigger integrated care agenda which is around interoperability</p>	<p>31 meetings observed</p> <p>Ten group interviews</p> <p>173 one-to-one interviews</p>

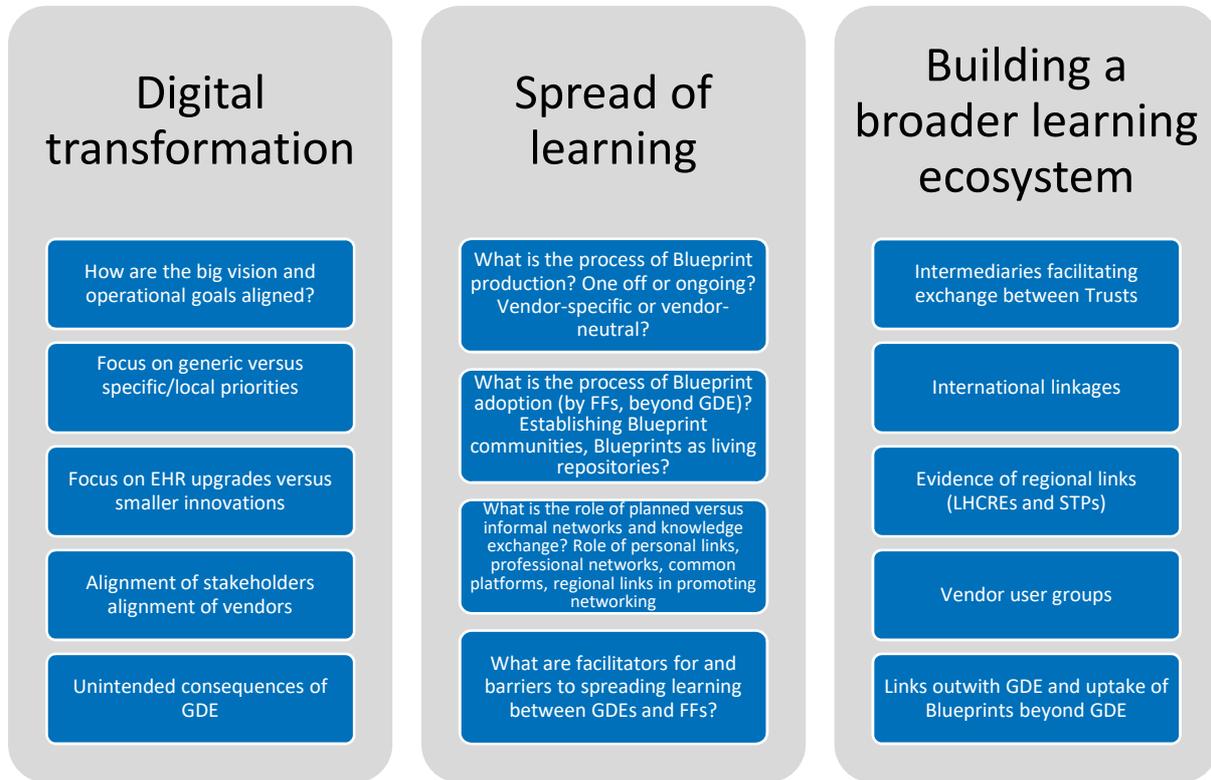
**Table 2: Description of baseline case study sites and data collected to date**

GDE/ FF	Benefits	Key Learning	Relationships	Data collected to date
10 acute	Increased pace, able to progress aspirational developments as well as core requirements	Digital seen as enabler to transforming care not an IT project  Senior leadership/ownership crucial	Increased collaboration across health economy and with other GDEs/international partners to aid development	44 interviews  Collation and review of GDE Funding Agreements and Dashboards
Five mental health	Increased pace and brought focus and change of culture	Clinical leadership crucial	Strong Mental Health Network	
Seven FFs	Increased pace and value of GDE badge	Training implemented in clinical settings	More proactive collaboration with other GDEs and involvement with wider supplier/CCIO networks	

## Conceptual framework

Figure 2 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 2: Key lines of enquiry**



## Findings

### Digital transformation in sites

We have accumulated evidence mainly surrounding digital transformation in sites, which we presented to the Steering Group in November 2019. Further study has confirmed this previous evidence (see Table 3).

**Table 3: Key findings to date**

Key emerging theme	Explanation of theme
Value of GDE in promoting digital transformation	<p>GDE support has accelerated the pace and ambition of digital transformation.</p> <p>GDE resources and reputational benefits combine to deliver transformational impact. This is reflected in the success of GDE in:</p> <ul style="list-style-type: none"> <li>• Securing clinical buy-in</li> <li>• Elevating the strategic importance of digital transformation (governance/strategy and organisation-wide culture/awareness)</li> <li>• Securing further digital investment locally (as a driver for success as well as an outcome)</li> </ul>

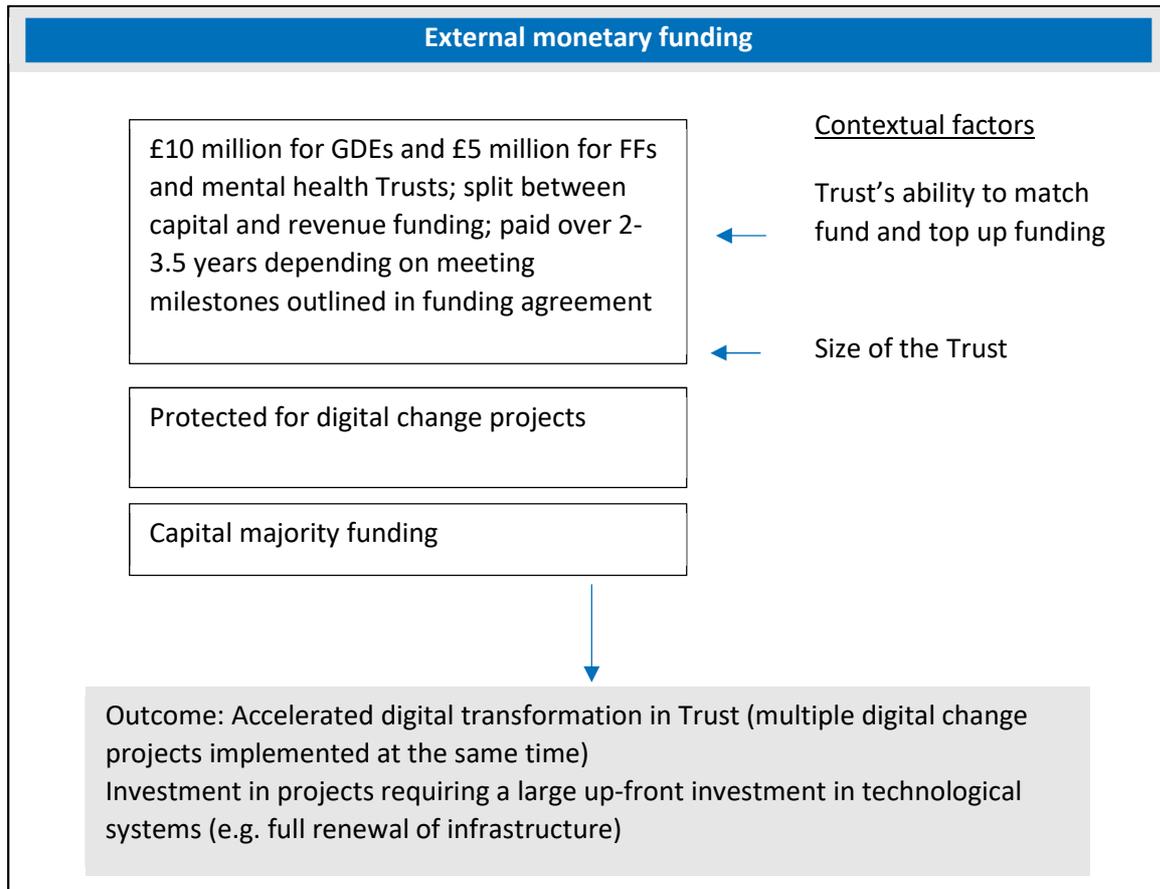
	<p>Success factors</p> <ul style="list-style-type: none"> <li>• Funding seen as valuable, especially to smaller sites</li> <li>• Match-funding requirement, necessitated Trust buy-in</li> <li>• Prior history/capability was important precursor for ‘success’ locally e.g. recent prior technology investments, leadership, strategy, governance arrangements</li> </ul>
<p>Benefits of GDE for Trusts</p>	<ul style="list-style-type: none"> <li>• Raising the priority of digital transformation and leadership</li> <li>• Improving scope and rigour in strategy</li> <li>• Promoting wider learning and sharing</li> <li>• Giving sites greater leverage over suppliers</li> <li>• Development and retention of technical staff</li> <li>• Development and retention of clinical digital leaders/transformation capacity</li> <li>• Some sites integrated GDE work into an overarching digital transformation agenda and see this as a long-term priority</li> </ul>
<p>Blueprinting</p>	<ul style="list-style-type: none"> <li>• Blueprinting and knowledge networking are highly successful in some contexts – but there are opportunities to learn from variations</li> <li>• Production of Blueprints seen by some as a one-off task to fulfil funding agreements</li> <li>• Blueprints introduced as an activity late in the GDE Programme</li> <li>• Others recognised value of ongoing ‘Blueprinting’: learning about the process</li> <li>• Being involved in the Blueprinting process is perceived to have led to increased reflection and better documentation of the journey in sites</li> <li>• Learning from setbacks as well as successes is viewed as important</li> <li>• Blueprints acting as signposts to relevant expertise –they may stimulate the creation of informal communities of practice</li> </ul>
<p>Challenges in running a large digital transformation programme</p>	<ul style="list-style-type: none"> <li>• Funds available are relatively modest in comparison to cost of digital transformation (especially in large Trusts)</li> <li>• Renewing digital infrastructure takes many years – this is in tension with political priority to demonstrate return on investment within a short Programme duration</li> <li>• Ongoing issues with benefits realisation: Trusts struggled to capture local achievements within standardised reporting system</li> <li>• How to plan digital transformation in the face of changing understandings/expectations?</li> <li>• There is no end-point or consensus about digital transformation of health systems</li> <li>• Visions evolve over time – e.g. increasing focus today on integrating secondary, primary and social care</li> </ul>

To date, our work has focused primarily on exploring the evidence around the transformational impact of the GDE Programme in individual sites. We here consolidate this evidence to make inferences of how the GDE Programme has integrated with local contexts to achieve transformational change. We then move to exploring the spread of learning through GDE/FF relationships, followed by an analysis of procurement. Further findings around the creation of a learning economy will be subject of our final summative report.

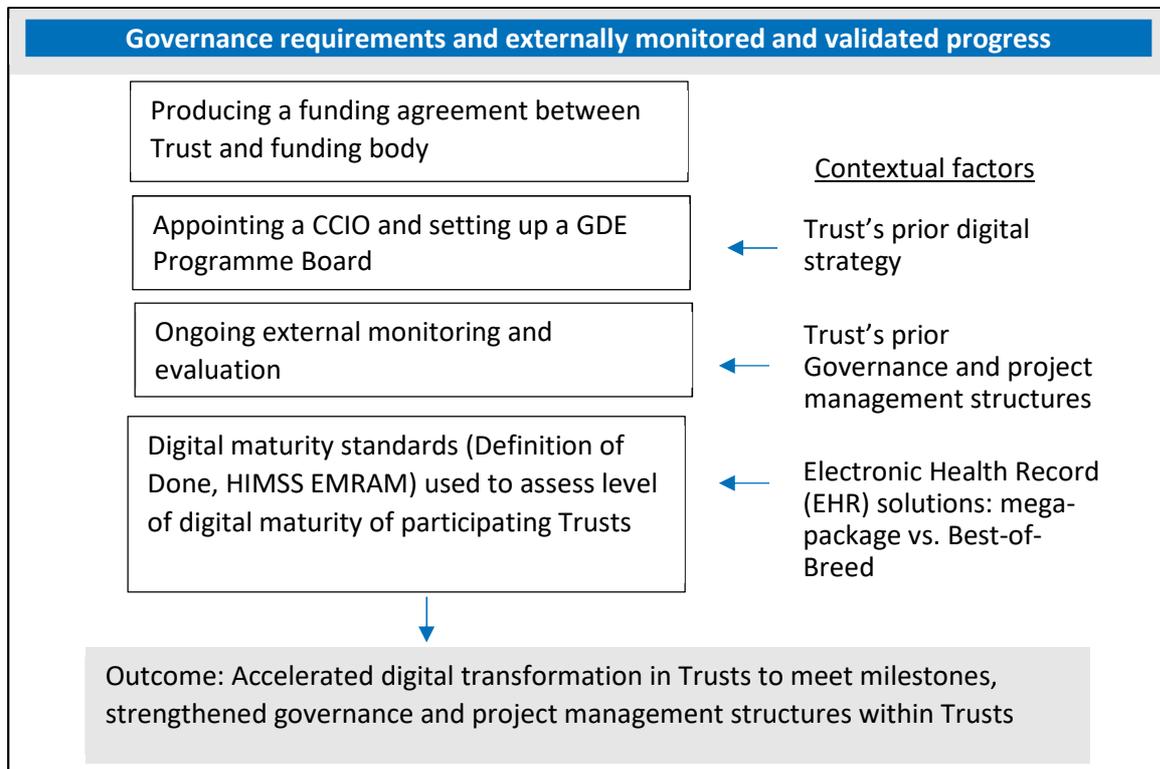
### Diversity of local contexts, processes and outcomes in Trusts

The GDE Programme was an accelerator for digital transformation in participating Trusts. We here explore how mechanisms/processes put in place by the GDE Programme and ways in which Trusts engaged with these, have, combined with contextual characteristics (including those of participating Trusts and vendor contexts), led to specific outcomes associated with digital transformation locally (see Figures 3-5). We explore key resources offered by the GDE Programme and manner in which these were taken up by the Trusts in the following paragraphs. Reasons for variations at a local level included: size of the Trust, its history of IT deployments, relationships with vendors, existing governance structures, clinical engagement and leadership buy-in.

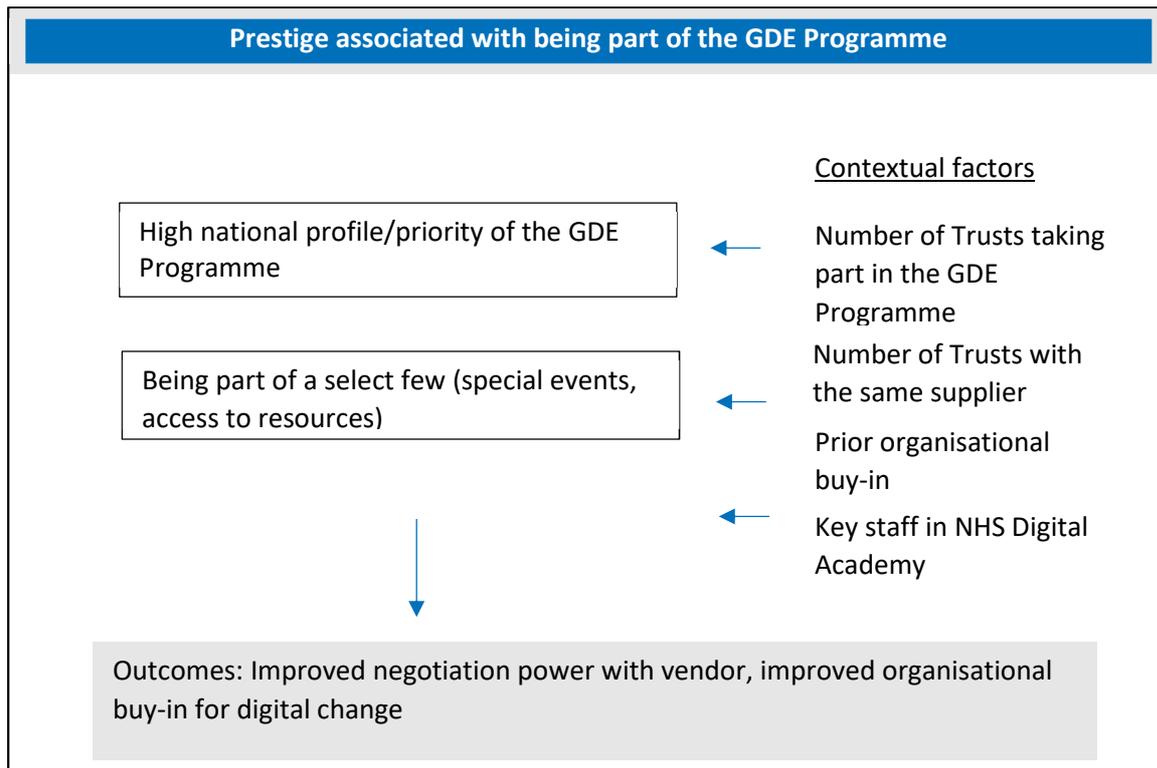
**Figure 3: Illustration of processes and outcomes associated with external monetary funding**



**Figure 4: Illustration of processes and outcomes associated with governance requirements**



**Figure 5: Illustration of processes and outcomes associated with prestige**



**External monetary funding to stimulate projects requiring large up-front investment**

We observed that dedicated monetary GDE funding helped to finance projects for which there would not have otherwise been money available in the Trust’s internal budgets. These included large infra-structural renewals (e.g. implementation of new EHR systems) that would otherwise not have been possible.).

*“I think if we weren’t a GDE, we just could have carried on not spending much money on it, carrying on doing everything on paper and not really changing anything. So it has focused...just by the injection of money rather than anything else, the money has enabled us to buy products which when you start delivering them, you then can’t really stop, so although the £10m isn’t enough, it’s now made it an issue that we benefit from this if we did a bit more and we spent a bit more.”*

(Manager, Site I)

*“But one before [GDE] you had to fight for every penny you got internally, with everything else was important. And it was very difficult to get the level of investment you needed to make real progress. So, the external investment is very valuable indeed.”*

(Manager, Site L)

The external ‘ringed-fenced’ money for the digital change projects allowed for accelerated digital transformation in Trusts.

*“It enabled us to do things, because of the money, it enabled us to do things, that we would have done anyway, at twice the speed, so we would have got there, eventually, but there is*

*something about scale and there is something about speed, which brings a value that is greater than achieving it in twice the time, if that makes sense, that's not very clear."*

(Manager, Site L)

*"We've had [through taking part in the GDE Programme] what I would call an adrenalin shot really in what was already on our road map, but has come out a lot quicker. (...) It's kick-started a lot of activity that we probably wouldn't have been able to do if we were just scratching around for this and that in over five years. It's probably doing in three years what we would have done in six or seven."*

(Manager, Site I)

*"I guess we'd taken the digitisation journey that we wanted, particularly from a clinical perspective, we divided it into about 10 elements and we'd started to work through that, then the opportunity came through GDE and that gave us the chance I think to accelerate that journey so rather than it kind of being necessarily being done sequentially, things could move forward in parallel because we had have the resource and the capacity and hopefully to deliver it."*

(Manager, Site D)

Although GDE funding provided a dedicated amount of money (a fixed sum of money, £10 million for GDE's and £5 million for FFs) to be spent on digital change projects, the relative salience of the external monetary funding depended on the size of the Trust. The same amount of money offered through the GDE Programme to Trusts constituted a relatively smaller external contribution for large Trusts with large budgets and running costs than for smaller Trusts. Moreover, the cost of EHR investment often also depended upon the size of the Trust (as many EHR vendors charge per number of beds) making the required investment higher for larger Trusts.

External investment was also dependent on the Trust's ability to provide match and top-up funding provided (which was greater in larger Trusts).

*"In terms of the value of the whole GDE Programme, we are a billion pound organisation, we are getting ten million pounds and we have to match it, and there are quite huge objectives surrounding that. (...) The sums of money that we're receiving are useful, but in the great scheme of things, it's not that much."*

(Information Management & Technology, Site C)

*"So, on a per year basis that was three million, but that represents well under 10 per cent of our IT spend here annually. So, we spend about 38 to 42 million a year. So, three million for us was very welcome. That wasn't going to get us EPR. We've already paid for that."*

(Manager, Site A)

The national focus on capital (as opposed to revenue) funding pushed sites to think in terms of investing in technology systems and infrastructures. Interviewees argued that this meant that investing in longer-term services to maintain, service, support, upgrade, and optimise systems was somewhat neglected.

*“I think the other thing is...and I don’t know how we get around it is just the funding cycles because it’s a three-year programme but we have to pin it down to specific delivery milestones and because it’s capital funded, they have to be within each financial year.”*

(Manager, Site D)

*“It doesn’t touch the level of ongoing investment that’s needed, and it doesn’t touch the level of ongoing investment that is needed in the estate, or medical equipment, or in other things that are absolutely critical to the Trust. And, you are always in a position of judging, is it more important to spend the capital that you have on replacing very old medical equipment, replacing windows that are leaking and breaking, replacing 20, 30, 40 year old [power] generating equipment, coolers and stuff like that, or on I.T. And, the NHS is capital poor, it gets lumps of capital occasionally...but sometimes that’s not that helpful, you actually probably need more revenue and you need more, I mean, you need multi-year investment and, I suppose, the GDE’s things has helped its helped focus its helped give prestige and pride in doing things, and its helped motivate people to get things done.”*

(Information Management & Technology, Site C)

### Governance requirements and externally monitored and validated progress

Our work shows that governance requirements put in place by the GDE Programme have led to strengthened existing governance and project management structures and impacted on the acceleration of digital transformation in the Trusts.

There were several governance requirements that Trusts taking part in the GDE Programme had to follow. This included a funding agreement between a Trust and the central funding body, detailing the Trust’s digital strategy and GDE Programme change project with agreed timescales and milestones. Further, participating Trusts were expected to appoint a Chief Clinical Information Officer (if they did not already have this position established) and to set up a GDE Programme Board that would oversee local Programme-related activities. The central funding body also monitored Trusts throughout the duration of the Programme to evaluate their progress.

Our work shows that those who already had a digital strategy in place, felt that this was accelerated and reinforced by the GDE Programme.

*“So the strategy is the same as it was before but it’s just been turbo boosted by GDE”*

(Manager, Site I)

*“So I think it’s a good thing. I think for us, in this organisation, we already were in the process of having digital transformation and there were already lots of plans. And I think, sort of, winning or being awarded the GDE and then becoming part of the GDE Programme was, kind of, the push that the organisation needed to get on and so some of those things. It was, kind of, it gave a bigger incentive to drive some of that work and I think there are some perhaps because of the GDE that means that some of those plans have changed slightly to fit in with what fits with the GDE overview and Programme. But generally most of those things were already...we already had a programme of digital transformation here.”*

(Manager, Site I)

For others, the GDE Programme facilitated the development of a digital strategy, and the appointment of key staff promoting digital change projects locally (e.g. Chief Clinical Information Officers, Business Change Managers, Chief Nurse Information Officers).

*“Yeah, we’ve definitely done more and we’ve been able to employ [digital nurses] which we didn’t have before, we’ve got Chief Clinical Information Officers now which we wouldn’t have had without GDE because I’m pretty sure that we were only really employed because of GDE coming along, sounds a bit cynical, but that’s how it was.”*

(Manager, Site I)

*“A lot of the work that we were going to do as part of GDE was already probably on the horizon within the Trust anyway. Now GDE is an enabler, acted as an enabler because it’s funded us and it’s allowed us to move things to the top of the agenda. We’ve got a banner we can wrap stuff up in, it’s in a sense there’s branding so we’ve been able to bring in other staff such as Business Change Managers, and other Project Managers who’ve got a lot of experience in pushing the agenda forward and publicising it within the staff group.”*

(Project Manager, Site A)

More broadly, the requirement to establish a GDE Programme Board was seen to facilitate establishing local governance and project management structures. This was especially important for Trusts where these structures were not present before the GDE Programme:

*“I think the GDE Programme definitely, from my point of view, has given us the opportunity to ask what people would like and to think about what people would like, as well as think about the way healthcare is going and the strategic objectives. But we’ve been able to pull people in and work with them on moving things forward and making things like [digital change project] work so that it actually does what they need.*

*Interviewer: And how has GDE given you that opportunity to do it?*

*I think it’s probably because we’ve been given a dedicated team to do that. So we’ve got a dedicated team of people who are all working towards that. We’ve got some funding behind us so we know that we’ve got some money to spend on developing systems and working with people. All of that has brought the right developers and that in-house, so we’ve just gone from strength to strength. So we started off with some very basic ideas, but then ‘cause we’ve got those developers on board, they’re able to then push us onto more and more, I think.”*

(Project Manager, Site F)

The requirement for a funding agreement, detailing the programme of digital change projects to be undertaken, as part of the GDE Programme with a list of milestones to be met combined with national requirements for progress reporting required Trusts to demonstrate progress to receive tranches of funding linked with achievement of specific milestones.

Measures of digital maturity (e.g. Definition of Done, HIMSS EMRAM) were used within the GDE Programme as a tool to assess the level of digital maturity of participating Trusts. As part of this, a self-reported threshold digital maturity was required to be eligible for the GDE funding and GDE Trusts were expected to obtain HIMSS Level 7 and FF Trusts were expected to achieve HIMSS Level 5 by the end of the Programme.

A Trust's ability to meet the HIMSS requirements was shaped by their choice of EHR product. While the most advanced mega-package solutions were seen as offering a well-established route to achieving the comprehensive functionality required to achieve HIMSS Level 7, other EHR products did not. One example of a specific capability that can be achieved through mega-packages products offered by certain vendors but not others is closed-loop medication:

*"Closed loop is something that our current product doesn't yet have a functionality"*  
(Manager, Site I)

As a result, some sites were forced to work with their vendor to achieve this functionality as an integrated solution or by combining it with other offerings from other vendors.

### Prestige associated with being part of the GDE Programme

Being selected as one of the few Trusts recognised as 'Global Digital Exemplars' was associated with perceived prestige amongst Trusts. This was promoted through special networking events with other sites and the highly regarded national profile of the Programme. This prestige increased Trusts' negotiating power with vendors and facilitated organisational buy-in for digital transformation.

*I think if you speak to our finance director (...) he would say it's the supplier relationship that's the most valuable part of the GDE. (...) If he'd have got the money himself, if he'd have raised the money in any other way. But in reality, being part of the GDE process, he thinks, gives him much more leverage with [Vendor] to actually deliver what they've promised. 'Cause quite frankly, if they don't deliver it with us, then they won't be able to sell to other organisations, 'cause we will be their site, where everyone will come and see all their solutions together. So, it's like a joint suicide pact. If we don't make it work, and if they don't make it work, then we'll be looking for another supplier, and they'll be out of business.*  
(Manager, Site I)

However, the ability to negotiate with vendors was dependent on the vendor's capacity to deliver. This in turn was impacted by the size and skills of the vendor's development team and the extent to which the Trust was competing over vendor resources with other customers including other Trusts taking part in the GDE Programme.

*"I think there's been a lot of demand for their resource and because we're all trying to do pretty much the thing at the same time or the biggest set of the most digitally rich organisation in the country are all trying to achieve the same thing at the same time, a huge chunk of them, as you say, are with [vendor], that has caused problems. They are spreading their resource too thinly and we have to battle that on a regular basis."*  
(Manager, Site G)

The prestige derived from being selected as a 'Global Digital Exemplar' was also instrumental in securing organisational buy-in:

*I think having GDE enables me to get the medical director to chair that (...), so I was able to take them to our GDE to meet with the medical director over there. So, it instantly raises the profile (...), but I think using the GDE as a mechanism to say this is really important and it's got*

*to be clinically led, will you be our Senior Responsible Officer for digital. I think that's helped me do that."*

(Information Management & Technology, Site B)

*"It [the GDE Programme] has raised the profile of digital within the [Trust] leadership, by leaps and bounds. So, anything that is digitally focused is much more likely to get to port now."*

(Pharmacist, Site C)

For example, some leaders responsible for digital transformation in Trusts were offered a possibility to take part in the NHS Digital Academy. This was perceived to result in improved digital skills:

*"And probably a lot to do with Digital Academy's mindset of how data works, how systems can interoperate. So, now I've got a view that, well this is all technically capable, why aren't these suppliers working to this technical capability, yes, and what can we do to drive them to get us there? Rather than going, oh that's what's on offer from that supplier, shall we buy it or not? Because that used to be the approach..."*

(Manager, Site E)

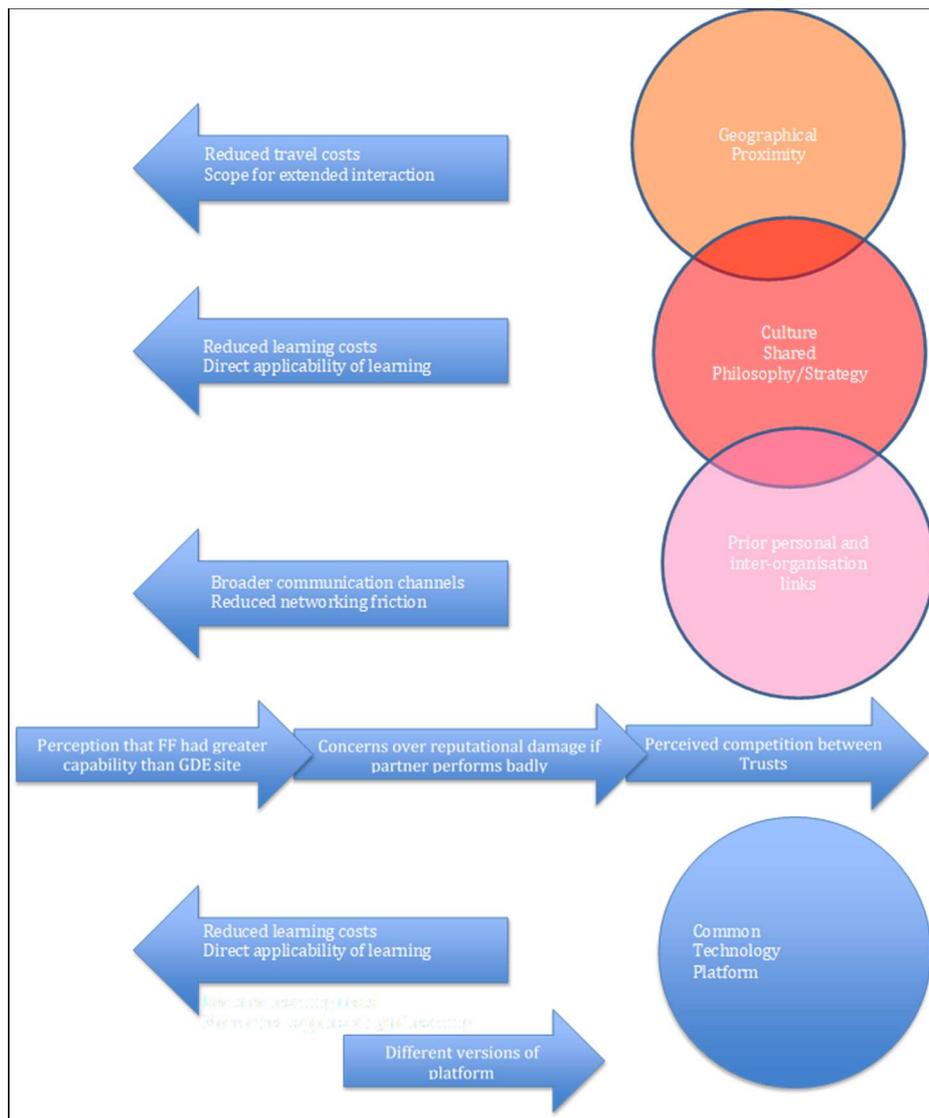
## Conclusions

We found that the GDE Programme accelerated the speed of digital change within participating Trusts. This acceleration was triggered by: (i) dedicated funding and the associated requirements for match funding which in turn helped to prioritise the digital transformation agenda local-ly, (ii) governance and reporting requirements put in place by the Programme that helped to strengthen existing governance and project management structures, and (iii) reputational benefits associated with being recognised as a GDE which helped negotiating power with vendors and facilitated organisational buy-in for digital transformation. We also observed some local variation within these themes that impacted on how resources offered through the GDE Programme were utilised to produce outcomes. These related to the size of the Trust, its history of IT deployments and prior governance structures and organisational buy-in and vendor contexts.

## Knowledge sharing through the concept of Fast Follower

The Wachter Review noted that the uncoordinated adoption of digital technologies by individual Trusts (in the aftermath of the failure of centralised technology procurement through the National Programme for Information Technology) was costly and failed to achieve opportunities for shared learning. The GDE Programme accordingly sought to improve the pace and reduce the costs of digital transformation. We here explore this concerted national attempt to create a learning economy through the establishment of GDE/FF relationships, by examining the factors affecting the learning and knowledge transfer between GDE sites and FFs. Figure 6 provides a graphical overview of our findings.

**Figure 6: Dynamics of knowledge sharing between GDEs and FFs**



**The dynamics of knowledge sharing**

The GDE Programme sought to establish knowledge exchange by supporting the establishment of various channels: linking GDE sites and FFs, producing and distributing Blueprints, and launching selected Learning Networks. These initiatives have been associated with a dramatic increase in knowledge networking and exchange within and beyond the GDE Programme. Informal knowledge exchange processes – perhaps facilitated by GDE resources and structures – have been driven by the (learning and reputational) benefits accruing to participants.

We found that most Trusts believed the GDE and FF relationship enhanced learning and accelerated adoption of technologies. However, this learning and sharing was not just about technology - it included governance, care pathways and advice on clinical engagement, and training.

*“Certainly, in our experiences with (FF) is they would say they have learned a lot in terms of the way we use clinical support, the way we do testing...so they learned a lot from our groups”*  
 (Manager, Site D)

Although sharing between GDEs and FFs was envisaged as taking place through the production and use of Blueprints, there was little evidence that Blueprints were a significant channel for knowledge exchange. Direct contact perhaps proved to be a more effective vehicle for sharing and support than a formal Blueprint document. In addition, the production, validation and dissemination of Blueprints took place relatively late in many GDE contracts.

*“I haven’t seen a Blueprint from (GDE) for example, (GDE) don’t have a Blueprint for EDRMS [Electronic Document and Records Management System] yet, as far as I’m aware, I haven’t seen one, although we are creating one ourselves.” (Project Lead, Site M)*

Examination of variation between cases allowed us to unpick the factors affecting the learning and knowledge transfer between GDE sites and FFs in more detail.

Planned learning initiatives put in place through GDE-FF relationships, the production of Blueprints and the establishment of Learning Networks had uneven impacts. They were most successful where they aligned with the formation of informal knowledge networks. This informal networking was driven by the mutual benefits for individuals and organisations involved. For GDEs this included for example, being seen to be providers of knowledge possessing valuable expertise and experience. Some sites also highlighted concerns about risks to reputation. For example, some GDEs worried that the FF’s non-compliance or lack of success would reflect badly on their reputation and influence their ability to obtain GDE status at the end of the Programme.

*“I think people are wondering about reputational damage. So, if the Trust that you were partnered with would never, ever, get to a position where you were, is that a failure of the mentoring Trust or is it a failure with the Trust trying to catch up?” (IT Manager, Site A)*

Formal channels of learning had provided a context in which bottom-up learning driven by mutual benefits of two-way knowledge exchange could flourish. In some cases, FFs succeeded in building upon their GDE’s experience and make further advances that could then be fed back to the GDE.

*“I have regular dialogue with my counterpart from (the FF), but I tend not to...I mean, we, as an organisation, have been quite heavily involved in their build, obviously, and we’ve been helping to provide our learning; and actually, they have provided some learning back to us, as well, and we have learnt from them.” (Manager, Site C)*

*“They’re also taking some of the things that we didn’t do or were on our filter and didn’t make it through; electronic outcomes in clinic – the idea that we can potentially Fast Follow some of them and make it a cyclical thing as opposed to a one way.” (Manager, Site H)*

However, this two-way partnership, conceptualised as a Leader-Follower relationship could also inhibit sharing. Many Trusts felt that, the label ‘Fast Follower’ did not reflect the true nature of the partnership they had established.

*“I don’t call this Fast Follower. I like the word Partner, which I’ve also raised with NHS Digital because I think that some of the work that we’re doing we’re leading rather than following our GDE ....So, we’ve been quite at the forefront of working with (GDE) not because we’re a Fast Follower just because we are one of the seven trusts currently involved in that (interoperability).” (Information Management & Technology, Site B)*

In one site, with a history of prior collaboration and a shared platform, the formalisation of the relationship through the GDE-FF policy as one of leader and follower was felt to have strained relationships.

*“There have been elements and we have had meetings with them where we’ve tried to talk about joint developments and we just concluded that actually we want different things out of it. I think formalising it through the Fast Follower programme in some ways made it slightly more difficult because we’re having pressure and continue to have pressure from NHS Digital to make sure (FF) delivers what they need to deliver. But actually, we’ve got very little say or clout over what they actually do. They’re their own independent organisation.” (Manager, Site D)*

### Enablers and barriers to organic knowledge transfer between GDEs and FFs

Knowledge transfer, and in particular the explosion of informal networking, was driven most immediately by the benefits participants derived from exchanging knowledge and experience with their peers. By examining variation in the experience and effectiveness of knowledge exchange between sites we are able to identify various factors at play. The uneven contours of informal networking point to enabling factors that enhanced the benefit and reduced the learning and coordination costs and barriers that reduced the benefits and increased the costs.

#### Shared technological platform

Where the GDE and FF shared core technology platforms (e.g. EHRs and Hospital Electronic Prescribing and Medicines Administration Systems, HEPMA) this enhanced the learning by reducing the costs of learning about the other site’s systems and increasing the benefit of the knowledge shared. This calls into question the assumption that Blueprints should be vendor-neutral.

*“So we are Fast Followers to (site). Specifically, truly the real fast following with (site) is about ePrescribing. So the whole HEPMA project. We have worked extremely closely with them. We have more or less cut and pasted all their workflows, all their pharmacy workflows, all their drug administration workflows... we’ve actually paid for time of their lead project pharmacist. They have attended all our design workshops with in the early days...without that involvement the project would have taken longer...I think the result is safer and more robust than it would have been if we had done it without their help.” (Manager, Site L)*

*“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...” (Manager, Site B)*

However, we also encountered cases where GDE and FF sites adopted the same EHR system, and where knowledge was not effectively shared because the two Trusts had very different approaches to implement the same system and they both thought that they “knew better”.

#### Geography

Many of the GDE/FF Trusts were in close proximity and within the same local Integrated Care System. The proximity was useful in terms of ease of travel. It also facilitated more intense forms of collaboration. One GDE/FF partnership decided to create a joint procurement team as a result of their successful collaboration. In another Trust, the proximity of the GDE site meant a clinician could test their system.

*“And then luckily for us we have one of the clinicians working on our site on Tuesdays and Thursdays....So I’ve given her access to our system, our test systems for her to just go in and test and then see where we need to improve upon, because they’ve used it for quite some time.... So it’s like lessons learnt. So she’s been really, really helpful.” (Programme Manager, Site M)*

Proximity also was associated with other enabling factors including greater likelihood of prior linkages between the people involved, and a mutual focus on local developments including interoperability.

In some regional areas, competition between organisations or poor personal relationships were seen to have inhibited optimal learning and sharing.

*“But the downside is because (site) have done it, they want to do something different so there’s a real challenge. This is culture, this is not technology, this is culture.”* (Manager, Site J)

### Peer-to-peer prior relationships

Proximity also related to the greater likelihood of peer-to-peer relationships between site staff and organisations within in the region. Some interpersonal relationships of key staff emerged from previous experience of working together or from staff movements between sites. In the case of the Site M, the project manager for implementation of the Clinical Data Repository (CDR) had previously worked on the same project for the GDE, and at Site F the CIO already knew staff at the FF site some distance away. Some relationships were based on pre-GDE collaborations. One respondent observed that these kinds of links could encourage greater openness to external ideas.

*“I think with the blue prints, no matter how good they are you’ve still got a locked door of people who will want to come up with it themselves and you have to change that mind set there. And I think you do that by getting people moving around.”* (Manager, Site H)

### Conclusions

The GDE/FF pairings contributed to growth in knowledge sharing across the NHS, facilitated by a number of other simultaneous initiatives including the development of Learning Networks, the Digital Academy and the increasing salience of supplier-user and regional groups.

There is clear evidence the GDE/FF policy has enhanced the idea of learning and sharing within the wider NHS, with peer-to-peer relationships as a key factor of success. Costs, in terms of time and resources were not a barrier when the benefits were considered to be high. But may need to be offset where exemplars are expected to make asymmetrical contributions to larger numbers of Trusts, going beyond what may be supported by reciprocal benefits.

### Procurement in the electronic health record market in the UK

The following sections will explore the current state of the UK EHR market through the lens of the GDE Programme. In doing so, we will discuss existing system architectures, power imbalances between vendors and users, and a gradual shift in the focus of concern from local functionalities to interoperability.

### Blurred lines between Best-of-Breed and mega-system strategies

Discussions of how to procure EHR systems are at the core of efforts to develop integrated Trust information infrastructures. In GDE Trusts, we initially identified two contrasting supply-strategies:

1. “Mega-systems” marketed by major vendors, such as Cerner or Epic, which aim at covering all EHR and associated functionalities required by a healthcare organisation in an integrated system; and
2. “Best-of-Breed” (BoB) systems, where a wide variety of functionally specific modules (usually coming from several different vendors) are integrated and stitched together to create an impression of an integrated system.

However, on closer examination, this dichotomy proves to be overly simplistic. For example, since even the most advanced mega-systems could not cover all required functionalities, all Trust information infrastructures examined under the GDE Evaluation programme were in fact multi-vendor configurations:

*“The reality of the situation sometimes is, even big vendors like [vendor] will say, document management needs to sit off on one side, simply because that’s not what we do, not our specialty. [...] So, there are cut off points where you say, well actually, we’d be too generalist to do some of that work. And I think you’ll find that that exists. Whether that’s really true Best-of-Breed, versus Single Source System.”*

(Manager, Site F)

In other cases, a BoB strategy had emerged because EHR vendors could not meet all functionality required by Trusts seeking to meet the ambitious goals of the GDE Programme. Some of these vendors worked to expand their offerings to meet these requirements, and in this way, become mega-system vendors:

*“I think a fundamental problem in the UK market, and this is not unique to systems here, fundamental problem is a lot of suppliers have started with a PAS [patient administration system] and tried to turn a PAS into an EPR [electronic patient record system]. And you can have a brilliant PAS but it’s not necessarily going to translate into a brilliant EPR.”*

(Manager, Site I)

Overall, there did not appear to be one preferable approach for GDE Trusts. The BoB approach was praised for its flexibility to cater for specific needs of individual Trusts, low up-front costs, and its support for small suppliers. However, it was also strongly criticised for interoperability and integration issues, and potentially higher maintenance costs (particularly over the longer-term), and making it more difficult for Trusts to achieve HIMSS EMRAM requirements.

In contrast, the mega-system approach was reported to offer better integration and better support for Trusts to achieve a higher HIMSS EMRAM level and in effect outsourced the maintenance of interoperability between components to the vendor. However, mega-systems were criticised for their high up-front costs and their rigid structure, the potential of vendor lock-in, and the difficulties interfacing with other external systems.

The following two quotes illustrate some typical reasons behind Trusts’ decisions to choose either the BoB or mega-system approach. Trusts, while arguing for their decisions, also acknowledged the trade-offs in choosing one approach over the other.

*“So, we’ve combined all the other functionality within [Mega-system], rather than having Best-of-Breed. Now the advantages you get in terms of usability and flexibility within the systems is often negated by the fact you’ve got poor interoperability between all the other systems [...] So I think with [Mega-system] we’ve got the advantage that all of that is integrated within pharmacy and with the oncology module, but we lack a lot of flexibility and we lack a lot of clinical flexibility and one of the problems that we’ve got is it’s a very structured and protocol driven system.”*

(Manager, Site B)

*“Do we want one single monolithic thing? No, and we have a view that there is no one system that’s going to speak to everybody’s needs all the time. You can standardise and say, well this is the common core and we’ll use that for very good reasons. But, there will always be exceptions, really important ones, and unless you can find ways to meet that need, you will alienate your clinicians, you will offer a less than perfect service to the patient, so we’ve got to have a way that we can be flexible to that.”*

(Manager, Site H)

There is a dearth of reliable information about the relative costs and benefits of these procurement strategies. It would be difficult and costly for individual Trusts to collect this. It is surprising that systematic information is not being collected across the NHS about procurement and maintenance costs for these core systems. As a result, there is great uncertainty around which approach is best for whom and under what circumstances, and GDE Trusts therefore struggled to make informed procurement choices.

### Tensions between vendors and NHS Trusts

In the EHR market, we have not (yet) not seen the stabilisation that has occurred in the commercial enterprise solution market around a modest number of offerings with well-characterised price/performance features. As a result, the NHS packaged solution market has been described as immature<sup>12</sup>

This is most evident in the tensions between vendors and NHS Trusts, with vendors exerting what is perceived to be “undue power” due to a lack of market competition.

*“While [vendors] didn’t have much competition, they could survive producing very poor outcomes because people didn’t have a choice. That’s where the healthcare software market is right now. It’s not competitive. It’s not a saturated market. As a result, suppliers have more influence than you would expect them to have, because you’re limited in your choice and actually there’s no obvious leader to go to in comparison to the others.”*

(Programme Manager, Site C)

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<sup>12</sup> The EHR market is immature, compared more mature market, such as the enterprise resource planning (ERP) market. Jacobs and Weston (2007, p.362) described the maturity of the ERP market as follows:

“It is our judgment that ERP systems have now reached a level of maturity where both software vendors and users understand the technical, human resource and financial resources required for implementation and ongoing use. ERP systems should now enter an era of relatively “easy configuration” that takes days and weeks with implementation completed in weeks, or at most 2–3 months.”

More recent studies conducted by Mozaffar and colleagues also confirmed the immaturity of the EHR market in the UK. For instance, it was found that the market for hospital ePrescribing system in England was “still in its infancy” (Mozaffar et al., 2014), while the English HEPMA market was described to be in “an emergence stage” (Mozaffar et al., 2017).

#### Reference:

Jacobs, F. R., and Weston Jr., F.C., (2007) “Enterprise Resource Planning (ERP) – A brief history”, *Journal of Operations Management*, 25 (2), 357-363.

Mozaffar, H., Williams, R., Cresswell, K. M., Pollock, N., Morrison, Z., & Sheikh, A. (2017). The challenges of implementing packaged hospital electronic prescribing and medicine administration systems in UK hospitals: Premature purchase of immature solutions? In *Information Infrastructures within European Health Care* (pp. 129–149). Springer.

Mozaffar, Hajar, Williams, R., Cresswell, K., Morrison, Z., Slee, A., & Sheikh, A. (2014). Product Diversity and Spectrum of Choice in Hospital ePrescribing Systems in England. *Plos One*, 9(4), 1–11.

This tension was particularly evident in procurement. Mega-systems cannot be developed quickly and smaller suppliers lacked capability to meet the new requirements of GDE Trusts. In addition, Trusts lacked the skills to appraise the promises of suppliers. Trusts often only had contact with other sites that was mediated by the supplier, thereby precluding honest exchanges of information and learning. This in turn was perceived to influence procurement decisions.

*“So we had a site visit and the other site had come to see what we were doing but they were absolutely adamant that they needed to have the supplier in the room with them, so any questions that they asked we were there thinking well, it’s very difficult to be completely open when you’ve got a supplier there and also then the supplier will interject and tell them their version and we’re thinking well, I’m not sure I agree with that. It’s a really odd, it would be a lot better to just have open conversations directly with sites.”*

(Manager, Site D)

There are links between Trusts that are adopters of a common platform. These Trusts usually form what is known as “user communities” in order to facilitate exchanges of information and learning. However, when suppliers run these communities, they may seek to channel discussions. As a result, there is a lack of information sharing around the strengths and weaknesses of various systems, leading Trusts to procure solutions that may not be in their best interest.

Many Trusts based their procurement decisions on information they were shown by the vendors. As such, little information about suppliers’ standing in the market, their visions, or their commitment to a certain market in the future was incorporated in the decision-making process.

*“...we asked the vendors to come and show and tell roadshows and we asked staff to formally comment back on the products that they saw and which ones they thought were going to be most useful from where we found ourselves and which ones they thought had most challenges, and [vendor] was the one that came out on top [...] The [system], all the clinicians felt was most appropriate for what we wanted to do.”*

(Manager, Site A)

### The gradual shift from local functional concerns to wider interoperability concerns

While most procurement decisions in GDE Trusts were driven by local functional concerns, we also witnessed some more strategic considerations, particularly in relation to interoperability and integration. For instance, some Trusts used the criterion of interoperability to filter out potential vendors, before considering functionality and usability of systems.

*“And if your vendor couldn’t have that interoperability with the other systems on the catalogue with NHS normally being the key identifier or a combination, we wouldn’t have complicated procurements. The system goes out of the question really. You’re then focusing on the problem and then you can pick the system that rate usability, people like best or has got an extra bell or whistle or whatever and I think that would’ve brought prices down as well.”*

(Programme Manager, Site B)

The ability to integrate legacy systems to the newly-procured system was also a primary concern for many.

*“So we developed some pretty bespoke functionality with [system] around that. [...] then [I] started doing a tender for the new system because they wanted an integrated*

*oncology approach. As a result of that, we've basically...probably just over two years ago with go-live, we took a lot of the building functionality and used the specs for that to then drop into [system]. So we've had a very bare minimum of functionality there because none of it's been integrated or joined up with a different area of the system. [System] was a standalone system and our EPR [electronic patient record system] was separate from that."*

(Manager, Site B)

### Developing partnerships with vendors

Some Trusts began to view the procurement process as entering a long-term partnership with vendors. Ideally, this partnership brought benefits to both sites with vendors developing desired functionality and users helping to refine systems.

*"I think the relationship that we've had with them has been very positive. I'd like to think that we've helped to support them in terms of their wider aspirations within the UK and Europe, but then equally, they've helped us to progress and achieve some of the benefits that we've done. It is about a relationship with a company and a partnership, as opposed to I'm just buying this system from you. It's not that transactional sort of relationship."*

(Manager, Site A)

Some GDE Trusts also appeared to engage in building a more constructive relationship with vendors by means of using international, industry-wide standards, such as the HIMSS EMRAM, as leverage to address the power imbalance.

*"Well, our major partner is [A-vendor], that's the provider of our EPR [electronic patient record system] and as much as possible we try to have a constructive relationship with them. For a long time, we were the only UK [A-vendor] site, we had a relatively small voice in influencing their roadmap but their European footprint's increasing so it's easier to influence. There's obviously levers you can try and pull to incentivise at cost or reduced cost work. [A-vendor] do not have a HIMMS level 6/7 site. Alright, we can develop that for you then, you need to be credited for a HIMMS 6 site [...]. Alright, that makes it easier for you to be procured by the site. You can create a positive relationship in that vein."*

(Manager, Site H)

### Conclusions

Based on our work to date, we suggest ways to address some of the identified challenges in the EHR market in the NHS:

- Support initiatives, such as the Health Systems Support Framework and joint procurement by mental health Trusts, which address the power imbalance between vendors and users. Central NHS bodies need to engage more proactively with major vendors such as Epic and Cerner to negotiate better deals on behalf of trusts.
- It is important to facilitate the sharing of knowledge and insights regarding the procurement process to encourage trusts to shift from a local functionality-based procurement focus to a more strategic one, including wider interoperability considerations and long-term mutually beneficial partnerships with vendors.
- Communities of trusts using the same platforms/ vendors are valuable in terms of knowledge sharing and support. However, when vendors run these forums, they may seek to shape and

dictate the discussions within the communities with the vendors' interests in mind. Consequently, it is important that these vendor communities are supported with a more open agenda by the GDE programme and wider NHS.

- There is a need to fund further independent study on the implications of adopting industry-wide standards, such as HIMSS EMRAM, with regard to local trusts improving patient safety and performance, as well as how these standards can be used by trusts as leverage to develop constructive relationships with vendors.

## Potential implications for policy emerging from our work

We recommend policy makers to consider the following formative issues emerging from our findings:

- Digital technologies still need to be more clearly positioned as key enablers of mainstream health and care policy delivery
- Future strategic initiatives should be designed to allow room for more risky innovations, and for learning from “failure”/overcoming challenges alongside core infrastructure upgrading (two-speed innovation system)
- Closer alignment of performance metrics and reporting is needed, ensuring proxy measures do not become an end in themselves; recognising the long time-lag between investment, technology implementation, optimisation and improved outcomes
- We acknowledge that linking investments, activities and outcomes is important to justify investments and attribute outcomes to Programme activities. However, we caution against an approach where strategic decisions are determined by numerical correlations of outcomes. The empirical literature shows that the impact of HIT on patient outcomes is often difficult to determine and this is particularly true for complex systems that have been implemented as part of the GDE Programme. Correlation does not equate causation.
- It is crucial to not lose sight of the vision of creating a learning ecosystem that is at least to a degree self-sustained. This will require a joined-up approach amongst all provider digitisation initiatives. These should not be viewed as being in competition with each other.
- Going forward, there is a need to agree on a minimum viable product that needs to be tailored to the needs of various settings and have a degree of flexibility.
- Establishing a functioning learning network is key for the Programme going forward.
- Communications activity needs to be viewed as essential throughout the Programme. It needs to be targeted at every level and seen as a mechanism to engage and open channels of communication between programme management and staff on the ground. It should not be seen solely as a way to promote positive messages in the media.
- Consideration should be given to further development as well as retention of digital skills, to enable sharing of scarce expertise
- The development of a vibrant digital and technology marketplace requires further consideration in the short-, medium-, and longer-term
- It will be important to create a framework that enables networking as opposed to try to precisely direct networking pathways and where bottom-up can supplement top-down activities is important.
- Lessons from international settings need to inform future efforts (see Appendix 4)

We further suggest ways to address some of the identified challenges in EHR procurement in the NHS:

- Support initiatives, such as the Health Systems Support Framework and joint procurement by mental health Trusts, which address the power imbalance between vendors and users. Central NHS bodies need to engage more proactively with major vendors such as Epic and Cerner to negotiate better deals on behalf of Trusts.

- It is important to facilitate the sharing of knowledge and insights regarding the procurement process to encourage Trusts to shift from a local functionality-based procurement focus to a more strategic one, including wider interoperability considerations and long-term mutually beneficial partnerships with vendors.
- Communities of Trusts using the same platforms/ vendors are valuable in terms of knowledge sharing and support. However, when vendors run these forums, they may seek to shape and dictate the discussions within the communities with the vendors' interests in mind. Consequently, it is important that these vendor-led communities are supported with a more open agenda by the GDE programme and wider NHS.
- There is a need to fund further independent study on the implications of adopting industry-wide standards, such as HIMSS EMRAM, with regard to local Trusts improving patient safety and performance, as well as how these standards can be used by Trusts as leverage to develop constructive relationships with vendors.

## Key questions going forward

Our final summative report will focus on the creation of a learning ecosystem to facilitate HIT-enabled transformation. Key issues we wish to explore in the next year include the following:

- What are the drivers for and barriers to creating a learning economy?
- What resources are likely to be needed and over what timeframe?
- How can the benefits of Blueprinting be maximised?
- What elements can be managed and promoted centrally and what elements can be self-sustaining for whom and under what circumstances?
- What can be learnt from international settings in relation to spread and sustained learning?
- What lessons can be learnt for the Digital Aspirant Programme in managing and evaluating HIT-enabled change?
- How can the market be stimulated to promote learning across a range of platforms with varying capabilities?
- How can large HIT transformation programmes in evolving contexts be managed without constraining local autonomy and innovation?

## Appendix 1 - Theoretical and methodological considerations in evaluating large scale health information technology change programmes

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## Abstract

Attempt to achieve digital transformation across the health service have stimulated ever larger and more complex change programmes. These encompass a growing range of functions in multiple locations across the system and may take place over extended timeframes. This calls for new approaches to evaluate these programmes. Drawing on over a decade of conducting formative and summative evaluations of health information technologies, we here build on previous work detailing evaluation challenges and ways to tackle these. Important considerations include tracing evolving networks, relationships, processes and changing organisational, economic, political, vendor and markets; exploring mechanisms of spread; and studying selected settings in depth to understand local tensions and priorities. Decision makers need to recognise that formative evaluations, if built on solid theoretical and methodological foundations, can help to mitigate risks and help to ensure that programmes have maximum chances of success.

## Introduction

High hopes are being placed internationally on health information technology (HIT) as a means to tackle existing health and care challenges, with a range of large-scale system-wide programmes launched over the past two decades to promote implementation and adoption of HIT.(1-3) Examples of such programmes include the United States (US) federal government's estimated \$30 billion national stimulus package to promote the adoption of electronic health records (EHRs) through the Health Information Technology for Economic and Clinical Health (HITECH) Act,(4) and the English National Health Service (NHS) £4 billion national digitisation fund.(5) Digitisation strategies and funding schemes reflect national circumstances, but such programmes face common challenges for example regarding how to reconcile national and local requirements. While some standardisation of data transactions and formats is essential to ensure interoperability and information exchange, there is also a need to adjust to local exigencies, practices and priorities.(6)

Summative evaluations that seek to capture the eventual outcomes of large national programmes appear to answer questions about the effectiveness of public investments. However, funders and administrators are under pressure to demonstrate outcomes quickly - often within the lifetime of programmes, whilst the full benefits of major change programmes can take a long time to materialise. Premature summative evaluation can generate unwarranted narratives of "failure" with damaging political consequences.(7)

The success or failure of HIT projects involves many different dimensions. Negotiations to reconcile incommensurable factors may be contested.(8,9) The political context is liable to change within the medium- to long-term timeframes of a major change programme,(6,8) as seen with some aspects of the English National Programme for Information Technology (NPfIT).(10,11) A formative evaluation approach cannot avoid these issues, but can help to better navigate the associated complexities by identifying apparently productive processes, emerging unintended consequences, and informing the programme's delivery strategy in real time.(12,13) It seeks to capture perceptions of actors involved about what is and is not working well and feed back findings into programme management. Such evaluations often involve gathering qualitative and quantitative data from various stakeholders and then feeding back emerging issues to implementers and decision makers so that strategies can be put in place to mitigate risks and maximise benefits.

Our team has conducted several formative evaluations of large HIT programmes and developed significant expertise over the years.(14-16) In doing so, we have encountered numerous theoretical and methodological challenges. We here build on a previous paper discussing the use of formative approaches to evaluation of specific technology implementations in the context of shifting political and economic landscapes.(10,14) In this previous work (Box 1), we described the complex processes of major HIT implementation and configuration and argued that evaluation requires a sociotechnical approach as such processes are not amenable to conventional positivist methodologies. We advocated multi-site studies exploring processes over extended timeframes.

We here offer an extension of this work to explore not only implementations of specific functionality (such as electronic health records (EHRs)), but their integration with ancillary systems (e.g. electronic prescribing and medicines administration, radiology) and in this way the emergence and evolution of information infrastructures (systems of systems) that are increasingly salient as we see functional integration within Trusts and across care settings. We also consider mechanisms of spread, evolving networks/processes, and vendor markets.(17)

### **Box 1: Summary of recommendations for formative evaluation of large-scale health information technology (Takian et al) (17)**

Before-during-after study designs are ill suited to explore large-scale electronic health record implementations due to shifting policy landscapes and over-optimistic deployment schedules. They also do not sufficiently take local views and interpretations into account.

Formative evaluations need to consider this changing landscape and explore stakeholder perspectives to gain insights into how local settings understand and implement change.

Sociotechnical approaches can help to conceptualise the interactions between people, technology and work processes. They can help to draw a more nuanced picture of the implementation and adoption landscape than traditional positivist paradigms.

#### Key formative evaluation challenges and methodological and theoretical implications

We have identified a number of challenges for formative evaluation of large scale transformation programmes and ways to tackle these. We discuss these in detail below.

##### The difficulty of attributing outcomes

The first challenge concerns the difficulty of attributing outcomes (i.e. exploring what caused a specific outcome) for major changes in HIT. Although often required to justify investments, the direct effects of complex HIT such as EHRs are difficult to track and measure.(18) This is particularly true for large-scale transformative and systemic upgrades in infrastructures, which are not one-off events, but occur through multiple iterations and interlinkages with existing systems. Such systems tend to have distributed effects with hard-to-establish baselines (when compared to local discrete technologies implemented in specific settings, although the effects of these can also be hard to measure).(19) Infrastructure renewal is a long term process where current achievements rest on earlier upgrades over long timeframes where systems are incrementally optimised and extended.(20)

An example may be an infrastructural renewal achieved through multiple overlapping rounds of investment such as the implementation of EHRs. Here, the causal mechanisms linking implementation decisions and outcomes are difficult, if not impossible, to detect. If they can be identified at all, this also occurs over extended timeframes. This issue is exacerbated in major digital transformation programmes, where decision-makers are typically championing not just one, but multiple implementations of various transformative systems, and where local priorities may clash with national strategies.(14)

Theoretically informed formative evaluations that draw on science and technology studies and acknowledge the interrelationship between social and technological factors can help to address this issue.(21) A particularly effective methodology used for such studies has involved exploring selected settings in depth to understand local complexities, while also monitoring a wider number of settings that are part of the change programme in less detail to understand general trends. By doing so, they provide an insight into local changes and potential mechanisms leading to outcomes.(22)

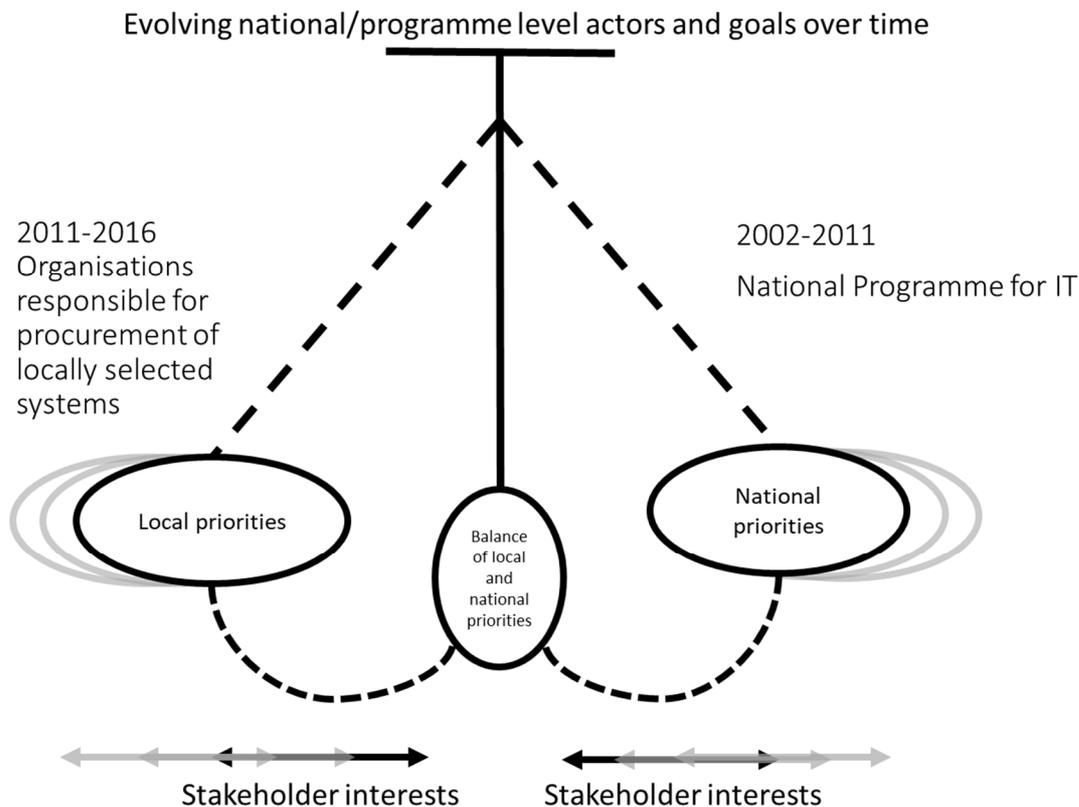
##### Balancing local diversity and autonomy with national aims

Standard solutions cannot simply be rolled out across the health service as sites vary in terms of clinical practices, existing information systems and data structures, size and organisational structures, contexts and local demographics. A key challenge for evaluation of large programmes is reconciling tensions between bringing specific sites up to a national standard and levelling up the local ecosys-

tem.(23) There is also often internal competition and conflicting priorities (e.g. between decision-makers and various groups of clinical staff). Organisational settings differ in their local contexts, structures and (emerging) service configurations, and are often separate autonomous entities that may be in competition.(24) In these locales, change programme visions may be re-interpreted, which can lead to unanticipated outcomes and deviation from central aims. In the US, the Meaningful Use criteria have for instance resulted in increasing implementation of EHRs but the impact on quality and safety is still unknown and concern has been expressed that they may have stifled local innovation.(25)

There is a tension between local and national priorities – and there is no stable way to redress these. Instead strategies constantly shift between these poles, never standing still, pulled by a network of stakeholder groups with conflicting interests in a process that has been conceptualised as a swinging pendulum (Figure 1).(14)

**Figure 1: Tension between local and national priorities in large national health information technology programmes (3)**



To explore this process and associated tensions, evaluators need to study evolving networks, relationships, and processes to understand how various stakeholders are mobilised nationally and locally as part of the change programme and what the perceived effects of these mobilisations are (Figure 2). This may involve working closely with national programme leads to identify current policy directions and intended national strategy, whilst also exploring local experiences of this strategy. A recurring example of tensions in our work relates to progress measures. National measures of progress designed to provide justification for programme resources are liable to be poorly aligned with local priorities and circumstances. Achieving these may be negatively perceived by participating local organisations as requiring large amounts of resources in comparison to limited local benefits and driven by the need to satisfy reporting demands. Agreeing on a limited core set of measures is therefore likely to satisfy both local and national demands.

## The evolving nature of HIT programmes over time

Takian and colleagues noted how the policy context changed in the course of a single long-term change programme.(17) These factors may result in various stakeholders chasing moving targets and scope creep. For example, the economic recession of 2008-13 heavily influenced the English NPfIT, which led to a lack of sustained funding.(26)

Although important, shifting socio-political environments only constitute part of the picture. A long-term view of nurturing evolving infrastructures highlights that visions of best practices will inevitably evolve over time with no definite end point and no consensus about strategic direction.(27) We have previously discussed this in the context of digital maturity, which is a somewhat contested concept.(28) Different kinds of programme management and evaluation tools may be needed that give cognisance to this kind of evolution.

Changes in medical techniques and diagnosis, models for care delivery, and vendor offerings also affect available technologies (and vice versa). The market may not immediately be able to respond to new policy-driven models, and therefore evaluations and policies need to consider these dimensions.(29) This may involve exploring evolving vendor-user relationships, the emergence and mobilisation of user groups, procurement frameworks, and market diversity.(30) Our work, for instance, shows that, reinforced by the English NPfIT, multi-national mega-suite solutions revolving around core EHR systems increasingly dominate the UK market. These offer a relatively well-established and reliable pathway to achieving digital maturity and interoperability. The alternative pathway involves knitting together EHRs with a range of other functionality provided by diverse vendors. This has been proposed as offering advantages in allowing an adopter to achieve a Best-of-Breed (BoB) solution unique to each local setting, and potentially better suited to local organisations.(31) However, there are difficulties for vendors of modular solutions designed for BoB to enter the market and develop interfaces, and existing EHR vendors experience difficulty in upgrading systems to become mega-packages. This in turn, influences local approaches to interoperability and innovation afforded by various systems, necessitating careful consideration of procurement approaches in order to stimulate (and not inhibit) a vibrant marketplace through programme activities.

## Scaling of change through developing a self-sustaining learning ecosystem

Large HIT change programmes are often concerned with not only stimulating local changes but also with promoting ongoing change ensuring that efforts are sustained and scaled beyond the life of the programme.(32) But this is not straightforward, partly due to lack of agreement over suitable metrics of success and partly due to limited understanding of the innovation process.(33)

Studies of the emergence and evolution of information infrastructures have in turn helped articulate new strategies for promoting/sustaining such change.(34-36) However, the notion of scaling also implies that innovation stops when diffusion starts. A more nuanced perspective flags that innovations evolve as they scale 'innofusion', requiring strong learning channels between adopter communities and vendors.(37)

Evaluators can explore success factors and barriers to scaling qualitatively and formatively feed these back to decision makers who can then adjust their strategies accordingly.(16) This needs to involve exploring local change in tandem with evolving networks at ecosystem level, studying a range of adopter sites and their relationships with each other as well as other stakeholders that are part of the developing ecosystem. Such work can help to identify what mechanisms of spread work to accelerate programme objectives and decision makers can align strategy accordingly to focus on these opportunities. Through exploring networks and relationships, evaluators can, for example, explore how

knowledge spreads throughout the wider health and care ecosystem in which the change programme is embedded, and how stakeholders were motivated to exchange and trade knowledge.(38)

## Conclusion

We are now entering an era that emphasises patient-centred care and data integration across the care ecosystem, including primary, secondary and social care. This is associated with a shift from discrete technological changes to systemic long-term infrastructural change associated with large national/regional HIT change programmes. Although there are some attempts to characterise and study these changes including our own,(17) these provide only a partial picture, which we have built on here based on our ongoing experiences over the last decade reflecting our current thinking. New methods of programme management are now needed that are geared towards ecosystems of adopters and vendors, and developing learning between them. These evolutionary perspectives also call for broader approaches to complex formative evaluations that can support the success of programmes and help to mitigate potential risks.

Although there is no prescriptive way to conduct such work, we hope that this paper helps decision makers to commission work that is well-suited to the subject of study, and implementers embarking on the evaluative journey to navigate this complex landscape.

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**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.

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## Appendix 2 – Abstracts of papers in preparation

### **Qualitative national evaluation of the English Global Digital Exemplar (GDE) Programme - diversity of local contexts, processes and outcomes in hospitals as a result of large scale health information technology change**

**Background:** There is currently a strong international drive towards creating digitally advanced healthcare systems through coordinated efforts at a national level. The English Global Digital Exemplar (GDE) Programme is a large-scale national digital transformation programme aiming to advance the digitisation of hospitals by creating local centres of digital excellence ('Global Digital Exemplars – GDEs).

**Aim:** To qualitatively evaluate the GDE Programme in terms of its impact on digital transformation and related outcomes within participating hospitals.

**Methods:** We conducted a series of theoretically-informed in-depth case studies in 12 purposively selected hospitals taking part in the GDE Programme. Data collected included 233 interviews and non-participant observations of 110 meetings and workshops. We used thematic analysis aided by NVivo software to analyse qualitative data. The analysis drew on sociotechnical systems theory and realist evaluation to identify contexts, mechanisms and outcomes.

**Results:** We found that the GDE Programme accelerated the speed of digital change within participating hospitals. This acceleration was triggered by: (i) dedicated funding and the associated requirements for match funding which in turn helped to prioritise the digital transformation agenda locally, (ii) governance and reporting requirements put in place by the Programme that helped to strengthen existing governance and project management structures, and (iii) reputational benefits associated with being recognised as a GDE which helped negotiating power with vendors and facilitated organisational buy-in for digital transformation. We also observed some local variation within these themes that impacted on how resources offered through the GDE Programme were utilised to produce outcomes. These related to the size of the hospital, its history of IT deployments and prior governance structures and organisational buy-in and vendor contexts.

**Conclusion:** Large-scale digital transformation programmes in healthcare can stimulate local change through and match-funding, putting in place governance and monitoring structures, and through harnessing networks and reputational benefits.

## **Creating a learning economy through the concept of Fast Follower: insights from a qualitative longitudinal evaluation of health information technology implementation in the English National Health Service**

**Background:** Based on the Wachter Review in 2016, the English National Health Service introduced the Global Digital Exemplar (GDE) Programme to promote the digitation of health care services. Organisations that were digitally mature were funded with the expectation that they would achieve internationally recognised levels of excellence and then share their learning with less mature Fast Follower (FF) sites, through the production of Blueprints which would be available to other Trusts across the NHS. This, together with other initiatives such as the establishment of a set of Learning Networks, was intended to create a learning economy across the NHS.

**Aims:** This paper explores the outcomes and factors affecting GDE and FF pairings, and their position within the learning economy of the English National Health Service.

**Methods:** The design of the independent evaluation of the GDE Programme included 12 in depth case studies of GDE and FF sites (not in their pairing) selected from the 47 GDE and FF organisations to provide a sample of acute, mental health and speciality health care organisations. We conducted 233 interviews and observations of 110 meetings. Thematic analysis was facilitated by NVivo software and drew on sociotechnical systems theory.

**Results:** Most Trusts believed the GDE and FF relationship enhanced learning and accelerated adoption of technologies. Planned learning initiatives through GDE-FF relationships, the production of Blueprints and the establishment of Learning Networks had uneven impacts. They were most successful where they aligned with the formation of informal knowledge networking. This was driven by the mutual benefits for individuals and organisations involved (learning benefits, reputational benefits). Organic networking was enhanced where the benefits of knowledge exchange were maximised and coordination and learning costs were minimised: by use of a shared technology platform; by geographical proximity; by a shared strategy/culture; and, by prior interpersonal relationships.

**Conclusions:** The GDE/FF relationships have produced significant gains for both FFs and GDEs. The policy has also been a significant boost to the concept of learning and sharing within the wider NHS to reduce the time and costs of digital transformation. The GDE/FF relationships are just one part of a wider self-organised learning economy, which to a large degree, relies on mutual benefits of knowledge sharing and is facilitated by proximity, use of common platforms and shared culture. Creating a framework that enables networking as opposed to try to precisely direct networking pathways and where bottom-up can supplement top-down activities is important.

## **Understanding the trajectory of the electronic health record (EHR) market in the UK: Lessons learnt from the software package market**

It is believed that the electronic health record (EHR) market in the UK will follow the patterns of development of the software package market. Despite its wide uptake and general acceptance amongst the health informatics community, little is known about what lessons can be learnt from the software package market and how these lessons may be applied to the EHR market. In this paper, we aim at addressing these issues by systematically examining the patterns of development and dynamics of the software package market via extensive literature review on the topic. We will then reconstruct and capture the current trajectory of development of the EHR market through in-depth case studies and quantitative descriptive data collected from a number of Trusts participating in the Global Digital Exemplar (GDE) programme initiated by NHS England. We argue that the pattern of development of the EHR market in the UK is dissimilar to the software package market. The EHR market has been dematured as a consequence of a shift towards the procurement of mega-systems and digital maturity models originating from the US. As a result, numerous new vendors have entered the market in a coordinated manner. We conclude with policy implications of this work, outlining how decision makers may influence market trajectories towards increasing maturity.

### **Objectives**

- To systematically examine the patterns of development and dynamics of the software package market
- To capture the existing dynamics of the EHR market in the UK in the context of the GDE Programme
- To shed light on the current trajectory of the EHR market and discuss its implications for policy makers in the UK

### **Methodology**

This research draws extensively on two bodies of work.

First, it utilises findings from our decade-long research on the software package market (most notably Customer Relationship Management Systems and Enterprise Resource Planning Systems), business analysts (particularly Gartner Inc.), and their roles and influence on market dynamics.

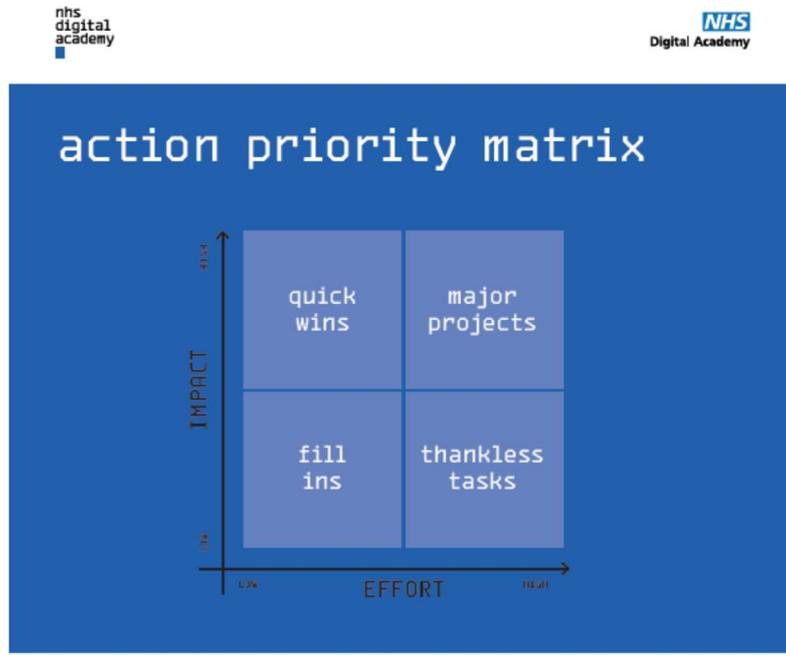
Second, empirical data of the EHR market come from an on-going longitudinal study of twelve digitally-advanced Trusts participating in the GDE Programme.

We collected data using (a) in-depth interviews with policy makers, heads of clinical informatics projects, clinicians and IT vendors; (b) fieldwork and observation notes; (c) a wide range of government reports, funding agreements and other documents related to the GDE Programme; (d) qualitative descriptive data from all GDE Trusts.

## Appendix 3 - Priority actions to create a learning economy from the NHS Digital Academy Cohort 2

On the 6<sup>th</sup> of November 2019, we asked 116 NHS Digital Academy students to answer the following question: How can learning from digital health implementations be accelerated across the NHS?

In order to help them identify priority areas, we gave them the following Action Priority Matrix:



ACTIVITY	IMPACT (0-10) 0 = no impact 10 = max impact	EFFORT (0-10) 0 = no effort 10 = max effort

Participants worked in 14 groups to identify three priority actions.

### Central repository to promote data sharing and learning

Most groups (12 out of 14) mentioned the role of national platforms in promoting the sharing of knowledge and learning. Blueprinting was mentioned as part of this (in 3 out of 14 groups) and participants suggested that they could be simplified, include resources required, ways of working, and learning from failures. More broadly, there was a perceived need for a centralised resource promoting data and knowledge sharing including basic information on ongoing projects, organisations (including non-GDE sites) and vendors. Some suggested that this should be mandatory whilst others highlighted the need for relevant incentives to encourage contributions.

### Developing digital leadership

Developing digital leadership was perceived to be a priority by four out of 14 groups. Setting national standards for this role at a national level (e.g. time commitments considering scheduled clinical time, dedicated time for learning, mentoring junior staff) may facilitate developing the profession.

### Importance of peer networks

Local information sharing and peer-to-peer networks were perceived to be most effective in promoting learning. Incentivising these by focusing on sharing experiences through these channels was therefore viewed as a priority by many (5 out of 14 groups).

### National leadership

National leadership was generally seen as essential to create a learning ecosystem. Particularly important roles mentioned included coordinating a national learning platform, incentivising stakeholders, promoting local digital leadership and setting professional and interoperability standards.

## Appendix 4 - Ontario – potential implications for Digital Aspirants

Ontario is one of the 13 provinces and territories of Canada. It has 154 public hospitals. The government provides federal funds for healthcare but these are managed locally by the provinces themselves.

80% of Ontario hospitals were at HIMSS 3 or lower so in 2016 Ontario provincial government started a hospital health information system (HIS) renewal strategy to encourage digital maturity of hospitals and rationalise resources. Key strands of this were:

- Clinical Standardisation: Three user group collaboratives were set up for each of the systems used: Epic, Cerner, Meditech. The aim of the collaboratives was to try to get all system instances together in one version across the province to develop a best version that could then be used by everyone. The programme was under \$30M (Canadian). It did not fund hospital implementation.
- The Ontario HIS Benefits and Adoption Team (HISBAT): Two hospitals with strong leadership and digital maturity were asked to lead a coaching outreach service to help others implement systems and to help them understand how to use tools better. This service pays attention to sharing issues the vendor may not attend to e.g. how to transform care; engage clinicians; design workflows; measure; maintain after vendor moves on.
  - Vendor neutral and agnostic approach
  - Peer to peer knowledge sharing and mentorship of HIS project teams through on site visits
  - Provides support for all stages from planning to execution of digitally enabled change
  - No cost to Ontario hospitals
  - Over 80 hospitals engaged across the province since 2017 costing under \$1 million Canadian a year. It pays for backfilling staff at the two leading hospitals.
  - Benefits: reduced costs and time for HIS implementation, increased clinical adoption, improved clinical outcomes, efficiencies that contribute to financial return on investment, and connection to provincial resources that enable inter-hospital information sharing for ongoing system optimisation.
- They would be happy to come over and to input in English strategy
- Would be happy to host visits and share methodologies