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Evaluation of the Regional Scale Programme and National Innovation Collaborative

Final evaluation report

The Strategy Unit.

Ipsos MORI

Contents

1 Introduction

In December 2020, NHSX commissioned Ipsos MORI, working in partnership with the Strategy Unit, to undertake the evaluation of the Regional Scale Programme and the National Innovation Collaborative. This is the final report for this independent evaluation prepared by Ipsos MORI and drawing together findings from a programme of interviewing and analysis conducted during the first half of 2021. It offers a comprehensive summary of findings to date across the objectives of the evaluation.

1.1 The Regional Scale Programme and National Innovation Collaborative

We were commissioned to conduct an evaluation of the Regional Scale Programme (RSP). This programme is leading work across England to accelerate the deployment of new care pathways supported by technology. The programme is working in partnership with the NHS locally, predominantly through integrated care systems (ICSs) and regions, as well as with social care in supporting those whose home is a care home. This was supported by £10.5m investment from NHSX which funded implementation and change management costs in 24 projects across all seven regions. This was then supplemented by an £18m investment to support license costs as part of a specific Covid-19 response. This license funding supported these 24 projects (see table 2.1) but also expanded the opportunity to support additional COVID Oximetry @home and COVID virtual ward projects (both of which are beyond the scope of this evaluation).

The RSP is supported by the National Innovation Collaborative (NIC). The Academic Health Science Network (AHSN) Network was commissioned by NHSX to support the NIC. This is a programme of support that aims to enable collaboration to rapidly share learning and best practice in digital transformation across the NHS and care sector.

Together the RSP and NIC aimed to rapidly scale up the use of remote monitoring technologies to be offered as an option for people managing long-term conditions, or other conditions (including Covid-19). Through this, the programme has aimed to support care providers to deploy the technology solutions rapidly, enabling benefits to emerge related to system efficiencies (through reduced hospital admissions, or earlier discharge, for example), improved experience for patients and service users (through being able to continue to reside in their own home, or through reduced need to attend appointments), and improved health outcomes (for example, the technologies should support infection control measures).

Throughout the report, we refer to RSP, NIC or RSP and NIC, depending on the context of a particular point being discussed; occasionally we use the term ‘the programme’ to describe it in broad terms and to aid readability.

1.1.1 Parameters of the evaluation

There are several related and complementary evaluative, communications and analytical activities underway. These are: quantitative and qualitative evaluations of the national implementation of COVID Oximetry @home projects (which in some cases are being delivered alongside projects in our scope) being led by Imperial College London and University College London respectively (RSET and BRACE NIHR rapid evaluation teams) ; the development of good practice case studies and videos to communicate the early positive stories emerging from the programme more widely; an internal lessons learned exercise and other communications-focused work (including blogs, podcasts and bulletin articles) developed in collaboration with the AHSN Network. We are also aware of evaluations which are underway at the regional and local levels, including a year-long study of the projects supported in the London region.

Throughout, we have sought to coordinate our own work with these projects. This has involved making sure the scope of this evaluation (the 24 projects noted above) is kept distinct from projects and activities in the scope of the other studies and activities. The overall objectives of this evaluation also differentiate the projects: this study is shorter-term and focused on processes and early outcomes. Where possible, we have aimed to coordinate fieldwork with the plans of other teams leading other evaluative, analytical or communication activities. Finally, due to some scope reduction within this original commission, a focus on the patient and service user perspective was added. This will be reported on later as an addition to this report.

In terms of the timing of the study, all interviews were completed by early June 2021; all data reported from programme management information is up to date as of the end of June 2021.

1.1.2 Key terminology

Throughout the evaluation, we have conceptualised the programme as being structured into several levels, which broadly correspond to the structure of the health and social care system. Where we reference activity or collate findings at the national level, we are generally referring to the national programme team, and the activities it has commissioned or undertaken, or NHSX more broadly. Where we refer to the regional level, we are referencing the NHS England and NHS Improvement (NHSEI) regional offices. The term sub-region/ regional, which we recognise is rarely used in the organisation of health and care in England, refers to the range of organisations – including ICSs and commissioners – which have overseen and supported the projects in their areas. Finally, the term ‘project’ refers to the teams formed (sometimes within the sub-regional organisations just noted) to put the technology solutions supported by the RSP into practice; as such, findings reported at the project level could refer to analysis of interviews with organisations ranging from a small health or care provider (such as a care home) through to a larger organisation (such as an ICS) managing the delivery of a project across several such settings.

In several places in the report, we report findings that relate to the end beneficiaries of the programme. Depending on the project, we use the term people or service user (generally for those people receiving care support from a social care provider), and patients (for recipients of health services). The terms are used in analysis to give context to the finding.

We have used the term digital maturity in several places in the report. We use this term broadly and often to reflect self-reported information from interviewees on their preparedness for adopting the technology in question (rather than drawing on a specific framework).

1.2 Objectives of the evaluation

The evaluation is focused on the processes and outcomes of the RSP and NIC, and particularly the support offered by NHSX to the health and care sites adopting the technologies. Learning from this evaluation is expected to inform the design of future technology supported programmes within NHSX.

The objectives of the evaluation are grouped into three areas:

1. **The extent to which the RSP and NIC have achieved their aims (the impact evaluation), in particular:**

- Whether and how the RSP and NIC facilitated greater collaboration, partnership working and application of improvement science methodologies;

- Whether and how the RSP and NIC led to increased adoption of remote monitoring technologies;
- Initial analysis of which remote monitoring interventions have led to the greatest increase in digital adoption by (i) health and care providers and (ii) patients and people, and what lessons regarding wider adoption of remote monitoring can be learned from this;
- Whether the RSP and NIC aided regional teams in developing their capacity to drive adoption of remote monitoring technologies;
- Initial analysis of the benefits of remote monitoring interventions for (i) patients and people, (ii) the health and care system and (iii) staff, and how this varies by setting and patient cohort;
- Initial analysis of the interventions that have proven to be particularly cost-effective.

2. **The processes through which the RSP and NIC have been implemented (the process evaluation), and what lessons can be learned for the implementation of future NHSX initiatives.**

- Whether the RSP and NIC were implemented as intended, the key barriers and enablers to implementation and what lessons can be learned for future programmes;
- How was the provision of national support perceived by regions and what could be improved or changed to maximise the impact;
- How the solutions were implemented across the regions and what could be improved or changed to maximise the impact.

3. **How the implementation and results of the RSP and NIC have varied across regions, implementation teams and specific interventions supported, and what lessons can be learned from this to inform the wider digital transformation agenda across the NHS.**

- How implementation and uptake varied across (i) different settings and (ii) a tech enabled service compared to a non-tech enabled remote monitoring service;
- The extent to which regional differences have shaped programme outcomes;
- Whether and how sub-regional teams supported implementation and programme delivery and the impacts of this on programme outcomes.

The specification for the work set the scene for the study as a service evaluation, an assessment that we as evaluators and the programme team agreed with. This is supported by the Health Research Authority assessment tool. Our approach for this work has been discussed with our internal ethics panel.

1.3 Summary of the method

To meet the objectives set out in the time available, we have used mostly qualitative methods (including interviews and document analysis). These methods have been used with stakeholders at various ‘levels’ of the programme – from the senior programme designers and managers to those delivering care to people and patients using some of the funded technologies.

There have been three phases to the evaluation:

- **Scoping phase (December 2020 – January 2021)**: This phase involved an introductory workshop with the central programme team, a document review, in-depth consultations with five senior NHSX stakeholders, ten NHSEI regional leads, and five contacts from the NIC delivery partner, the AHSN Network. The objectives of the scoping phase were to develop a programme theory of change (a description of how the programme is designed to generate outcomes for people and patients, staff and systems), evaluation framework (metrics and methods used to assess this theory) and a methodology for the later phases. This work was summarised in a scoping report agreed with NHSX in February 2021.

- **Main phase (February 2021 – May 2021)**: This phase comprised of in-depth interviews with programme stakeholders working at the 'sub-regional' level (organisations who were overseeing projects in their area), and the project level (more locally based organisations, such as clinical commissioning groups or primary care networks, who were responsible for the management of the projects). During this phase (including some mop-up interviews that took place during the consolidation phase), a total of 43 organisations / projects were engaged through interviews or group discussions. In this phase, we also analysed management information (MI) made available by the programme team, including data on adoption of technologies. An interim report summarising the findings of this phase was agreed with NHSX in May 2021.

- **Consolidation phase (May 2021 – June 2021)**: This final phase of work is designed to deepen findings from the main phase. It has included the following tasks:

  - nine interviews with technology providers;

  - nine interviews, four joint interviews, and one focus group (14 encounters total) with staff using the funded technologies across four organisations to form project impact stories;

  - further analysis of the programme management information; and

  - an evidence scan of secondary literature and other relevant documents.

  Fieldwork to capture the potential benefits of the technologies from the point of view of the patient / person has also been completed and will be summarised in a short additional paper to this report.

Throughout, data gathered from interviews has been analysed thematically against the evaluation objectives. We have also drawn on frameworks including the non-adoption, abandonment, scale-up, spread and sustainability (NASSS) framework[1] to understand how innovation is adopted and spread in the health and care sector, and the strategic added value framework[2] to understand early-stage outcomes of the programme.

As noted, interviews have been conducted at different 'levels' of the programme. Where there are differences in responses between levels, we have identified these in our analysis. In many cases, the division between sub-regional and project levels was arbitrary so these differences were not relevant. For more information on the method, see appendix A.

[1] Greenhalgh T, Wherton J, Papoutsi C, Lynch J, Hughes G, A'Court C, Hinder S, Fahy N, Procter R, Shaw S. Beyond adoption: a new framework for theorizing and evaluating non adoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. J Med Internet Res. 2017;19(11):e367.

[2] This framework has been used as basis for understanding how a central agent (in this case, the programme team, or NHSX) has influenced their partners' and stakeholders' behaviours and performance – other than through their programme funding. It includes exploring strategic concepts such as leadership, the extent to which the programme has acted as a catalyst, and whether it has successfully leveraged resources from other partners.

1.3.1 Method and programme limitations

This section sets out aspects of the programme, and the methodology, which place limitations on the evaluation.

Limitations placed on the evaluation method by wider context and aspects of the programme design

Several features of the recent wider context facing health and care services, and aspects of the programme design, have placed limitations on the methodology. This includes that:

- The RSP and NIC are supporting projects to implement remote monitoring solutions which were central to the response of health and care services to the pandemic (since the solutions are designed to reduce people's needs to attend healthcare settings in person). This was one of the reasons for the fast pace and large scale that has characterised the programme. Reflecting this, the evaluation has also been delivered over relatively short timescales for a programme of this scale and level of development. Given this, the evaluation has focused on programme processes and early outcomes (to reflect the information needs of the programme at this time). It also means that the longer-term benefits of the programme (such as improved health outcomes, improved clinical safety, improved patient experience, time savings for staff) are not fully captured in this study, since not all projects are fully developed and able to begin demonstrating these robustly. Benefits which relate to people's health, also typically take time to evidence robustly.

- The challenging wider context facing the health and social care system over the first half of 2021 has contributed to many of the projects having to reduce their original targets or delivering over a shorter timescale than intended. This has further reduced the volume of evidence of benefits available to the evaluation at this point.

- These challenges were understood in the design of the methodology (for example, the overall focus on qualitative methods, and using contacts at higher levels of the programme to support fieldwork set up), as well as the focus on early signs of benefits, and programme processes. However, further evidence (of higher quality) of the benefits the projects' activities are contributing to will likely become available later in 2021; most projects are collecting data to this effect.

Limitations of the method

The methodology itself also had limitations which influenced the extent of the analysis that could be undertaken.

- Given the above description of the context, and level of development of some projects, the evaluation team has drawn on a wide variety of evidence types, mostly gathered through interviews. Analysis of administrative data and other secondary sources were not available in the timescales. Given this, we have occasionally used the term 'anecdotal evidence' to describe the supporting evidence our findings are based on. Where this term is used throughout the report, we are referring to factual claims provided by interviewees that are based only on their own or others' personal observations, and which were collected in a casual or non-systematic manner. Such findings were also commonly drawn from interviewees' observations gathered in the course of delivering or overseeing the projects.

- The consolidation phase of the work has involved fieldwork with staff who have used the funded digital platforms in their day-to-day work. These interviews have given an initial insight into how the platforms have affected the clinical or caring encounter. However, given the timescales available, the number of projects where this insight was captured is limited. Therefore, these findings, while incredibly insightful and robustly collected, remain at an early stage (i.e. the technologies had generally only been in use for a matter of weeks and months).

- Fieldwork with patients and service users has been written up into a short summary paper which will be attached to this report.

- Finally, the costs of interventions have not been assessed quantitatively at this stage limiting findings on value for money. It became clear in the scoping phase that a detailed examination of costs using project-supplied data would not be feasible in the current context. However, the costs of implementing the interventions have been explored qualitatively in most interviews at the project level offering initial insights into this.

1.4 Structure of the report

There are seven main sections to this report, including the introduction, and they are supported by Appendices.

- Section 2 sets out an overview of the RSP and NIC, describing the programme's key features.

- Section 3 discusses the sub-regional and local contexts in which projects were implemented, some of the key motivations and rationales for applying for programme funding, and the focus of projects which were funded.

- Section 4 discusses the different stages of programme delivery, a review of the support offered through the national team and the AHSN Network, as well as enablers and barriers to project delivery.

- Section 5 discusses progress towards the key impacts as set out in the programme logic model.

- Section 6 reviews the extent to which projects implemented will continue beyond the NHSX funding provided, and under which circumstances.

- Section 7 offers a report overview, assesses any gaps in this evaluation, sets the findings in the wider context, and provides a set of actionable, forward-looking recommendations.

The appendices are the full evidence scan of wider literature, a more detailed summary of the method, and the evaluation framework.

2 Programme overview

This section sets out an overview of several key features of the RSP and NIC, drawn together from analysis of management information.

2.1 Overview of the RSP and NIC

The highly devolved design of the RSP, with a key role for the NHS regional offices in defining local plans, is reflected in the level of variation observed across the 24 projects that were funded. This section provides an overview of the projects supported by the RSP and NIC and the progress that has been made since its inception in September 2020.

2.1.1 Characteristics of funded projects

The table in appendix C provides a breakdown of the 24 funded projects[3] by region, project aim, digital platform used and whether the project was new or being scaled from an existing project.

Projects can be assembled into three groupings based on the cohort of patients or service users they were aimed at.

- Long term conditions, Community Care or Covid-19: Seven of the 24 projects.
- Remote monitoring of people whose home is a care home: Eleven of the 24 projects.
- Other remote monitoring, including outpatients, mental health, paediatrics and complex needs: Six of the 24 projects.

As demonstrated in the table below, the majority of the license funding (61%) was allocated to projects focusing on people whose home is a care home, with just over one quarter of the funding (27%) aimed at remote monitoring of patients with long-terms conditions, community care, or patients with Covid-19. It is important to note that further funding was provided for the rapid scaling of technology enabled COVID Oximetry @home and COVID virtual ward services but these are outside the scope of this evaluation and are covered by the UCL/Imperial research mentioned in section 1.1.1.

Table 2.1: Breakdown of projects and license funding by target population

Focus of project	Number of projects	License funding[4]	Proportion of license funding
Long term conditions, Community Care or Covid-19	7	£3,903,278	27%
People whose home is a care home	11	£8,888,094	61%
Others, including outpatients, paediatrics, patients with mental health conditions, and complex needs	6	£1,777,522	12%

[3] We have sought to map the several smaller projects into the 24 projects which constitute the programme. Appendix C provides a full breakdown of the projects, including a description and detail of their high level aims.
[4] In addition to license funding, NHSX provided each project with implementation funding via the regional teams. Each region was allocated £1.5mimplementation funding, which the region distributed among projects in the region. The subsequent allocation of funding within Regions was then managed through the Regional teams.

We explored the focus of all projects' activities (either directly with project leads, or with sub-regional leads overseeing projects in their region) across all interviews, to supplement the analysis of programme management information presented here. Interviews explored the extent to which the funded technologies led to changes in the fundamentals of the model of care; this included where care is delivered, how and who delivers it, changes to referral pathways and practices, whether something entirely novel was being offered, whether new information was made available through the technology to inform clinical and care decisions among staff and patients, and how the technology supported delivery.

Sub-regional and project leads were commonly able to describe how the funding supported a new way of delivering care for most of the projects which were funded. This included:

- Increasing the availability of data to inform the management of patients or people and available options; for example, projects which involved more active remote monitoring of vital signs enabled early identification and recognition of deteriorating patients. One staff member felt that the increased availability of data had improved patients' trust in carers, as well as carers' confidence in managing patients' conditions.

- Quicker and easier communications with specialists; for example, several interviewees described how the technology had both enriched and expedited communication between GPs, patients or service users and specialists. The technology has enabled GPs, patients or service users to send specialists detailed information (including pictures), enabling a more sophisticated, rapid response, sometimes within hours.

- New ways of managing patients' or people's conditions; this included managing their condition from a distance which guaranteed an infection safe environment, improved efficiency by reducing the need to travel, or supporting carers to take more frequent clinical readings.

- One staff member described how their project had enabled care that was more person oriented through consistent digital observations of the patient's health, as opposed to intermittent phone call check-ups.

- New models which promote new clinical relationships or collaboration across organisations. This was felt to be applicable at the local level, particularly in improving links between health, social and community care. For example, one project described how their digital platform had become the main form of contact between community pharmacies and hospital pharmacies. Data sharing between other areas of the health system, such as between hospitals, pharmacies, GP practices or care homes, was also frequently mentioned.

Project Impact Story: Changes to models of care

One project lead described how their digital intervention – a system linking patient information in care homes to GPs and hospitals – had led to new models of care. Specifically, they outlined four key areas where they felt this occurred:

Improved information sharing across organisations by enabling care home staff to access patient-information which is logged by GPs and hospitals.

Improved communication across organisations by enabling instant messages to be sent from care homes to GPs regarding patients and service users.

Changes to medicine prescription pathways by allowing care home staff to request medication from pharmacies through the system.

Improving availability of information by allowing data to be logged about the patient through the system.

`*Yes, it has a massive impact on the way care is delivered in all care homes. It enables the team to have a lot more information at their fingertips – before there were no observations taken. For those homes, it's a massive change – leads to more interactions with the system. Lots of care home staff are say[ing]: "It's transformed the way we deliver care to our residents… makes them feel like they're part of the health system"* – Project-level interview

However, a few organisation and project leads presented a more mixed view that, while remote monitoring platforms made care more efficient and saved time, they did not bring about a more fundamental change to what is being delivered.

It is notable, too, that sub-regional and project leads rarely referred to the possibilities that remote monitoring approaches offered for improved levels of engagement and activation for the people receiving care. This may be because these interviews took place at an early stage of the evaluation, when most interviewees were still developing their project, rather than seeing it in practice. It may also reflect the more strategic roles that this part of the analysis draws on primarily. It also contrasts with what we heard later in the evaluation, when interviews moved to the project and staff level. In these interviews we did hear early reports of improved engagement and activation for people and patients (see chapter 5 for further detail). However, it may also reflect a programme which aimed to put technology solutions into care settings, primarily to support those people to remain at home during the pandemic. While improved engagement and activation for those receiving care were among the goals of the programme, they were secondary to the need to support in-home monitoring and care.

Some interviewees further felt that the point of their project was not necessarily to change care pathways. This viewpoint was more pronounced among some staff delivering projects who were interviewed as part of the project impact stories. Although highly specific to certain projects, staff questioned whether the digital intervention which had been implemented truly changed the way they delivered care. Nonetheless, some could point towards significant benefits of the technology, including a more digitised and organised platform for viewing patient data, or improved safety and Information Governance (IG) processes.

NHS regions

Table 2.2 presents the distribution of funding across the seven regions. It excludes additional funding provided for rapid scale of technology enabled COVID Oximetry @home and COVID virtual wards services as these are outside the scope of this evaluation.

All seven NHS regions within England were represented. The London region supported the most projects, with one project based in each of its five ICSs.

Table 2.2: Breakdown of funded projects and funding by region

Region	Number of projects	License funding	Implementation funding[5]	Proportion of total funding
London	5	£2,372,527	£1,500,000	15%
Midlands	2	£3,950,839	£1,500,000	22%
North East and Yorkshire	4	£1,599,616	£1,500,000	12%
North West	4	£3,245,400	£1,500,000	19%
East of England	3	£1,697,943	£1,500,000	13%
South East	3	£1,427,360	£1,500,000	12%
South West	3	£275,208	£1,500,000	7%

Digital platforms

Across the projects, 23 different platforms are reported to have been used, with the majority of these (15) used only within a single project. It should be noted that the projects included in this analysis exclude the COVID Oximetry @home or COVID virtual ward projects, as these are outside the scope of the evaluation (as noted in section 1.1.1).

As shown in table 2.3, while each region used a range of platforms across their projects, the number used varied substantially. For example, while 11 platforms were utilised across London's five projects, only four were used in the projects in each of the following regions - the Midlands, the north west and the south east.

About half of the projects (11) used multiple digital platforms. In most of these cases, the use of multiple platforms by a single project was due to different strands within the project using different tools to achieve the same end. For example, in the East of England, six local sprints to scale remote monitoring in care homes were conducted. With one exception, each local sprint employed a different digital platform, with the result that five different digital platforms were used across a single project. For a smaller number of projects, multiple tools were needed in order to provide the required range of functionality.

Further details of the digital platforms used across the 24 projects can be found in appendix C.

[5] NHSX provided each project with implementation funding via the regional teams. Each region was allocated £10.5m implementation funding, which they allocated to projects as required.

Table 2.3: Breakdown of funded projects by digital platform(s) and region[6]

Digital platform utilised	London	Midlands	North East and Yorkshire	North West	East of England	South East	South West	Total number of projects
Whzan	2				5			7
Docobo	1	1	1	2		1		**5**
InHealthCare	2					1		**3**
HealthCall			2					**2**
My Medical Record						2		**2**
My Health Guide – Hear me now							2	**2**
Current Health	1				1			**2**
Doccla		1			1			**2**
Other tools (each used by a single project)	5	2	3	2	3	0	3	**19**
Total number of digital platforms	11	4	6	4	10	4	5	

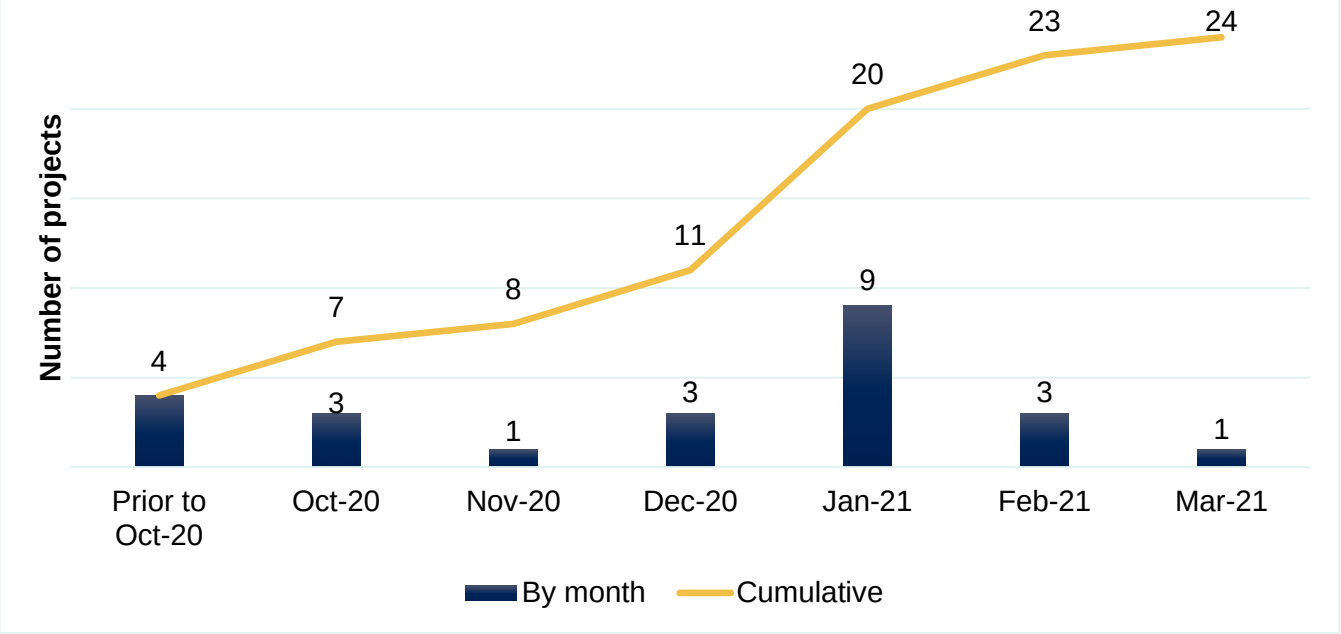
2.1.2 Project progress

The RSP provided implementation funding to NHS regions in September 2020, which was then allocated to individual projects by the regional teams. Figure 2.1 illustrates the month in which, following the receipt of funding, projects reported that at least one strand of the project had gone live. However, for many projects covering several care settings, the roll out across organisations or localities was gradual, and there will have been a series of 'go live' dates across different organisations or localities.

It is notable that four projects reported the first use of their digital platform(s) prior to October 2020. The regional bid documents demonstrate that, for these four projects, the digital platforms were already in use by July 2020. In these cases, the implementation and license funding were sought to support further rapid scaling.

[6] The number of projects in the table does not sum to 24 as 11 projects used multiple digital platforms.

Figure 2.1: Month in which funded projects first reported utilisation[7]



Source: NHSX analysis of highlight reports

This analysis demonstrates that by the end of 2020, around half the funded projects had started using the digital platforms. The number of live projects increased markedly in January 2021, with all projects having reported utilisation by March 2021. This level of mobilisation in the early part of the calendar year is notable given the pressures of the vaccine rollout in primary care and the effects of the second wave of Covid-19. A significant number of interviewees cited these as key reasons for implementation delays.

In comparison to projects' initial timetables (as detailed in each project's bid documents), 17 projects did not experience any delay and 'went live' when planned or earlier (although some of these projects did experience delays to scaling the project across organisations or localities at their planned pace). Factors which contributed towards these delays, and factors that supported rapid scaling, are described in sections 4.2 and 4.3 respectively.

However, seven projects experienced delays to their 'go live' date, ranging from between one and five months. These delays occurred across all types of projects. Reasons for these delays are explored in section 4. The consequences of these delays on the evaluation should be recognised. It was apparent both in the main phase and consolidation phase of the evaluation that projects that had experienced delays were less able to describe or provide evidence for observed outcomes than projects that were delivering to planned timescales.

[7] Where projects had multiple strands, with different 'go live' dates, the earliest instance of patient utilisation has been reported for that project.

3 Context and rationale

This section explores the national, sub-regional and local contexts in which the RSP was implemented, some of the key drivers and rationales for applying for RSP funding, and the focus of projects which were funded.

The level of digital maturity of organisations prior to joining the programme was varied. Digital maturity was interpreted differently by interviewees. Generally, however, organisations who described themselves as less digitally mature tended to highlight a lack of coordination and resources to implement digital projects/interventions.

Interviewees described how the Covid-19 crisis contributed to moving the digital policy context forward. It also caused delays in ensuring staff resources to implement projects and build digital infrastructure.

The RSP was therefore seen to fill a gap in resourcing to implement digital projects. Funding was used to support projects which aligned with broader strategic goals and could be implemented effectively.

3.1 Relevant context external to the programme

To put the findings about the RSP in context, first we set out aspects of the wider policy context relevant to the programme's development.

3.1.1 Policy context

NHSX was established in July 2019 to be the digital delivery arm of the NHS and the Department of Health and Social Care (DHSC). It is a joint delivery unit comprising of staff from both organisations. Some of NHSX's key responsibilities include setting the national digital policy agenda, establishing standards for the use of technologies, supporting the use of new technologies and reforming the procurement of digital platforms. The NIC and RSP are high profile elements of NHSX's portfolio which sits within the remit of the Chief Digital Officer.

Several influential policy documents have been published in recent years, providing the wider policy context for the initiative:

- In October 2018, DHSC published the policy paper, "The future of healthcare: our vision for digital, data and technology in health and care". The paper outlined a commitment to working with relevant partners to enable widespread adoption of digital health technology within the NHS. Its four priority areas of infrastructure, digital services, innovation, and skills and culture mirror aspects of the design of the programme.[8]

- The NHS Long Term Plan[9], published in January 2019, further outlined a series of detailed commitments regarding mainstreaming of digital health care across the NHS. These were centred around five thematic commitments, including empowering people, supporting health and care professionals, supporting clinical care, improving population health, and improving clinician

[8] Department of Health and Social Care. (2018). *The future of healthcare: our vision for digital, data and technology in health and care*. London: HMSO. (Retrieved from: https://www.gov.uk/government/publications/the-future-of-healthcare-our-vision-for-digital-data-and-technology-in-health-and-care/the-future-of-healthcare-our-vision-for-digital-data-and-technology-in-health-and-care)

[9] National Health Service (2019). *The NHS Long-term plan.* (Retrieved from: https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf)

efficiency and safety. These commitments offer a helpful framework for understanding the potential impacts of the programme.

- The Topol Review[10], published in February 2019, detailed recommendations and guidance for adopting digital technologies across the NHS over the next decade. Included in this were three principles which would enable effective deployment of these technologies: inclusion of patients as partners, with a particular focus on marginalised groups; continued development of expertise and guidance on new technologies for the healthcare workforce; and, prioritisation of adopting technologies which would enable staff to spend more time caring for their patients. Underpinning these three principles was a recognition that digital health technologies will result in substantial changes to the health system, with more general care being delivered peripherally and specialised care delivered centrally. In addition to this, collaboration with academic institutions and industry was considered a key component for preventing technological skills gaps among healthcare practitioners and digital transformation delays.

- Data Saves Lives: reshaping health and social care - a single data strategy for health and care in England was published by NHSX in June 2021 in draft format and seeks to improve the way data flows and is used in patient care, including digital home care, as well as for research and development of new treatments.[11]

3.1.2 The influence of the pandemic

While there was a broadly supportive policy in place prior to the Covid-19 pandemic, there was still a need to develop additional digital infrastructure to support these policies. Although Covid-19 shifted priorities away from developing this digital infrastructure towards addressing the needs of the pandemic, it also provided a springboard for digital transformation at pace.

During the scoping phase, interviewees noted how the pandemic had necessitated the introduction of digital platforms to ensure services could continue running, thereby demonstrating their importance to organisations. The rapid shift towards digitisation, alongside the urgent need to do so, was also described as promoting a cultural change among staff and acceptance of digital platforms. Finally, the need to isolate and socially distance throughout the pandemic has increased the demand for remote monitoring solutions from patients themselves. This was also partially driven by the lack of face-to-face services that were available throughout the pandemic. Overall, this has resulted in observed changes in the public's use of general practice, 111, community pharmacy and other primary care provision; outpatients' appointments also saw a significant move to remote models of consultation throughout 2020.[12]

[10] National Health Service. (2019). *The Topol Review: Preparing the healthcare workforce to deliver the digital future.* (Retrieved from: https://topol.hee.nhs.uk/the-topol-review/)

[11] Department of Health and Social Care. (2021). *Data saves lives: reshaping health and social care with data.* (Retrieved from: https://www.gov.uk/government/publications/data-saves-lives-reshaping-health-and-social-care-with-data-draft)

[12] Nuffield Trust. (2020). *The impact of Covid-19 on the use of digital technology in the NHS.* (Retrieved from: https://www.nuffieldtrust.org.uk/research/the-impact-of-covid-19-on-the-use-of-digital-technology-in-the-nhs)

"In terms of digital maturity, we were quite advanced and we've always had that vision, that plan. More than anything, it's been a culture barrier across the patch on a wider scale. It sounds awful, but the one pro that's come out of the Covid side of things, is that it's escalated within other organisations the importance and need for digital and that's allowing us to expand on our plans for remote monitoring."

Project-level interview

The wider Covid-19 context also shaped the programme's design, and particularly its focus on scaling at substantial pace; however, it also impacted projects' ability to deliver (see chapter 4).

3.2 Relevant context within the programme

Prior to implementation of the programme, interviewees reported a high level of variability in terms of their organisations' digital maturity[13], capacity and skill sets, highlighted areas of digital poverty, and their ability to manage projects. This was true across all organisational levels explored in this evaluation, including sub-regional organisations (such as ICSs), local organisations (such as acute Trusts and care homes), and within the projects themselves.

Sub-regional level

At the sub-regional level, which includes ICSs and CCGs, digital maturity was often defined by the extent to which digital interventions were joined up within a system. Sub-regional leads who described their area as more mature often pointed towards comprehensive and central digital boards and strategies, which enabled them to identify, support and link together different projects within their health and social care system. They were also able to evidence a successful track-record of implementing digital projects; this generally involved the integration of digital care records, but also included smaller-scale projects targeting a multi-disciplinary pathway or area of care.

ICS and CCG leads could generally point towards strong project management skills and a digital team in place which enabled them to effectively roll-out digital platforms within their footprint. This included projects such as establishing telehealth within GP practices and patient data transfer projects between different systems. However, the role of organisations such as ICSs and CCGs in driving digital transformation projects often lacked clarity. For example, some interviewees expressed that due to limitations on their resources, they should be mainly responsible for coordinating digital projects within their footprint as opposed to *introducing new* digital tools.

Less digitally mature sub-regions expressed that although digital interventions were present within their footprint, they were often siloed, lacked a structure for supporting and linking-up digital interventions and were unable to point towards a larger digital transformation plan. For example, one of the sub-regions that was interviewed described how some acute Trusts within their area had advanced automated digital systems in place, while others were still waiting for a more basic electronic care record to be implemented. This variable baseline of digital maturity within the system often made it challenging to implement digital projects in a consistent way across the whole footprint, as projects required tailoring to suit different levels of digital infrastructure and skill sets.

[13] Digital maturity was self-reported by interviewees based around elements of the NASSS Framework and interviewees were asked to provide examples or case studies to illustrate this assessment. How interviewees defined digital maturity varied from organisation to organisation; this interpretation is provided in the report.

Organisation level

It was at the organisational level, which includes acute, community, and mental health Trusts and care homes, where variation in relation to digital maturity was most commonly reported by interviewees. This is likely because projects were implemented across a wide range of organisation types and care pathways, including organisation-specific projects such as those in care homes or acute Trusts, and pathway-specific projects among a particular team in an acute Trust.

Acute Trusts were considered to be relatively digitally mature in terms of the digital platforms in place and the type and level of staff skills they have access to. However, interviewees noted that there were sometimes multiple digital systems in place within these organisations, which were usually specific to a certain pathway or specialism. This was felt to be a challenge towards ensuring pathways and departments within organisations were on an equal footing and posed a significant challenge for integrating the organisation with other areas of the health sector (such as GP practices) due to the excess of patient data which would need to be linked.

Care homes were frequently identified as the least digitally mature organisations supported within the programme. Project leads spoke of poor Wi-Fi connectivity caused by old infrastructure, a lack of digital tools within the care home (such as computers and tablets), and in some cases, using a 'paper and pencil' method. However, this was not a hard and fast rule, and project-leads noted how some care homes, particularly those who were part of a larger care home federation, had more advanced digital systems in place, such as a resident record system.

Similar to the sub-regional level, interviewees noted that effective leadership and collaboration across the organisation helped to drive digital maturity. This was thought to help address two key barriers commonly cited across organisations when implementing digital projects: concerns around information-sharing and developing a cultural change among staff within organisations.

Staff level

The project impact stories have further revealed a mixed picture in terms of the digital literacy and expertise of the staff who are working with the new digital platforms. While there were patterns linked to the type of organisation in question (for example, care home staff were felt to have fewer digital skills compared with those working in acute Trusts), the level of staff expertise with digital platforms was still highly variable, even within organisations.

For example, staff from one project, which was implemented within a community-care step-down pathway, explained that the digital capability of staff varied across all members and roles, with some who were 'tech-savvier' than others. Interviewees partially attributed this to a lack of organisational support in place in terms of training for new digital skills, provision of equipment (such as work phones), and extra staff capacity to manage digital projects. However, they also explained that this was partially down to individuals' own, unique levels of comfort towards technology.

The lack of skills among staff was often compounded by the number of digital systems in place within organisations. Staff described having to sign-in to separate systems for different tasks, a process which was felt to be cumbersome and inefficient. Care home managers further described how the relatively low average retention rates of care home staff – with staff moving from job to job quite frequently – created a workforce who continually had to re-adapt and learn how to use new systems. Overall, these were felt to be significant contextual barriers when introducing a new system or digital platform within organisations.

Wider relevant context

In addition to the evaluation, Ipsos MORI is carrying out research for NHSX into the digital skills of the adult social care workforce. Findings from this research offer context to what has been set out here.

On digital maturity/staff skills:

- Most care providers self-reported their digital maturity as 'developing'. While a range of technology is used to support the business and delivery of care, very few care providers (12%) self-reported their organisation as 'expert' regarding digital maturity. Most define themselves as 'developing' (67%), while just under one in five regard their organisation as 'novice' (17%) in terms of adopting, implementing, and managing new technology.[14]

- Digital poverty. Overall, one in ten care providers (10%) are not using any of the technology listed to support the delivery of care. This increases to 13% of domiciliary care providers and settings employing fewer than 50 staff. The figure is also higher among organisations which offer care and support only to people who are not self-funders (16%).

- Staff skills. While two-thirds (66%) of care providers agree that staff have the relevant skills and knowledge to assess and commission technology solutions, a significant proportion (17%) disagree and 14% are unsure.

On policies:

- Data Processing Agreement. A quarter of care home providers (26%) do not have a template data processing agreement in place.

On attitudes towards tech adoption:

- Burden of tech. Care home providers and domiciliary care providers differ in their attitudes towards the impact of consumer technology or apps on carers. While half (50%) of domiciliary care providers agree that it has reduced the burden on carers, only 36% of care home providers agree, and the same proportion (37%) disagree.

- Costs/delayed outcomes. When asked to consider the impact of consumer technology or apps, very few care providers (10%) feel that the cost of technology is immediately recouped in improved productivity. Instead, the most common response was that costs would be recouped through improved productivity, in the medium to long-term (mentioned by 37% of care providers).[15]

3.3 Rationale

We explored with all interviewees their views on the case for selecting the specific project which was funded through the RSP. At the patient and staff levels, this focused on the clinical or care need met by the digital solution; at more strategic levels, discussions focused on the need for complementary digital strategies within sub-regions and regions.

[14] Question: Thinking about your organisation, how digitally mature would you say it is? By digitally mature, we mean how able your organisation is to adopt, implement and manage new technology. 1. Expert 2. Developing 3. Novice 4. Don't know

[15] The findings summarised here are based on telephone survey interviews with 608 CQC registered care providers and depth telephone interviews with 25 care providers which were carried out during May and June 2021. This was from a counterpart project to this evaluation being delivered by Ipsos MORI for NHSX looking at the digital skills of the adult social care workforce. The providers include care homes, domiciliary or home care and housing related care provision.

The programme brief was reported to be well-aligned to existing digital projects within sub-regions. Interviewees often described this as an opportunity to secure funding to scale-up pre-existing projects which had shown early promise within the region.

The dual funding streams, which consisted of implementation funding and licensing support, were felt to be well-suited for scaling up digital interventions. Sub-regional and project leads expressed that while license funding is a significant component of digital projects, it is often overlooked by funding organisations. However, at the project level, interviewees explained that the limited licensing agreement stipulated through the project funding made it difficult for longer-term project planning. Other interviewees also commented that it was unclear in the initial brief whether there would be funding for licenses, again making it difficult to properly plan projects.

We understand that in the initial budget NHSX had available to support this work, the focus was on assisting with local implementation costs and there was no funding for licences. However, resources for licences were obtained subsequently by NHSX accessing emergency Covid grant funding to scale the digitally supported COVID Oximetry @home model, and these funds passed to front line organisations through the RSP.

The benefits realisation support was also reported to have encouraged some organisations to have participated in the programme (particularly at the sub-regional level), as they anticipated it would help to fill a skills gap in monitoring and realising benefits. This was only mentioned by a few projects as a motivation for joining and may in fact have been inaccurately recalled since the programme team noted that they did not make the benefits support offer available when they asked people to bid for funding. The funding streams were generally felt to be the more attractive offer.

3.3.1 Strategic rationale for projects supported

The projects which were prioritised by sub-regions tended to focus on driving three overarching strategies:

1. Strengthening links between health and social care, particularly regarding care homes, which were considered to be poorly integrated (in general) into the health and social care system. Projects within care homes were also described as a ‘quick win’ by some sub-regional leads as there were a high number of avoidable admissions from care homes (thus establishing a business case), alongside their vulnerability to the Covid-19 virus

2. Expansion of digital systems within the sub-region; this was either done by focusing on expanding the system to additional sites (scale), such as rolling-out a digital platform from a pilot site to multiple, similar sites; and/or expanding the digital system to other areas of the health sector (scope), such as implementing a communication tool from GP practices to the pharmacy sector.

3. Using digital health technology to address poor health outcomes or health inequalities, generally among a specific cohort of patients. This included those who had been impacted by Covid-19, as well as specific cohorts where there was an identified issue within the sub-region (for example, improving the number of health checks among patients with Learning Disabilities).

Underlying these three strategic goals was a further aim to strengthen health and care systems to be better prepared for further waves of Covid-19; this aim was evident across nearly all projects.

Wider relevant context (from the adult social care research):

Four in five (80%) care providers reported an increase in their use of technology since the Covid-19 pandemic. Nearly one in five (19%) said that their technology use has remained the same, and for very few respondents their use decreased in that period when introducing a new system or digital platform within organisations.

3.3.2 Operational rationale for projects supported

Alongside their strategic rationale, projects which could be implemented effectively and quickly were also prioritised by sub-regional organisations who helped to develop bids. Generally, these projects included one or more of the following three features:

1. Projects which built on or scaled up previous successes, either through a pilot project (which had demonstrated benefits) or within another area of the health and care sector, such as a clinical record system which had proved effective in primary care being adapted to care homes. As much of the RSP has been built on small projects which had demonstrated evidence of benefits, the value of longer-term benefits tracking is shown. It also suggests that there is some experience and resource within some of these areas for conducting benefits realisation and evaluation work.

2. Projects using platforms which could be easily implemented within the pre-existing digital infrastructure were prioritised; for example, digital technology which was wirelessly enabled. Digital platforms which were already in place and could be expanded within the sub-region were also prioritised. This often meant that projects which had a pre-established link with the digital provider were prioritised.

3. Projects which were anticipated to be cost-effective by the sub-regional and project leads, such as a remote monitoring solution which reduced the paid time GPs needed to travel to care homes for mandatory health checks. These projects were often described as a ‘no-brainer’ by sub-regional leads as they anticipated significant cost-savings from these projects.

4 Delivery of projects

This section discusses findings related to the processes through which the programme was implemented. Overall, the delivery mode and delivery processes were appropriate and effective in helping the programme progress towards its intended outcomes. While the stratified nature of the programme ensured a localised response, it also led to a number of implementation challenges.

As a result of the flexible and agile programme design, a variety of projects were funded. This variety is visible in the time taken to complete the initial scoping and set-up phase by some projects.

A number of key enablers to implementation were identified, and these align with enablers identified through our review of the wider evidence base (see appendices). Enablers include clinical and digital champions in individual organisations, as well as dedicated funding to Regional Directors of Digital Transformation (RDDTs) or similar coordinating roles.

Key barriers were identified around a lack of evidence of the efficiency and clinical effectiveness of some digital platforms funded, which made engagement and buy-in of target users more challenging, and increased the workload of staff (administration, training, lack of IT system integration), as well as a lack of input from patients and clinicians.

4.1 Overview of delivery

Interviewees were generally happy with their progress given the challenges brought about by Covid-19. The general level of progress, as well as key blockages mentioned throughout the interviews, are as follows.

4.1.1 Bidding and receiving funding

Implementation funding was moved from the national to regional level in September of 2020. However, several interviewees at the project level reported delays in receiving implementation funding and/or procuring digital technology. This often did not align with expectations; for example, projects commonly expressed that they expected to receive funding in December 2020 but did not receive it until February 2021. In one case, a project lead who we spoke to in April 2021 had still to receive implementation funding, and the project was being financed by other channels within the CCG.

One regional lead was able to clearly identify where this delay took place within their region. They explained that it occurred at the regional level, where they thought a ‘business case process’ had to be undertaken before funds could be released. This process was thought to be the source of the delay by the interviewee. They suspected that where other regions did not experience delays, the funding had been given directly to a lead CCG, which was then able to rapidly commission projects.

This issue demonstrates the extent to which project teams were devolved from the central programme. Although this devolved nature of the programme has benefits, including producing more localised and tailored approaches, it also poses problems for rapidly distributing funding and ensuring communication across the system.

4.1.2 Scoping phase

Project interviewees tended to feel that the scoping phase of their projects required significantly more time than they expected. Several causes of this were reported:

- **Projects underestimating the volume of project documentation that needed to be put in place**, particularly regarding the General Data Protection Regulation (GDPR) and IG. One project, which was deploying a remote monitoring solution across a number of care homes, highlighted how every care home required a bespoke Data Processing Impact Assessment with the CCG before proceeding with the project. This was felt to be a major time investment, and some interviewees suggested that the national team might have a role to play in developing these documents as part of the national support offer (they were unaware that this support was available through the Innovation Collaborative workspace on the FutureNHS collaboration platform).

- **Projects overestimating the digital maturity of target organisations**, particularly those that were implemented in care homes. For example, one project mentioned that the digital skill set and infrastructure within care homes was at such a low level that they decided early-on in the project to add a digital capacity building arm to the project, thereby delaying delivery (see below project impact story).

- **Engaging staff and target organisations**, such as GPs, and care homes, was felt to be more time-consuming than anticipated. This was often down to slow communication channels which were exacerbated by external conditions caused by Covid-19 (see Impact of Covid-19 below).

The delays experienced by projects during the scoping phase speaks to the variety of projects which were funded by the programme.

4.1.3 Procurement of digital technologies

Digital technology was procured by some organisations through the Spark DPS. Projects had mixed feedback on this system; although some found it helpful and procured digital platforms through this system, others found guidance received from NHSX to be confusing, and often expressed that they were overwhelmed with the number of suppliers through the DPS. Some also reported that the search function was ineffective as they were unable to search for specific companies with whom they were seeking to work. While some projects did procure digital technology through the Spark DPS, several projects reported procuring digital technology through other frameworks (such as the Shared Business Services or Health Systems Support Framework) or contracted the supplier directly.

The strengths and weaknesses of this procurement approach are explored more fully in section 4.4.1.

4.1.4 Implementation phase

To implement their projects, funded teams had to carry out a range of general activities, including recruiting target users, building-up digital capabilities among target organisations, and rolling-out the digital platforms to a few initial sites or users. Overall, projects tended to feel that they had made good progress on this phase of delivery and were generally satisfied given the circumstances (see section 4.1.1). Projects largely attributed the success of this phase to the implementation funding, which gave them the resources to increase staff capacity (either through funding dedicated days with internal staff and/or hiring additional staff) to properly manage the implementation and scale-up of their digital platform.

The experience of delivery staff (interviewed as part of the project impact stories) in implementing the digital platforms was mixed. Implementation was often described as ‘getting off to a shaky start’ as staff had to adapt to the new digital platform which often necessitated new ways of working. The digital platforms sometimes did not work as anticipated (for example, not being able to take certain measurements which staff could take before). In these cases, digital suppliers had to adjust their

product, which was often described as slow due to staff needing to communicate their issue with management, who would then contact the supplier.

The project impact stories highlighted how in some cases, the digital platforms generated additional work, at least in the short-term. One project described how they had hired a data administrator specifically to handle the extra work generated from the digital platform. Another project highlighted the time required to use the platform with frail elderly people, and then sanitise it to maintain infection control. Finally, staff also highlighted how some patients required additional support to use the digital platform where patients were required to input their own data. This was felt to be particularly pertinent for older cohorts of patients, especially those aged 90 and above. However, other projects did not report this increased workload; in these cases, staff reported that the digital platform was intuitive and easy to use and worked as expected. This suggests that digital technology should be carefully selected and matched to the infrastructure and skill set of staff, and that detailed change management plans should be developed when introducing digital platforms. In addition, a more detailed exploration of the costs of setting up and using the new technologies, and a comparison to the benefits they generate, is needed.

4.1.5 Full delivery phase

Once projects reached the full delivery phase, there were generally fewer issues to report and progress of the project was in line with expectations.

There was recognition of the importance of benefits realisation, and sub-regions and projects were able to clearly articulate the anticipated benefits of their projects in interviews; they generally had a plan in place for measuring benefits, which was set out prospectively. Having the right expertise within the project team (such as having a data expert on the project team), as well as the benefits realisation workshops, were felt to be facilitators in evidencing benefits realisation. Conversely, barriers to evidencing benefits realisation included a lack of staff capacity, and poor monitoring infrastructure in place in target areas.

Project Impact Story: Changes to delivery

One project lead described the adjustments they had to make to their project after being made aware of the low levels of digital maturity across targeted care homes. Initially, they had planned to install the system directly into care homes; however, it became evident early on that many care homes staff lacked digital skills and care homes did not have the appropriate documentation to implement the project.

The project felt this was an opportunity to undertake additional work with care homes through the introduction of the Data Security Protection Toolkit assessment to stratify care homes into those that would need further digital support.[16] Those who were ranked low or who did not pass the assessment were provided with bespoke support to help build-up their digital capabilities and pass this assessment in a second round. Following this, the care home could then be onboarded to the actual project and have the digital system installed.

4.1.6 Impact of the pandemic

The pandemic and vaccine-induced delays in delivery were considered to have made it difficult to engage many of the target groups for the digital platforms; for example, GP practices were occupied with vaccination planning and care homes were having to address frequent Covid-19 outbreaks. They also

[16] It should be noted that the DSPT assessment is an annual requirement for all organisations that have access to NHS patient data and systems: https://www.dsptoolkit.nhs.uk/Help/overview.

reduced staff capacity, and some projects were put on pause while they addressed these challenges. The delays caused by these factors were mentioned by all the projects that we spoke to.

"And I think our challenge has always been we thought we could get through this much, much quicker but I think the challenge has been the pandemic, it's been vaccinations and, because you know, a lot of practices and GPs have just been like, 'oh, if it's not vaccinations don't talk to me'... linking on from that is outbreaks, so we've had a number of care homes that have just said 'well, we had an outbreak, half of staff are self-isolating, we can't engage with you on this, [it] sounds like it's a great idea but we just can't', so it's been a lot slower than we wanted it to be."

Project-level interviews

4.2 Enablers to delivery

We asked interviewees at all levels of the programme to reflect on the factors which supported them to achieve project objectives and outputs, and factors that worked against it.

4.2.1 Engagement and collaboration

Nearly all projects reported engagement and collaboration among the different organisations involved with the project as a key enabler to successful project delivery. This was felt to be a mechanism in which the project could understand the needs of target organisations and effectively have them buy-in to the digital platform. Depending on the project, this engagement and collaboration were fostered in the following ways:

The most cited way to achieve this was by nominating a clinical digital champion within the core project team who could approach target organisations and demonstrate the value of the technology to their counterparts. These roles were nearly always funded through implementation funding. One project highlighted how they identified 'super-users' of their digital platform within their team. These individuals were approached and asked to guide other members of the team on using the technology effectively.

Projects also achieved this through stakeholder engagement, which was done through various means. A couple of projects explained how they included representatives from target organisations (such as care home representatives and members from GP Federations) within their project working groups, effectively as a means to gather input, field questions, and communicate the project back to their own teams. A few projects established links among stakeholders in their project through their core team via clinical digital champions; for example, one project described using nurses to train staff (funded by the programme), who helped train up care assistants on the use of the digital project, alongside engaging GPs to use the platform as well.

One project explained how they engaged with stakeholders during the scoping stage through the development of a 'working book' which could be sent to target organisations. This 'working book' highlighted the benefits of the project and was intended to sell the digital platform to potential organisations. Although less personal than digital or clinical champions, project leads described how they could send the 'working book' rapidly to multiple organisations, thereby helping to achieve scale.

"If you want to ask me about success factors, to me [clinical buy-in] is the most important thing... By far the most important [component of delivery] is whether the clinicians actually buy into the idea, understand the concepts behind the pathway, and believe that it will make a difference to the way in which they treat their patients."

Sub-regional level interview

4.2.2 Team composition and leadership

The implementation funding made available through the RSP was key to ensuring projects had the right expertise and capacity within their team to deliver the project. Interviewees were positive that the RSP recognised the human factors as well as technological elements of these projects. Specific roles which were felt to be beneficial included:

- Programme management and coordination roles;
- Local digital and clinical champions to engage target audiences and stakeholders – cross-cutting teams to champion the project and on-board other sectors/areas;
- Specialist expertise for specific health issues, such as learning disabilities;
- External staff resources, such as data administrators.

Alongside these roles, effective leadership was highlighted as another key component of team composition and successful project delivery. Such individuals (or leadership teams) were perceived to have effectively managed rapid and competing demands, as well as contributed to building partnerships across the project. Where projects experienced challenges in delivery, this was sometimes attributed by interviewees to a lack of clear leadership.

"The most important thing [the project leads] did in this setting was the trust and relationships and collaboration and leadership. You've got very strong leadership, but not authoritarian. Just the way they led the whole activity provided guidance, and energy and enthusiasm, and made it happen. Whereas where leadership was less effective it became much harder... They had the vision, right? It was their vision, and they were in a position to allocate resources and make things happen, so that's why it worked so well."

Project-impact story interview

4.2.3 The pandemic as a catalyst for change

Some interviewees felt that the pandemic had acted as a catalyst for driving engagement among different organisations as it necessitated a safe way of delivering services under the circumstances (i.e., social distancing and self-isolation) created by Covid-19. In addition, the pandemic was felt to have assembled sometimes disparate services around a central goal, enabling effective engagement and successful roll-out of the digital platform.

This was particularly evident in one of the project impact stories, which developed a model of care for patients at-risk of Covid-19 to monitor them virtually in the community. The project had begun to capture evidence relating to several beneficial outcomes (such as reduced ambulance conveyances), which – while attributable to several different factors – was partially due to the urgent need for the project brought about by Covid-19.

"If we were all working in various silos before Covid hit, this time last year, we've come such a long way. Partially due to the crisis of Covid, but also due to projects like this that have really helped join up the dots with integrated care partnership working, system thinking and system working"

Project-level interview

4.3 Barriers to delivery

4.3.1 Variability of digital infrastructure and skills

Digital maturity was self-reported by interviewees using questions derived from the NASSS framework; interviewees were asked to provide examples to illustrate their assessment. Where there were perceived low-levels of digital maturity in an organisation, projects reported that a significant time-investment was necessary to improve this baseline and foster cultural change. This included:

- **Poor digital infrastructure** including a lack of digital resources (such as devices) across community care settings and care homes or poor WiFi caused by concrete walls within the buildings of care homes.
- **Knowledge and capability of IG** such as low Data Security and Protection Toolkit standards in care homes which required an additional step to address.
- **Data sharing skills and knowledge of staff** which required additional resources to build-up and delayed roll-out of the digital platform; this was present to some extent across all organisations within the regions.

In some cases, there was a lack of awareness of the resources provided by the NIC to support projects to overcome these barriers. For example, template data sharing agreements – which were requested by some projects – were available on the Innovation Collaborative workspace on the FutureNHS collaboration platform throughout the duration of the programme.

The need for comprehensive training on a regular basis became apparent after the initial implementation. This was driven by the variation in digital skills across staff, coupled with a high turnover of staff in some settings. The flexibility of the RSP funding model allowed projects to meet this need by allocating dedicated resources to ongoing engagement and tailored training within local organisations. For example, some projects chose to engage nurses or project managers to fulfil this role.

4.3.2 Presence of multiple systems

Despite the challenges presented by a lack of self-reported digital maturity, projects also expressed that the pre-existing presence of digital systems, such as electronic patient records in care homes which were part of a federation, was not necessarily beneficial either. The presence of these platforms within care homes were often encountered during the scoping stage of the project. Projects described having to dedicate additional time and resources to engage these organisations to switch to the new system and demonstrate its effectiveness over the pre-existing system. This was exacerbated by the fact that pre-existing systems were often well-established and embedded in the digital infrastructure of the organisation, making it difficult to get stakeholders to buy-into (or even sell) the benefits of the digital system.

This point is illustrated through one of the project impact stories, where the same digital platform was implemented in a top-down manner in two separate locations. Feedback from both locations revealed divergent opinions regarding the digital platform; one location felt that the platform was effective and easy to use, while the other location felt the platform was ineffective and inflexible. Further questioning revealed that the location which had positive feedback had been using the digital system since the beginning of the project; conversely, the location which gave negative feedback had been using a different system – which they felt to be better – for the first two months of project implementation. This speaks to the need for projects to effectively communicate the value of digital platforms to staff to ensure buy-in to the project.

Once implemented, some projects reported interoperability issues between the existing and new platforms; for example, one platform required a separate sign-in portal for staff, which was felt to be cumbersome and a barrier to using the platform by project leads. This issue was often encountered with projects targeted at acute Trusts or GP practices.

4.3.3 Engaging healthcare professionals

A commonly reported challenge was engaging healthcare professionals (HCPs). One of the main reasons cited for this was that HCPs, such as GPs, worried their workload would increase because of engaging with the project. Care homes were also reluctant to engage at times. This was often due to competing offers and projects, as well as external pressures caused by the pandemic (such as outbreaks of Covid-19). Interviewees also described difficulties engaging GPs, with one project manager detailing how some GPs required evidence of the effectiveness of the intervention within their own local footprint (as opposed to in another area).

Some NHS organisations were concerned by the reduced frequency of face-to-face contact with high-risk patients, which constrained the number of patients with which the technology was utilised. For example, interviewees reported that GPs had been reluctant to use the technology with patients who were not already proactive in independently managing their conditions.

Projects implementing digital tools which lacked perceived cost-effectiveness data from target users experienced particular challenges in engaging target users.

Overall, projects felt that engagement with HCPs was an important way for them to recognise the need for cultural change. They explained that if people understand the benefits, rather than thinking of the technology as another piece of work, then it is possible to get them on board (see section 4.2.1).

4.3.4 Expectations of the digital platform

Staff perceptions about the usability and effectiveness of the digital platforms which were procured by projects were mixed. Although some staff felt that the digital platform had improved their productivity and efficiency, others felt that the digital platform did not work as expected, and required additional work compared with the previous way of working.

Staff highlighted how there could be a gap between what the platform could do and what was promised by the digital technology companies. For example, one project explained that the clinical communication tool they had procured was not delivering as expected; while they previously thought that the digital platform could enable conversations between three or more community providers over a range of different media (such as pictures), in reality, it was only able to transfer text messages between two community providers. This experience was echoed by another project interviewee, who explained that they were led to believe the platform they had procured was a ‘continuous monitoring kit’ which required

minimal clinical intervention. In reality, the platform required patients to input their readings themselves (and was therefore not continuous); in some cases, this led to patients inputting their readings incorrectly, which required unanticipated additional data checks. The result of this meant the project had to hire a data administrator specifically to manage the extra work created by the platform.

Whether these cases are a result of misleading information on the part of the supplier, a misunderstanding of capabilities on the part of project procurers, or misuse of the digital platform on the part of staff is difficult to say. Clearly, however, there was sometimes a gap in knowledge between suppliers and procurers, demonstrating a need to support NHS and social care teams to become more knowledgeable purchasers.

4.4 Programme support for delivery of projects

Recognising the significant challenges regions, sub-regions and project teams were likely to face in implementing technology projects during a challenging time for the health and care sector, the NIC and RSP aimed to facilitate collaboration, provide opportunities for learning, and access to experts on key topics. This support offer included the:

- Development of the Spark Digital Procurement System (DPS) for projects to rapidly procure digital technology solutions. This was led by the core NHSX team.
- Implementation funding for the regional scale plans and funding to support the procurement of digital licenses, which was again led by the core NHSX team.
- Commission with the AHSN Network to partner on the delivery of the NIC which included masterclasses and national events to promote learning and collaboration among the 24 projects which were funded. This also included providing resources, opportunities for collaboration, and communication channels through the Innovation Collaborative workspace on the FutureNHS collaboration platform.

Through this support, as well as the funding, NHSX aimed to improve projects' chances of success and address the contextual barriers outlined in section 4.2 and 4.3.

4.4.1 Spark DPS

The Spark DPS was developed as a way for organisations to rapidly procure innovative digital technologies for remote monitoring projects. As part of the RSP, suppliers applied against the required Crown Commercial Services criteria, and then applied against specific NHSX questions; this latter application was assessed by NHSX, and successful applicants were then able to register. Regions and other commissioning organisations were then able to run mini-competitions to invite bids from suppliers registered on the remote health technologies lot, following guidance issued by NHSX. Commissioning organisations were responsible for running these competitions, project assessment and the final selection of suppliers.

As part of this evaluation, we spoke to some of the suppliers who had been on this system to get their feedback.

Views from Suppliers. We spoke to a total of nine suppliers. Interviewees had a range of experiences developing digital platforms; some were relatively new companies with a single digital platform and a limited market share, while others were more established companies with a range of platforms and were

available in multiple markets. With one exception, all companies had previously delivered digital platforms for the NHS through other frameworks or through direct contracts with CCGs and/or ICSs.

Given this range of experiences, motivations for registering with Spark DPS varied; some used this process as an opportunity to gain experience with Spark DPS, others saw it as a way to expand their client base; a further few saw it purely as a commercial opportunity. In all cases the platform which they ultimately registered onto the Spark DPS was fully developed and had either been previously rolled out or was ready to roll out.

Suppliers generally had limited feedback on the registration process; some of the newer, smaller and less-experienced companies felt that the process required a significant amount of documentation to be completed; however, those with more experience felt that the requirements were in line with other procurement frameworks. A key point of contention among a minority of the suppliers (particularly those which were more mature) was the number of companies which had made it onto the Spark DPS, as they were unsure as to the capabilities of certain organisations; however, this can generally be seen to be in line with the nature of the Spark DPS as a means to procure innovations from less established firms.

There was also a perception among suppliers that commissioning organisations lacked the digital expertise to understand their digital requirements and assess digital products effectively. Suppliers felt in such cases that competition requirements and the process to assess bids were unclear.

Views from purchasing organisations. A limited number of projects used the Spark DPS to procure digital technology. Those who used the Spark DPS reported that it gave them confidence in the digital product(s) being implemented. However, more negative views were voiced including that there were too many products listed on the site; some interviewees also felt that an interview stage with the suppliers would have been helpful in querying the product in more detail thus aiding with implementation, but it was felt by projects not to be possible due to the short timescales to of the programme. For these reasons, most projects procured digital technologies from other frameworks, or contracted the providers directly.

"That [Spark DPS] should've been useful, because they did a lot of work identifying which suppliers had remote monitoring solutions, but the problem was the Spark framework was really difficult to use, and there was no way in initiating the Spark procurements of narrowing down to just the software companies that had remote monitoring solutions. So, I think there were 270, and you had to send your [expression of interest] out to all 270, and then you had to wade through whatever came back, and there were just too many, and there are so many remote monitoring suppliers."

Project-level interview

4.4.2 Resources provided by the programme

Implementation funding was largely allocated towards increasing the capacity of project teams and/or bringing in outside expertise from digital and specialised care sectors. Key activities supported included the following:

- The significant amount of time required at the beginning of a project in order to lay the groundwork for the digital intervention.

- Given that digital interventions commonly require people to work differently, projects tended to generate a range of skill and training needs which have implications for programme delivery and sustainability. This was a resource-intensive requirement across all projects, particularly in their early stages. For example, the training needs of care assistants using a remote monitoring platform to monitor their residents' vital signs was a common reference. In some cases, projects explained how they had to hire additional staff to manage the requirements of the digital platform while staff were trained-up and got up to speed. This finding draws attention to the need to factor in this training period to project timelines.

- To scale-up their digital products, projects often used the implementation funding to develop training programmes, including developing materials, a curriculum, and rolling out the training. Some projects voiced concern regarding the scale of training required due to a lack of digital skills among staff; one project explained that they had implemented a Train the Trainer approach to address this scale.

4.4.3 Uptake and strengths of the support offer

The majority of organisations funded had accessed support offers through the NIC and RSP. The support provided through the NHSX team was generally considered helpful to establishing collaborative networks which enabled sharing learning and solving challenges experienced by projects; this was felt to be especially helpful in the early stages of project delivery.

Around one-third of the organisations we spoke to had not accessed any support offers outside of funding and were unaware of what was available. These organisations tended to be less aware of the NIC generally and were confused as to whether it was linked with the RSP. Individuals who were unaware of the support offer tended to sit at the project and delivery level; for example, all of the project staff across the four project impact stories which were undertaken were unaware of this support offer when prompted. Comparatively, sub-regional and project leads tended to be more aware of the NIC programme or had used the support. This may be indicative of variable communication within regions.

Implementation funding was the most recognised area of support and was viewed as central to delivering scaling-up projects. Indeed, a strong theme across interviews is that without this aspect of the programme, projects would have struggled to make any headway. Interviewees considered this support vital in ensuring that technology was well-adopted by healthcare workers and end-users, as it allowed sub-regions to focus on improving the digital culture within their area.

"The project would not have happened without NHSX intervention and public funding. Just to be clear, first of all, NHSX made this happen. That's for sure. The £500,000 was a major or majority contribution to making this happen and the benefits that patients received. It would have been an absolute disaster; it wouldn't have happened without it."

Project impact story interview

The funding for licenses was also considered a key aspect for scaling projects. This became available after implementation funding was approved as a response to a recognition from the RSP plans that this would aid rapid scale-up as part of the Covid-19 response and avoid local business case work. However, a few projects explained that they were not aware there would be separate funding for licenses when they submitted their bid for implementation funding, making it difficult to plan accordingly. Despite it being made clear to projects that the license funding from NHSX was only for one year, some projects expected that funding for future licenses may be made available through their CCG. The non-recurrent

funding for licenses was therefore felt to be inadequate to generate evidence to make the case for procurement via other channels, leading to some concerns at the project-level regarding the sustainability of this funding model. It also made it difficult to plan and justify implementation of the project considering the license would only be usable for a year.

Wider relevant context (from the adult social care research):

A barrier to implementing technology with social care has been found to be finance and costs: This was the most frequently mentioned barrier. Those citing this as a barrier explained that they were working in organisations where finances were very limited, and any expenditure needed to have a clear purpose and benefit.

Through the NIC, a programme of masterclasses and national events were delivered on subjects such as Statistical Process Control (SPC) charts, health economics, and evaluating impact. Monitoring data from NHSX indicates that two NIC events (with an average of 170 attendees), four benefits masterclasses (with an average of 85 attendees), and three thought leadership events (with an average of 50 attendees) have been held. These masterclasses and national learning events were felt to be very useful by those who attended them and helped projects to situate themselves within the broader context of the programme (something projects viewed positively). There was also evidence that collaborative networks among projects had been established through some of these events. However, some projects mentioned that it was difficult to make time to attend these events, especially given the pressures and time constraints brought about by Covid-19. In these instances, the interviewees did not seem to be aware that the videos were made available on the Innovation Collaborative workspace on the FutureNHS collaboration platform, something which was planned from the outset of the programme to address anticipated demands on the system.

In addition to the above points, some projects reported that the collaborative networks created through the NIC were helpful in addressing project-specific problems, and they could see the long-term benefit of continuing to collaborate in this capacity.

4.4.4 Gaps and improvements in the support offer

Organisations felt that the visibility of the national programme could be improved, however, the stratified nature of the programme was acknowledged as a fundamental challenge here. Some organisations also felt that there could be more clinical leadership at the national level to ensure buy-in from GPs and other healthcare professionals.

The timescales for bidding and delivering projects, especially in light of the increased requirements from the Covid-19 response previously mentioned, were felt to be too short and unrealistic. It takes time to build staff trust in the technology, and the reliability with which it feeds into organisations' clinical management systems. For this reason, the speed of implementation could act as a barrier. In some instances, care teams' trust in the digital platform has been enhanced through iterative evaluation activity which was used to demonstrate the intervention's value to organisations.

For example, one interviewee at the regional level explained that they consistently had to turn down funding for procurement due to the two-week time frames, and little notice about additional funding being made available; as the procurement funding was not distributed with these timescales at the national level, this is likely due to variable communication within regions. Generally, projects and sub-regions felt that due to the complex nature of implementing remote monitoring solutions within their region, a

prolonged period to respond to the brief and fully think through the strategy and benefits would have been more suitable. In one instance, a project reported that they had been put up for the funding by their regional or ICS team without being consulted; they attributed this to a lack of timing to respond to the brief.

Producing the highlight reports were often felt to be burdensome. Projects felt that they tended to focus on the number of users of the project, an output that was not always applicable to systems-level interventions and required reporting against impacts at a point when projects were still in the scoping phase. The frequency in which data was requested (with some projects reporting weekly update requirements), was also felt to be too regular to be of use. As national reporting requirements were monthly, this weekly frequency was likely to have been a regional requirement.

"We came up with a whole list of things that we wanted to do that would support what we were already doing but I personally feel that the focus [of the highlight reports] is very narrow and it's very prescriptive on [low] numbers of people in the care homes who are receiving support and number of care homes on board. And some of the other solutions that we proposed were much wider, but I think there were real issues with the funders and pinning things down"

Project level interview

Regarding benefits realisation, it was commonly noted that reporting timescales and lack of capacity due to Covid-19 pressures did not allow the time to set up and begin to deliver projects; additionally, the articulated benefits were generally felt to be realised in the long-term. This appeared to stem from an underestimation of project requirements on the part of the project team in some instances, as well as a tendency to over promise project outcomes in response to annual funding cycles. For example, one project focusing on Annual Health Checks (AHCs) explained that they would not see any improvements for at least a year. Therefore, most projects explained they will see benefits emerge during this financial year (21/22) rather than 20/21.

Although some found the Innovation Collaborative workspace on the FutureNHS collaboration platform useful, most interviewees we spoke with found it difficult to navigate. They were particularly critical of the layout and usability of the site and often described the site as overwhelming. It should be noted that these findings pertain to an older version of the Innovation Collaborative workspace on the FutureNHS collaboration platform, which has since been updated.

4.5 Non-programme support

Outside of the programme support offer, projects also received support from external organisations. This commonly included advisory support and additional staff capacity often delivered through digital suppliers and AHSNs (who were sometimes funded through RSP implementation funding), as well as additional funding channels, generally provided by CCGs or ICSs.

4.5.1 Support from suppliers

Projects were generally positive about the support they received from digital providers. Project leads who were in communication with suppliers generally found their support teams to be responsive and flexible (although this varied somewhat depending on the digital provider). Projects which had pre-existing relationships with digital providers were especially positive about this relationship.

4.5.2 Support from AHSNs

Several projects reported linking with their local AHSN for additional support on developing the initial bid, introducing the project team to key stakeholders in the region, and providing additional staff capacity. This support was offered through a prior agreement with the AHSN, through additional funding channels, or using RSP implementation funding.

Although there were a few exceptions, the support provided by AHSNs was generally felt to be valuable. Areas where projects felt AHSNs had provided effective input include developing the initial bids, linking projects with stakeholders, and providing bespoke support to projects including extra resources.

5 Adoption and benefits realisation

Driven by the wider Covid-19 crisis and ambitious implementation timescales, the programme has led to substantial adoption of remote monitoring technologies since its commencement. The evaluation has found substantial qualitative evidence of early positive outcomes materialising for patients, staff and the wider systems of health and care targeted by the funded interventions and is starting to collate more robust evidence driven by projects' own analysis. At the time of writing, this is happening in several projects, but this evidence is likely to build.

While there were differences in how regions managed their allocation of funding and how they chose and defined projects in their areas, there was no clear pattern in the analysis that this had driven variation in progressing towards demonstrating short and longer-term benefits. The drivers of variation are more a function of projects' own baseline capabilities (including in relation to technology adoption), the effectiveness of the approaches they deployed, how they tackled the challenging task of engaging target groups (whether that be patients or staff such as GPs), and other factors (see chapter 4 for a more detailed summary). This strengthens the case for a national level programme which aims to support collaboration at the project level of the programme.

Evidence on the cost-effectiveness of individual interventions is not available at this point in time, however the wider evidence (see appendices) provides some indication of what evidence the RSP should look to collect, to strengthen the overall case for adoption of remote monitoring.

In this section, the evidence is collated and drawn together to produce an overall assessment of the extent to which the projects have achieved the programme's intended benefits. We draw on several sources including interviews from across the whole programme of fieldwork, project impact stories, and projects' own analysis. Consideration is given to enablers and barriers which have helped or hindered benefits realisation.

5.1 Rapid scaling of digital technology

The rapid scaling of digital technology to support people at home is considered by programme stakeholders to be the central aim of the programme. Uptake of technologies by patients/ service users and staff are two key indicators of this.

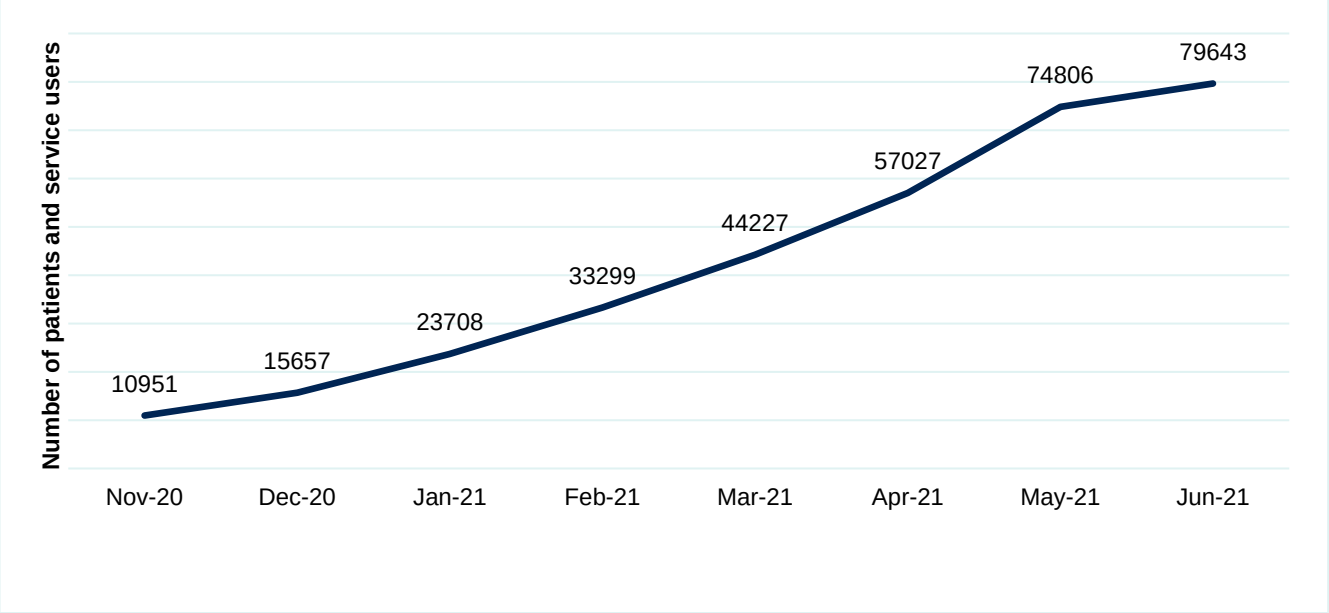
5.1.1 Patient utilisation of digital technology

Figure 5.1:, which draws on the programme's monthly highlight reports, demonstrates the scale of the use of digital technology across the projects. The data is understood to show the number of individual patients and service users that the technology has been used with across the 24 projects. However, the evaluation team has not checked the extent to which the figures that are provided within the highlight reports are accurate or reported in a consistent way across projects. Quality assurance conducted by the programme team indicates some inconsistency in the way in which projects report the figures, which they have corrected where possible.

Programme data[17] shows that 79,643 patients and service users have utilised remote monitoring as part of the 24 projects supported by the programme. This figure was reached through consistent growth of between 5,000 and 18,000 uses per month, between November 2020 and June 2021.

[17] The data used is calculated based on the sum of the utilisation figures included in the highlight reports.

Figure 5.1: Cumulative patient and service user utilisation of remote monitoring over time



Source: NHSX analysis of monthly highlight reports

Further analysis of the data reveals that the scaling of digital technology has not been consistent across the country (see table below). The number of patients and service users who have accessed remote monitoring varies greatly by region; from 1,184 in the South West to 21,882 in the South East. This is related to both variation in the type of projects implemented in each region (some of which were intended to reach larger populations than others) and the speed with which the projects in each region were able to 'go live'.

Table 5.1: Patient and service user utilisation of remote monitoring by region (Nov 2020 – June 2021)

Region	Number of patients
London	10,196
Midlands	3,386
North East and Yorkshire	14,358
North West	16,778
East of England	11,859
South East	21,882
South West	1,184
Total	**79,643**

Source: NHSX analysis of monthly highlight reports

Corroborating the positive response to digital technology at the national level, in-depth interviews with project leads, project staff, and staff using the digital platforms suggested an encouraging and proactive reaction from most organisations. Where there was a lack of engagement, this was generally isolated to specific individuals or organisations (e.g. single GP practices).

Once the projects had 'gone live', a wide range of factors either supported or slowed the scaling of the digital technologies to further organisations and localities. These enablers and barriers are discussed in sections 4.2 and 4.3 respectively.

5.1.2 Anticipated programme benefits

The rapid scaling of digital technology is intended to contribute to a range of desired benefits at the project-level. Some of these anticipated benefits were identified by the 24 projects and collated by NHSX in the National Benefits Register. The benefits anticipated across the 24 projects are outlined in the table below.

Table 5.2: Anticipated benefits (by theme) across the 24 projects

Anticipated benefit	Number of projects
Reduction in emergency admissions	18
Improved patient experience	13
Reduction in A&E attendances	11
Reduction in length of stay	7
Increased capacity for carers	7
Increased capacity for clinicians	6
Reduced GP appointments	6
Reduced Ambulance conveyances	**5**
Improved staff satisfaction	**5**

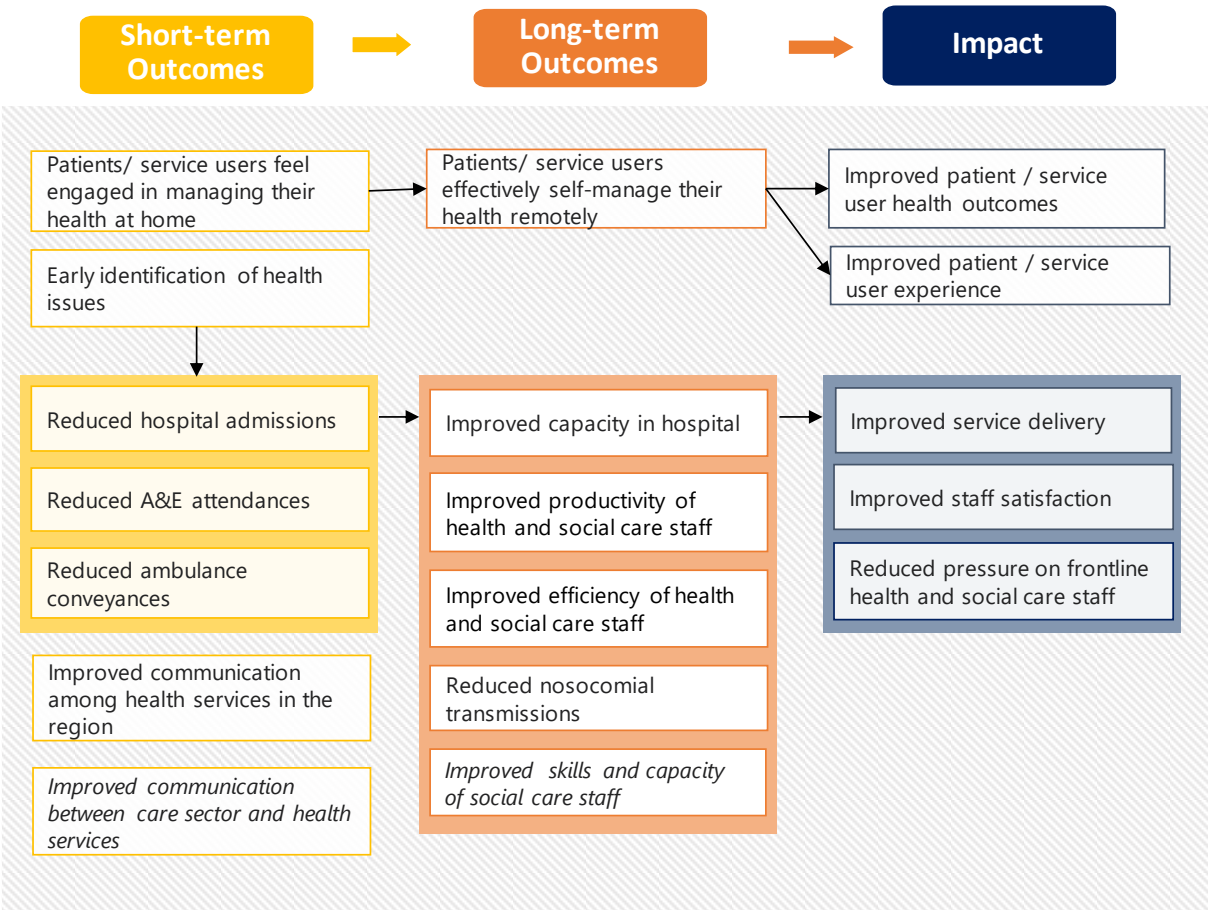
Source: National Benefits Register collated by NHSX

The benefits anticipated by projects and detailed within the National Benefits Register align with benefits identified by the evaluation team during the scoping phase of the evaluation. These benefits are described in the evaluation 'Theory of Change' and illustrated within the evaluation logic model (see below).

The logic model divides the benefits identified in the National Benefits Register into short-term benefits (i.e. reduced pressure on primary and secondary care), and long-term benefits (i.e. improved patient experience, improved staff satisfaction and increased capacity). In addition to these benefits, the evaluation team identified a number of shorter-term benefits that are hypothesised to mediate between the intervention and longer-term benefits. These shorter-term benefits include increased patient engagement and improved communication between health services in the region.

The key groups of benefits are discussed in turn in the sections that follow.

Figure 5.2: Anticipated project level benefits resulting from rapid scaling of digital technology



5.1.3 Benefits emerging over the shorter term

Patients engage to effectively manage their health at home

The case for change underpinning the programme's objectives includes using technology solutions to encourage patients and service users to engage in the management of their health and care at home. As such, the Theory of Change supposes a causal link between the scaling of remote monitoring, engaging patients and service users to manage their health at home, and patients'/ service users' ability to manage their health conditions. It should be noted that this latter point, which can be partly captured in the concept of patient activation (which has been defined as a person's knowledge, skill and confidence to manage their health and health care[18]), was given less prominence in the early stages of programme development. The priority for the programme at this time was to scale remote monitoring to enable people to manage their health and care better in the home. This need, at the time, was driven by the pandemic. This is one reason that a formal approach to measurement of these patient outcomes was not built into the programme from outset.

The evidence scan provides supportive evidence for this link. For example, remote monitoring has been associated with increased compliance to care plans, resulting in a moderate to large improvement in

[18] Hibbard JH, Mahoney ER, Stockard J, Tusler M (2005). 'Development and testing of a short form of the Patient Activation Measure'. Health Services Research, vol 40, no 6, part 1, pp 1918–30

diabetes management compared to usual care.[19] Similar effects have been observed in relation to COPD and heart failure.[20]

The in-depth interviews with project leads, project staff, and the staff using the digital platforms is suggestive of the potential for the technologies to facilitate increased patient engagement and activation towards managing their health conditions as a result of the technology. Specifically, interviewees observed that remote monitoring had helped to:

- Ensure that patients and service users who have difficulty attending face-to-face appointments continue to engage with their health on a regular basis. For example, one project enabled a large number of patients to complete the pulmonary rehabilitation programme, which the Covid-19 pandemic would have otherwise prevented.
- Increase patients' and service users' accountability for compliance with their care plan and providing a way for them to record their progress;
- Increase patients' and service users' familiarity with their own health status, and how this varies over time, by taking regular health observations; and,
- Improve patients' and service users' relationship with health and social care staff by providing informal means of communication.

"Patients are able to monitor their health much more effectively. The platform helps provide education around lifestyle because patients can check their weight for example, and this makes them more aware of the changes they can make in their life."

Project impact story interview

Despite the clear potential, and supportive evidence base, for remote monitoring technology to support patients to manage their health conditions, some interviewees had observed patients losing confidence in self-management over the course of the Covid-19 pandemic. As a result, patients were increasingly seeking reassurance from clinicians in scenarios that would not have previously phased them. While the source of this anxiety was considered to be the Covid-19 pandemic, rather than remote monitoring itself, clinicians voiced concerns that it may have a negative short-term impact on patient uptake of remote monitoring technology.

"There's a shift that has happened psychologically where people may not have been frightened about diabetes or other things, but they are now. I don't know if it's because they haven't been out much, or they haven't had access to doctors, but a number of our staff are saying that more reassurance is needed than before."

Project impact story interview

A further concern noted by interviewees was that giving patients the responsibility for taking health observations may cause anxiety among some patients. Interviewees mentioned, for example, that this could lead to excessively frequent health readings or increased sensitivity to small changes in these

[19] Imison et al. (2017). Shifting the balance of care: Great expectations. *Nuffield Trust*. (Retrieved from: https://www.nuffieldtrust.org.uk/files/2017-02/shifting-the-balance-of-care-summary-web-final.pdf); Queirós A et al. (2017) Remote Care Technology: A Systematic Overview. Stud Health Technol Inform. 242:111-118; Eze ND et al. (2020) Telemedicine in the OECD: An umbrella review of clinical and cost-effectiveness, patient experience and implementation. PLoS ONE. 15(8): e0237585

[20] Taylor M et al. (2021) Does remote patient monitoring reduce acute care use? A systematic review. BMJ Open. 11: e040232

readings. It was acknowledged by interviewees however that this risk of anxiety is exacerbated due to the Covid-19 pandemic and may therefore be less of a concern in the future. But we heard too, that clinicians are already considering patients' needs when deciding whether or not they should be offered remote monitoring. For example, those at risk of health anxiety or those who had a fixed routine already may not be well suited. In contrast, those who are newly diagnosed, or live in a rural location, may be particularly suited. This aligns with findings from the evidence scan, which showed that patients in remote or rural communities generally prefer remote monitoring solutions to face-to-face appointments.[21]

"Everybody's worry now is "People get too obsessive about the saturation readings, and they get too dependent". I think that's a bit patronising towards patients. I think if you give people the right tools, they're okay with them, but I think people have got really frightened in these last 12 months."

Project impact story interview

Overall, although interviewees had often seen the activation of patients through the use of remote monitoring, there was recognition that the context in which this had taken place is an unusual one. Some interviewees stated that it was challenging to draw conclusions about the longer-term impact on patient engagement based on experiences during the Covid-19 pandemic.

Reduced pressure on secondary care services

The programme's case for change also drew on the possible value of remote monitoring activity in reducing demand for secondary care services (including through reductions in measures of hospital use such as admissions and ambulance conveyances). Two possible causal drivers for this are set out in the programme theory of change:

- Firstly, among those with acute conditions, remote monitoring means that patients are less likely to require admission to hospital for observation. In cases where patients do require admission, they can be discharged sooner as they will continue to be monitored at home.
- Secondly, among those with chronic conditions, the ability to quickly identify deterioration in patients' health status allows improved condition management before the need for admission arises.

The first of these is particularly relevant to the current Covid-19 context, while the second has longer-term applicability.

Again, the evidence scan offers supportive evidence in this area. One review reported that non-invasive remote monitoring had reduced admissions in 47% of studies related to cardiovascular disease and had reduced A&E attendance in 30% of studies relating to COPD. The majority of the remaining studies reported no change in use, with very few reporting increased usage.[22] A review by Queirós et al.[23] noted that conditions in which remote monitoring has been shown to be particularly effective – namely diabetes, COPD and heart failure – share the risk of acute exacerbations, particularly if the condition is poorly managed. Therefore, this suggests that remote monitoring may improve proactive identification of

[21] Rouleau G et al. (2017) Impact of Information and Communication Technologies on Nursing Care: Results of an Overview of Systematic Reviews. J Med Internet Res. 9(4): e122

[22] Taylor M et al. (2021) Does remote patient monitoring reduce acute care use? A systematic review. BMJ Open. 11: e040232

[23] Queirós A et al. (2017) Remote Care Technology: A Systematic Overview. Stud Health Technol Inform. 242:111-118

deterioration in patients' health status, in turn improving the management of their condition before admission is necessitated.

In the project impact stories, many interviewees stressed that it was too early for them to make robust conclusions about the impact of remote monitoring on secondary care usage. There were several reasons for this including the need for data over a longer time period (particularly given the recent volatility of the health and care sector) and IG challenges that prevented access to all required data sets.

Nonetheless, the interviews and monitoring information (drawn from a range of sources) reveal empirical evidence of reduced pressure on secondary care services in some regions. The quality of this evidence varies, and interviewees admitted that it was challenging to isolate the impact of the remote monitoring intervention from other interventions happening concurrently. Examples of this evidence include[24]:

- East of England: A&E attendances reduced by 6.04% (331 residents) in care homes with remote monitoring compared with 2.47% (22 residents) in care homes without remote monitoring. *(Source: March 21 Highlight Report)*
- East of England: Emergency admissions reduced by 7.73% (367 residents) in care homes with remote monitoring compared with 5.54% (31 residents) in care homes without remote monitoring. *(Source: March 21 Highlight Report)*
- Midlands: A 50% reduction in re-admission rates amongst patients supported by the Covid-19 virtual ward, saving 288 hospital bed days between January and April 2021. *(Source: NHSX case study, July 21)*
- North West: Of 263 patients with oxygen saturation levels below 92%, only 48 were referred to hospital for treatment with the remaining patients monitored remotely. This resulted in 215 avoided hospital attendances. *(Source: March 21 Highlight Report)*
- North East and Yorkshire: Each care home using remote monitoring has an average of two fewer emergency admissions per month compared with the same care-home pre-covid *(Source: NHSX case study, July 21)*.
- South East: Over 670 A&E attendances were avoided, and 350 hospital bed days saved by April 21 as a result of the project. *(Source: April 21 Project Course Report)*

By June 2021, at the time of reporting, no empirical data relating to secondary care usage had been provided by the London or South West regions. However, even where empirical evidence was lacking, interviewees were able to provide anecdotal evidence that remote monitoring had prevented individual patients needing to be admitted to hospital. For example, in cases where an individual's conditions deteriorated, remote monitoring provided confidence, both to staff and the patient, that it was safe for them to remain at home while being monitored remotely.

[24] This evidence was drawn from a range of sources including the project impact stories, Highlight Reports, NHSX case studies and Project Course Reports. The evidence has not been verified by the evaluation team and, in some cases, projects cautioned that the analysis was in its early stages.

"Nurse trainers report that over the last few weeks, they've seen some homes take huge strides, in terms of the number of patients that they're keeping in the homes, the number of conveyances to hospital going down, the number of avoidable admissions almost being zero, which is huge for some homes. Some homes used to have loads, and now have none."
Project-level interview

"There was a patient that used to be admitted to hospital all the time and since he has been on remote monitoring, he has not been admitted at all. His symptoms are at a point where, in the past he would have just taken himself straight to hospital, and now, because he's got this system, he thinks it's the best thing since sliced bread because someone is watching."
Project impact story interview

In summary, although robust empirical evidence of the impact of remote monitoring on reducing pressure on secondary care is not widely available, there are encouraging early signs that the projects are realising the intended benefits. Based on this insight, coupled with longer-term findings from the evidence scan (as detailed earlier in this section), it is anticipated that these positive impacts will be confirmed in time, assuming continued progress with delivery. Indeed, several of the projects we spoke to have plans in place to conduct robust analysis once sufficient data is available later this year.

Improved communication between health and care services in the region

The programme team described that the programme should contribute to improved communication and integration between services where projects are based. Previous case studies have identified evidence of this outcome.[25] For example, after implementing a digital health platform during the Covid-19 pandemic, the study found that care homes demonstrated improved communication between GPs and carers.

Across the study methodology, we have gathered encouraging evidence in this respect. We have found that the technology itself has acted as a tool to improve the efficiency of communication between services.

For example, in the South West region, the Collaborative Care Lists increased visibility of patients' positions on the care pathway, enabling identification and mitigation of bottlenecks. The availability of this information reduced the need for staff to collate this information manually by telephoning multiple health services; "playing phone tag".

"It's saved us time in the long run. Especially clinical time because they can see what's going on. They don't have to do another phone call, another email. So, communication wise it's probably saved – even for our admin teams – up to an hour a day."
Project impact story interview

It should be noted that although these projects have increased the efficiency of communication between staff, they also have the potential to reduce the amount of contact that staff have with each other in the long term. Mitigating this risk, however, some interviewees suggested that equitable access to

[25] Masconi-Yule K. (2020). Innovation collaborative: Rapid review of current remote monitoring in care homes across the UK. Health Innovation Network South London.

information reinforces the interconnectedness of health and social care services, creating feelings of inclusivity that will lead to collaboration.

Aside from the communication efficiencies conferred by improved access to data, the 'integrating' effect of the programme was evident at other levels:

- The process of designing and implementing projects that involve new care pathways requires strategic input from all services along the pathway, including primary care, secondary care, ambulance services, community teams, and voluntary organisations. This ongoing collaboration led to improved working relationships and opened new channels of communication between services.

"There were some very meaningful conversations between primary care, the ambulance service, and the hospital about the interactions between those services."

Project impact story interview

- In some cases, securing the engagement of multiple health services was felt to have been enabled by the funding model. Specifically, where the funding was given to a consortium of providers, rather than a single organisation, this was felt to help ensure increased collaboration.

- Greater parity of information has led to richer communication between care homes and health services, where organisations are able to support each other, thereby improving care. For example, one interviewee reported that care home staff involved in a remote monitoring project had become more confident and capable when dealing with paramedics and other clinicians.

"Just by working through this project, you can see the value in encouraging innovation amongst care home staff. It shows them that they are a very valuable workforce, because I don't think they've felt that previously."

Project-level interview

Over the course of the project, the interviewee reported that the ambulance trust has developed confidence in the health observations provided by care homes and that paramedics increasingly collaborate with care home staff to deliver improved care for patients.

5.1.4 Benefits emerging over the longer-term

Improved capacity, productivity and efficiency

As detailed earlier in this section, there was general agreement and some emerging evidence that, in the short-term, remote monitoring could lead to reduced pressure on secondary care at a system level. The Theory of Change posits that, in the longer term this should lead to improved capacity, productivity and efficiency across health care services.

In a small number of cases, projects were able to provide early, empirical evidence of these benefits. For example, in the East of England, a small reduction in travel time had been experienced by the clinicians who trialled the remote monitoring equipment (the project intends to collect further evidence of this as the project is scaled). In the South East, it was estimated that the project had saved 261 hours of specialist nurse time (based on 15 minutes per patient to April 21) and 24 hours of consultant time (based on 30 minutes per patient to April 21).

Where projects did not have empirical evidence, interviewees generally felt less able to confirm this benefit at the time of interviews (conducted between one and eight months after the projects reported 'going live'). In part, this may be because – as a longer-term benefit – it is more challenging to evidence at this early point in the intervention. It may also be due to perceptions that remote monitoring placed additional burden on individual staff members. For example, the use of collaborative care lists in the South West has increased the efficiency of communication, especially among clinicians. However, interviewees suggested that this was offset by the increased administrative burden that was placed on other staff. These inefficiencies had partially resulted from the speed at which the project had been implemented, which had precluded the possibility of creating a more integrated bespoke digital solution.

"Communication wise, it's probably saved admin teams up to an hour a day. But they're probably doing at least an hour's data entry more than they were doing before because they haven't been able to completely drop their other systems, and because it's so reliant on manual data entry."
Project impact story interview

Similar concerns were seen in relation to virtual wards. Interviewees described how virtual wards – while seen to be effective from a clinical perspective – placed a large additional burden on individual clinicians, some of whom monitored virtual wards as well as conducting face-to-face clinical work. Again, the causes of this additional burden were complex, resulting from the intersection of weaknesses in the digital platform, human error, and the requirements of standard operating procedures.

"It has brought them additional work - they need to access the data provided through the platform regularly and contact the patient if alerted - this includes a consent process and documentation. The alerts that are coming in are often faulty because patients input their data wrong - but they still need to act on these faulty measurements."
Project impact story interview

Finally, an early report from the social care sector supported this pattern. Although the digital platform enabled staff to secure clinical attention for their residents more quickly, senior care home staff highlighted that, in the early stages of using a new remote monitoring tool, it was time consuming to develop best practice protocols for its use.

Exacerbating the challenge of this additional burden, some interviewees were concerned that CCGs and ICSs were not fully aware of the value and main activities of virtual wards. For example, one interviewee reported needing to regularly prompt the CCG to include virtual wards in their system capacity metrics. In the longer term, there were concerns that this could lead to a lack of resourcing for remote monitoring projects. Increased resource requirements as a finding warrants further evaluation.

Improved patient experience

Across the projects, relatively little systematic monitoring of patient experience had been conducted at the time of interview. One exception to this was the South East Covid-19 virtual ward, for which a patient experience survey has been conducted. However, interviewees were able to provide anecdotal evidence of patients' responses to remote monitoring and in a number of cases (for example in the Midlands and

East of England) had detailed plans to monitor patient experience once the projects were more established.[26]

It was notable that patient experience was most frequently reported in relation to remote monitoring projects focussed on Covid-19 patients. Interviewees described the reassurance that the projects provided to patients; particularly in cases where patients had concerns about being admitted to hospital. In many cases, patients built good relationships with the clinical staff providing the service and were disappointed when they were discharged from the service. This finding contrasts with concerns voiced by some clinicians, as described earlier in this section, that remote monitoring would cause some patients anxiety.

"Many of the patients were isolated and quite frightened. The early information we're getting back from our patient questionnaires is that they really appreciate the service."
Project-level interview

"It was overwhelmingly positive how patients felt about the project during what was really a pretty frightening time."
Project impact story interview

Among remote monitoring projects which focussed on patients with long-term conditions however, patient feedback was less consistent. For example, in the East of England the response of patients with heart failure has been mixed, with some patients asking to be removed from the service for a range of reasons including the burden of providing the readings and the belief that remote monitoring was no longer beneficial to them.

"I've actually had a few patients ask me if they can stop it. Some patients - perhaps the younger ones who are going out to work - find the readings and entering the details in their phone quite a lot to have to do. And some people get to the stage where they're feeling better, and they just want to get on with their lives. They don't want to be monitoring blood pressure every day."
Project impact story interview

It was noted that newly diagnosed patients appear to be more open to the technology compared with those who had been managing their condition for longer. The interviewee suggested that this may be because they place greater value on the additional reassurance that the technology provides. This also concurs with findings identified through the evidence scan, which showed that patients who frequently consult with clinicians to manage long-term conditions are more likely to prefer a face-to-face appointment to a video consultation.[27]

Among the projects within care homes, interviewees noted that residents had displayed increased trust in care staff to conduct the health observations and were increasingly feeling reassured by the care staff's ability to do so. As noted earlier in this section, this coincides with the care staff's own increasing confidence in working with health observations.

[26] It should be noted that Ipsos MORI, as part of this present evaluation, is collecting patient feedback on a small selection of interventions. This work is expected to complete in August 2021 and will complement findings in this section.
[27] Orlando J et al. (2019) Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. PLoS ONE. 14(8): e0221848

"Initially, it was "oh, you're a carer, you don't know how to take my blood pressure etc." But now residents are seeing carers being able to deliver care one step further. A doctor or nurse used to come to do the observations but now residents are enjoying that the carer can check their wellbeing."

Project-level interview

6 Sustainability

For the programme's intended long-term impacts to be achieved, the benefits of the projects must be sustained beyond the programme. When approaching sustainability, interviewees described two key areas of focus: re-purposing the digital platforms appropriately and securing financial sustainability.

Building on learning

Underlying the strategic goals of all projects was the aim to strengthen health and care systems to be better able to support patients and service users with long-term conditions. Across many of the projects, the use of remote monitoring was central to the management of long-term conditions during the Covid-19 pandemic. However, it was clear from the project impact stories that since the initial design of the projects, the staff involved have learned a lot about the strengths and weaknesses of the digital platforms and the models of delivery they have adopted. As the Covid-19 pandemic eases, many of the staff described how they will build on this learning to create a sustainable long-term approach to remote monitoring.

For example, in projects where remote monitoring may be repurposed to COPD, heart failure, or diabetes cases, careful consideration is being given to the characteristics of the patient cohorts, and the appropriateness of the technology for them. Other redeployment opportunities that staff are currently exploring include the creation of a virtual frailty service over the winter months, with the aim of avoiding admissions or enabling early discharge of patients.

Project impact story: Moving towards a hybrid model of care

In the East of England, the programme has enabled the pulmonary rehabilitation programme to be transitioned to remote monitoring for the majority of patients. However, as the pandemic eases and restrictions are lifted, staff plan to transition to a hybrid model of care.

In the case of pulmonary rehabilitation, the staff plan to resume the original face-to-face sessions in most cases, with particular educational elements of the programme being delivered digitally. The project staff view face-to-face delivery of the rehabilitation programme as preferable as it enables the assurance that participants are engaging in physical exercises correctly and safely. The British Thoracic Society advises that face to face rehabilitation should be conducted wherever possible[28].

"Face-to-face is gold-standard. That's our guidance. So, when the guidance allows us to do that, we would like to do patient exercising face to face, and then access the education element digitally." – Project impact story interview

However, the fully remote monitoring option will be retained for patients for whom this is more appropriate (for example, patients whose work precludes them from attending the twice weekly rehabilitation sessions or patients with agoraphobia). The staff are pleased to be able to offer this flexibility to patients.

In addition to use among a subset of pulmonary rehabilitation patients, staff have identified that remote monitoring will be particularly appropriate for the long-term management of patients with respiratory conditions once they have undertaken rehabilitation, and to monitor those who are

[28] https://www.brit-thoracic.org.uk/document-library/quality-improvement/covid-19/pulmonary-rehabilitation-reopening-services-for-the-business-as-usual-participants/

experiencing acute exacerbations. In these cases, remote monitoring will reduce the need for patients to be admitted to hospital for observation.

Financial sustainability

Across the interviews, several different models of sustainability were described. In most cases, in order to continue once the programme funding ends, projects are reliant on additional funding. The funding was generally required to pay for the digital product's license fee, but in some cases, it was also required to maintain capacity within the project team for onboarding, support and management. Across these projects, there were two main approaches:

- Build a value proposition to secure funding from commissioners: A significant proportion of projects had well-developed plans to evaluate the benefits of the intervention, with the ambition of creating an evidence base to make the case for additional funding from commissioners. In most cases, projects taking this approach were confident that, if the project could be shown to be successful, the funding would be secured from their CCG or ICS.

- Bidding for funding from external sources: A similar proportion of projects anticipated bidding for funding from external sources. Although NHSX has communicated that there will be no further licence funding for 2021/22, in some cases interviewees nonetheless believed that NHSX might make further funding available. The future reliance on external funding was particularly prevalent where short licensing agreements meant that it would not be feasible to create an evidence base before the programme funding ended. Further support from the programme to identify other potential sources of external funding would be valuable to the projects, while ensuring that the progress made throughout the programme is not lost.

Interviewees noted that ongoing funding for both license and implementation costs is required to ensure sustainability. For example, as new care staff are recruited, they need to be trained to use the tools. Without the central project team to train them, the technology may not continue to be used with such intensity.

In a smaller proportion of cases, it was anticipated that no further funding would be necessary to continue the intervention (although without funding some did suspect that their pace would slow). In these cases, projects had often placed a specific focus when designing the intervention to ensure that minimal ongoing central resource was necessary. For example:

- One project chose to train GP practice staff to onboard patients and review monitoring data from the start of the project, rather than having this centrally managed by either the project team or technology provider and be forced to transition later.

- One project emphasised the importance of embedding the technology into existing processes, rather than adding further burden to clinicians' workloads. By streamlining the processes, more of the processes associated with the project can sit with clinicians.

"The thing that does worry me about oximetry is that it's going to be difficult for the practice to take back because they're so used to someone else looking after oximetry patients."

Project impact story interview

A number of projects viewed the programme funding as an opportunity to implement a new model of care which, once proven, could be applied to other patient cohorts or pathways in the local area, and further afield. In some cases, project teams advocated the creation of a toolkit, describing best practice and lessons learned that could be used locally, but shared nationally.

7 Key findings, conclusions and recommendations

This section presents an overview of the evaluation findings, then sets them in the context of the wider evidence base. It assesses the strengths and gaps of the current evaluation, providing a set of recommended next steps to improve the impact and outcomes of this programme and wider remote monitoring work. It concludes with a set of recommendations for the programme team and NHSX to consider.

7.1 Key findings

1. **The programme engaged health and social care organisations with a wide range of self-reported digital maturity levels.**

   Notably, the level of digital maturity among care providers participating in the programme was particularly low.

   Among organisations with low self-reported digital maturity, the pandemic was a key driver of participation. Interviewees suggested that the urgent service challenges stemming from the pandemic resulted in a culture of increased openness to digital products (both among staff and service users), which had facilitated their participation.

   The variety of organisations willing and able to implement remote monitoring solutions suggests that the programme has identified a significant unmet need in health and social care. Indeed, a wider review of the evidence suggests that action on remote monitoring technologies at this national scale has not been attempted before.

2. **All funded projects achieved some level of adoption of remote monitoring (by patients, service users or staff) by March 2021.**

   Although it should be noted that the scale of adoption varied considerably by project, by June 2021 79,643 patients and other users had been onboarded onto the projects nationally.

   For the majority of projects, the introduction or scaling of remote monitoring involved fundamental re-designs to models of care, including where care was delivered, who delivered it and referral pathways. Given the challenging context in which projects were delivering these major changes, the implementation progress met the expectations of regional and project leads.

   However, the success of further scaling of the digital platforms has varied. In many cases, the initial usage of the digital platform was limited to single localities or organisations, with wider scaling of the project continuing at a slower pace.

3. **The evaluation identified several characteristics of health and social care organisations which supported successful implementation of remote monitoring.**

   Nearly all projects reported that engagement with local organisations was a key enabler to successful project delivery. Engagement was often facilitated by a clinical digital champion (a role that was often supported by implementation funding) who was responsible for approaching target organisations to demonstrate the value of the digital product. Regular engagement with

stakeholders, for example via working groups, was also deemed important by a number of projects.

Effective leadership of the project team was highlighted as another key component of successful project delivery. Specifically, multi-disciplinary leadership teams (including those in management, clinical and operational roles), which were trusted by senior management to make decisions independently, were considered crucial to implementing the project within the short timeframes of the programme. Where projects experienced challenges in delivery, this was sometimes attributed by interviewees to a lack of clear leadership.

Despite the programme ambition to align with improvement science, this was not a commonly discussed theme during interviews. This alignment could potentially help with both engagement and leadership.

4. **A range of barriers relating to both technological and human factors were reported by projects.**

   To address these barriers projects often relied on implementation funding; this was enabled by the flexibility of the funding model adopted by the RSP.

   An example of this was that in organisations with low levels of self-reported digital maturity, projects reported that significant investment was required to train and secure engagement from staff. In some cases, it was identified that there was a lack of awareness of the resources provided by the NIC to support projects in these tasks. For example, data sharing agreement templates – which for some projects were identified as a barrier - were made available on the Innovation Collaborative workspace on the FutureNHS collaboration platform for the duration of the programme.

   Despite the challenges presented by a lack of self-reported digital maturity, projects also expressed that the pre-existing presence of legacy digital systems was not necessarily beneficial either. In these cases, projects described having to dedicate additional time and resources to convince organisations to switch to the new system. This challenge was particularly salient where systems were not interoperable, necessitating organisations to switch between multiple systems.

   Securing staff engagement was also identified as a challenge by some projects. The perceived usability and effectiveness of the digital platforms by staff were mixed. In some cases, where digital platforms were not felt to be delivering their promised functionality, staff raised concerns about increased workload and were subsequently more likely to disengage from the project.

5. **The highly devolved design of the RSP meant that programme resources were directed to those projects which were considered by regional stakeholders to be most capable of success.**

   This approach is reflected in the highly varied activities, condition focus and technology solutions used across the 24 projects. Many interviewees from organisations overseeing projects reported that this local tailoring had helped engage local organisations, and this had driven rapid implementation.

   However, the extent to which project teams were devolved from the central programme, and the large role of the regional organisations, appeared to have caused some inefficiencies. For

example, there were reports of delays to funding being received by some of the project-teams, despite it having been released in a timely manner by NHSX.

Furthermore, ensuring successful communication across the system was found to be challenging, which may have contributed to some projects being unaware of the full national support offer.

6. **Projects that engaged with the full range of support offered, felt it had increased their chances of success.**

   The key areas of support mentioned by projects were the implementation and license funding, the opportunities for collaboration provided by the programme and the Spark DPS. However, some of the organisations interviewed were unaware of the support offers available outside of the RSP funding. Therefore, ensuring there is awareness of the offer across all tiers of the programme, especially project-level teams, is advised.

   The implementation funding was the most recognised area of support and was viewed as central to scaling remote monitoring. Indeed, a strong theme across interviews was that without this aspect of the programme, no significant progress would have been made. The license funding was also viewed as valuable, although concerns were expressed about how to identify future funding sources for this once the initial agreement is finished.

   Among those who had accessed it, the contribution the NIC support made to enabling collaboration was particularly noted, and this helped kick-start some projects. Given this feedback, the 'Collaborative' model is certainly worth considering in future large-scale programmes (particularly where the wider context is less challenging, which would, in theory, leave projects more time to engage with the support).

   Finally, the Spark DPS, which was developed by NHSX to enable rapid procurement of digital platforms, had limited uptake by projects. Those who used the Spark DPS reported that it gave them confidence in the digital products being implemented. However, others reported that greater curation of the projects listed on the Spark DPS would have increased its utility to projects, especially given the short timescales of the programme. As a result of these challenges, many projects used an alternative procurement approach other than Spark DPS or procured solutions directly.

7. **The programme should also be encouraged by the variety of short-term benefits that were evidenced by both health and social care organisations.**

   Benefits for patients, service users, staff and local systems of health and care were evident across most projects. The evidence we have collected is mostly early-stage and qualitative, but this is to be expected given the timing of the evaluation. However, several projects were able to offer more robust data (drawing on an early quantitative analysis). This offers encouraging signs as to the potential longer-term benefits of the RSP.

   Although robust empirical evidence of the impact of remote monitoring on reducing pressures on secondary care is not widely available, there are encouraging early signs that the projects are realising these intended benefits. Based on this insight, coupled with evidence of longer-term benefits from the evidence scan, it is anticipated that these positive impacts will be confirmed in time, assuming continued progress with delivery. Indeed, several of the project teams interviewed have plans in place to conduct robust analyses once sufficient data is available later this year. In

the longer term, reduced pressures on secondary care should lead to improved capacity, productivity, and efficiency across health care services. Few projects were able to evidence reductions in pressure in secondary care at the time of the evaluation. This may be because, as a longer-term benefit, it is more challenging to evidence at such an early point in the intervention.

Across the evaluation, we have gathered encouraging evidence that the programme has contributed to improved communication and collaboration between staff in different organisations. We have found that the technology itself has acted as a tool to improve the efficiency of communication between services. It should be noted that although these projects have increased the efficiency of communication between staff, they may also have the potential to reduce the amount of contact that staff have with each other in the long term. Mitigating the risk of reduced communication between staff, some interviewees suggested that equitable access to information reinforces the interconnectedness of health and social care services, creating feelings of inclusivity that will lead to collaboration.

Emergent evidence on the impact of the technology solutions on resourcing and the workforce impact is mixed. In some cases, we heard that implementing the technologies was time-consuming; other interviewees reported that it had been a timesaver in the longer term. Increased resource requirements as a finding warrants further evaluation.

In the most mature projects, substantial qualitative evidence was provided which offers some confidence that the technology solutions were beginning to have positive effects on patients' and service users' understanding of their condition. We also heard cases of people empowered through the new technology solution to take a more active role in the management of their condition. It was reported by projects, for example, that the technologies increased patients' and service users' familiarity with their own health status, which is a predictor of improved healthcare behaviours and outcomes[29].

However, the evaluation has also observed that because the programme aims were articulated in relation to patients being supported to stay in their homes to aid pandemic resilience, rather than supporting improved activation levels as a primary outcome in and of itself, no formal expectation has been made for projects to measure these outcomes.

8. **Projects have plans to sustain their activities, but there are risks to these which may require programme action.**

Interviewees described two main models for sustaining and building on the progress made during the life of the programme. The first is through building on the learning project teams have gathered over the past few months and applying this (and the technology) in other service areas. Others spoke of building longer-term approaches to using remote monitoring technologies in their organisational strategies.

The second approach (which was described by most projects) is to identify further financial support to continue the work over a longer period, as part of their sustainability plan. This demonstrates that the case for investment in these technologies as part of organisations' core budgets needs to be made. Towards the end of the evaluation timescales, there were examples of this investment

[29] Roberts, S., Chaboyer, W., Gonzalez, R. *et al.* Using technology to engage hospitalised patients in their care: a realist review. *BMC Health Serv Res* **17,** 388 (2017). https://doi.org/10.1186/s12913-017-2314-0

being secured by projects. It also shows the importance of continued evaluation so that the longer-term benefits can be adequately evidenced to help form the value propositions.

7.2 The findings of this evaluation set in the context of the wider evidence base (as summarised through our evidence review in Appendix D)

The programme's aims – particularly in relation to the scale of technology rollout, but also when the exceptional context is considered – were ambitious. There are limited previous examples of similarly scaled national technology rollouts in these circumstances. Given this, the existing evidence base can only offer guidance as to what might be expected. Nonetheless, we have found that findings from the fieldwork conducted largely align with the results of a wider evidence review undertaken by the study team, as well as our existing understanding of programme design in the sector.

7.2.1 Programme design

Several characteristics of the programme's overall design are worth further consideration. The programme adopted a devolved structure, aiming to capitalise on the expertise and local knowledge within NHS regions and sub-regional organisations (such as regional directors of digital transformation and other local digital leads) to ensure that a set of highly tailored projects emerge. Tailoring in this respect means that programme resources were directed to those projects which were considered by regional stakeholders to be most capable of success (in the short timescales). In this respect, it has followed other recent digital transformation initiatives – such as the local health care records programme – in attempting to establish local ownership for projects. There is a sound logic to this approach, and the weight of evidence from this study suggests that it has contributed to progress (relative to how a centrally directed programme may have operated). However, the decentralised model also generates challenges and additional effort for the central team, including pulling together a comprehensive picture of what has been funded, and the progress being made. The layered approach may also have contributed to difficulties in managing individual projects at the local level (from afar) when progress was not being made (and this was certainly exacerbated by the pandemic). Efforts were made to tackle this including the central NHSX team being heavily involved in the weekly pan regional sharing sessions which generated insight about challenges and successes of the projects within the regions.

The programme has had a streamlined central team, partnering with the AHSN Network to deliver much of the support in terms of events as part of the Innovation Collaborative. This model has its advantages, allowing the central team to also focus on contract management, monitoring and the policy implications of the programme whilst providing support to the learning system delivered through the innovation collaboration work.

Finally, the programme is defined by its aim to deliver these technologies at a large scale and at pace. Even given that health and social care programmes often require rapid rollout of an intervention, the pace of the RSP and NIC is particularly striking. The reasoning behind this is fairly straightforward, given the important role that these technologies were to play in the pandemic response. But these timescales have contributed to some frustrations, and difficulties with developing robust evidence given some anticipated impacts are expected to materialise at a later date. The evaluation also found evidence that the required speed of implementation may have obstructed the programme's ambition to align with improvement science. While this was not a commonly discussed theme during interviews, it was notable that many interviewees emphasised the need to 'get it right first time' given the urgency of the requirement. This approach runs counter to the iterative approach advocated in improvement science.

7.2.2 Programme processes

The findings of the present study with regards to programme delivery generally align with the wider literature reviewed. This evaluation highlights the crucial role played by clinical digital champions for technology adoption in individual organisations, as well as dedicated funding to regional coordinating roles. The wider evidence suggests there is value to this approach, with the crucial role of organisational leaders in residential and clinical settings being a strong theme. The role of champions is found to be particularly effective where these individuals have protected time and are actively involved in the specific groups/settings targeted by a digital transformation/ intervention; this was evident in many of the projects we engaged with.

The wider evidence is also consistent with most of the barriers and enablers which were identified as having influenced the delivery of the projects funded by NHSX through this programme. A lack of evidence on the cost-effectiveness of some digital platforms made engagement and buy-in of target users more challenging. An increased workload for staff (administration, training, lack of IT system integration), upfront costs of procuring remote monitoring technologies, and top-down decisions being made at the organisational level with a lack of input from patients, service users and clinicians were also consistent with the wider evidence. A key enabler was the usability of the technology within the current setting and systems. We heard early, qualitative findings in relation to each of these areas; further exploration is advised.

7.2.3 Programme benefits

Our review of the wider evidence base aligns largely with the benefits reported by the programme so far (see appendices). The wider evidence on efficiency gains or savings in the form of non-cash releasing benefits as a result of the introduction of remote monitoring technology varied according to the specific condition being managed. Whilst the wider evidence mostly supported that remote monitoring was more cost-effective compared with in-person clinician visits to the patient’s or service user's home, there was limited evidence to suggest that any improvements in self-management led to a reduction in costs in the long term (although other benefits were commonly reported).

In terms of benefits reported, the wider evidence supports the positive potential of remote monitoring in care homes to reduce service utilisation, including GP referral reduction, reduced ambulance calls and conveyances, reduction in NHS 111 calls and reduced hospital admissions.

Some examples of specific interventions funded by the programme are supported by the wider evidence base. For instance, the wider literature suggests that remote patient monitoring for specific conditions, such as diabetes, was also found to lead to a moderate to large improvement in self-management, leading to superior long-term patient benefits compared to the counterfactual. Automatic patient data transmission, including automatic alarms, and virtual consultations for patients with congestive heart failure was reported to reduce healthcare utilisation compared with the counterfactual, including lowering the number of hospital admissions, and improving mortality.

7.3 High level conclusions

In this section we offer some high-level summative reflections about the programme. Drawing on, and following these, we provide a set of recommendations for action.

7.3.1 Key achievements

Over the past six months, we have observed a programme deliver funding and support to partner organisations to fund a series of remote monitoring technologies. The funding and support have been

warmly welcomed by project teams and this has contributed to swift adoption at large scale across many projects; measured at the programme level, the adoption figures in the time available are significant. Our wider review of the evidence suggests that action on remote monitoring technologies at this national scale has not been attempted before. This supports the programme team's own narrative about the large ambition of the programme, which seems a fair assessment.

The speed and scale of adoption also suggests that the programme has identified, and partly addressed, a significant unmet need in health and care. There are plenty of providers willing and able to implement these technology projects and to do so quickly; other parts of the system (the regions and ICSs) were also happy to facilitate. While the context presented by the pandemic has made the adoption of these technologies more clinically necessary for all projects, the programme's catalytic impact (it was often seen as having provided the final stimulus for teams who had already been considering such approaches) has been tangible.

Looking across the evidence of programme benefits which have been collected, it is striking that the introduction of the new technologies (which are, in general, relatively straightforward solutions for taking/ monitoring people's vital signs, rather than highly advanced and expensive pieces of equipment) seems to have subtly impacted key relationships within the health and social care system. We have heard that the technologies have affected how: patients, service users and their carer or clinician interact (*e.g. patients asking different questions, working together to take readings*); the care teams in a single provider operate (*e.g. carers working in tandem to more efficiently use the technology in an infection safe way*); and, different organisations / clinicians responsible for caring for a patient engage with one another (*e.g. GPs and care homes engaging on a for more equal footing than previously*). This latter observation is particularly notable to the national policy makers focused on encouraging providers to collaborate with one another. It is particularly relevant for NHSX with the recent data strategy[30] recognising its role in using data and technology to aid collaboration across organisations. Future programmes and their evaluations should explore these interpersonal / interorganisational effects in much greater depth.

7.3.2 Longer-term effects and wider scaling

The question of whether this catalytic effect will continue after the life of the programme, with scaling happening beyond the original project footprints (or within project footprints but over a longer time period) is not answerable at this stage. However, we can see some evidence of the programme having helped local teams take the first several steps towards developing value propositions for these technologies to be more widely used. There is ample evidence of uptake by clinicians, non-clinical staff, people, and managers and several voiced their enduring commitment to the technology. Continued support for benefits realisation and wider, robust, evaluation is essential to allow this.

There are many stakeholders ready to support this scaling. The regional offices, ICSs and AHSNs with whom we engaged throughout this study, are supportive and keen to play a role in scaling. Through our fieldwork, particularly in the early stages of the study when we were speaking to those in more strategic roles, we identified and held detailed discussions with a highly skilled, specialised, and focused group of digital / technology experts working across the NHS and (to a lesser extent) social care. Formal and informal networks between these people exist, and these networks were used to respond to NHSX.

[30] Department of Health and Social Care. *Data saves lives: reshaping health and social care with data. [Internet]. 2021 [cited 25 Aug 2021]. Available from: https://www.gov.uk/government/publications/data-saves-lives-reshaping-health-and-social-care-with-data-draft*

NHSX will continue to be the crucial bridge between the policy level and the delivery of healthcare services.

At the project level, the evaluation has identified key roles to support future scaling include programme managers (including from external organisations such as commissioning support units or AHSNs), and local clinical digital champions who can engage target audiences and stakeholders outside of their own organisation if necessary.

7.3.3 Learning about the implementation of these technologies

Another strong theme across the evaluation is the variation in projects' progress and successes. While it is to be expected in all policy programmes that those taking part will experience varied success, the speed and scale of the RSP probably exacerbated this. We have also concluded that this variation is not primarily driven by regional differences, but rather factors which reside at the project level. The most successful projects are those that allied the rollout of the technology with an equal investment in what might be termed 'change management' or, alternatively, the non-technological parts of the programme. Findings from the evidence review strongly correlate with this.

In general, we have found that this programme has supported (through transformation funding) and encouraged (through the NIC's activities) these 'cultural' elements of the projects and so it should remain central to NHSX's thinking about future programming. But, as noted, in some cases, the short timescales and the varied way the pandemic impacted projects challenged their abilities to make this investment in culture change. A further explanation related to the varied baseline of projects / organisations to adopt these new technologies (which we and they frequently termed digital maturity) also seems relevant (although, again, this is something which is to be expected in the rollout of a major programme like the RSP).

There was also variation in how project teams took up the support offered by NHSX. The programme's offer of support hasn't always reached the organisations actually putting the technologies in place. Given the relatively positive feedback offered by those who did take up the programme support, it suggests that the fact that not everyone has taken it up is a missed opportunity. One way to counteract this, which has been successfully used by other programmes in recent years, is to invest heavily in the communications behind the programme. A strong programme brand, social media presence, and targeted communications to particular types of providers have worked to improve uptake of programme support in the recent past. However, for such an investment to be worthwhile, the programme requires a longer lifespan.

The relatively positive results presented here also serve as a clear example of the role that NHSX can play in advancing the technology agenda in health and care and as a possible model (with some amendments) for future programmes. Described at a high level, the programme has: 1) identified a need (and linked this to a strong clinical case for action), 2) invested quickly, and at scale, using regional partners to ensure that funding finds its way to the most suitable local systems, and 3) offered support to projects, particularly around collaboration, which have made it more likely that they succeed. This forms a high-level template for future action.

7.4 Recommendations

This section offers recommendations to NHSX at two levels: the policy/strategic level (senior NHSX decision makers); and the programme level (the programme team).

7.4.1 Strategic/ policy level

Recommendation 1: Clear articulation of future opportunities: NHSX should endeavour to publicise future programme opportunities to ensure the sector is aware of upcoming funding opportunities. If possible, this should set out what funding NHSX plans to make available, with indicative timings for individual funding competitions. Regional offices, ICSs and other stakeholders will benefit from this clarity.

Recommendation 2: Future programme support: The following aspects of this programme's design should be considered for inclusion in future technology uptake initiatives:

- The provision of implementation funding with flexibility on how it is used;
- Using regional teams to target projects based on local need;
- A focus on supporting collaboration across organisations;
- A focus on the workforce and cultural aspects of introducing new technologies;
- Building capacity/tools for local and regional stakeholders to understand the relative benefits and costs of the wide variety of remote monitoring tools available.

Future programmes should also benefit from much needed clarity and structure on information governance through the Information Governance Framework for Integrated Health and Care.

Recommendation 3: Communications. A formal communication strategy should be considered for future programmes. The objectives of the strategy should include ensuring that organisations that take part in the programme feel like they are part of a wider initiative than their own activities, and that they are aware of any programme support made available. This is particularly important for organisations who may be in more need of external support to achieve their goals.

Recommendation 4: Digital maturity in the social care sector: We are aware of other work led by NHSX to improve digital maturity in the adult social care sector. Our findings offer support for NHSX's planned focus on this area of the health and care system. We also suggest that efforts to improve digital maturity in this sector are designed with holistic aims. Individual programmes of support on particular innovations need to be joined up (most probably at the ICS level) to create a coherent offer to the sector. Approaching providers in this sector with a range of different support offers risks confusion or overwhelming these key audiences. We have also identified training and support needs in this sector; meeting these will be essential to maintain and extend the progress made in this programme.

Recommendation 5: Evaluation strategy. In the early stages of major programmes, evaluation strategies need to be designed to define the main evaluation questions to be addressed and set out timetables for studies which match programmes' stage of delivery. For future NHSX programmes, such an evaluation strategy should be prepared routinely as a core programme foundation document. This will ensure evaluations can be coordinated and delivered efficiently, and that project level data collections can be arranged early. Common desired outcomes (as opposed to only outputs) for participant projects should be specified. The role of rigorous evaluation in sustaining programme achievements – at the national and local levels – should be included in this strategy.

Recommendation 6: Funding structures in programmes: Beyond the challenges introduced by the Covid-19 crisis, other factors were identified which resulted in the project set-up phase and scoping

taking longer than expected. Reasons included the need to map out digital maturity across an ICS or CCG, arrange GDPR compliance and Information Governance, or there were delays in agreeing product specifications with suppliers. A phased approach to funding should therefore be adopted. This would include a 3-month seed funding phase for project scoping and set-up preceding a mainstage where the bulk of implementation and license funding is distributed. It would also allow regions / local systems to select the projects promising most added value, based on reviewing progress and results from the seed funding phase.

Recommendation 7: Patient and service user outcomes. NHSX should ensure that patient input is gathered in the design phase of new programmes and that, where appropriate, programme objectives which are focused on the value of the programme intervention to patients' and service users' wellbeing, health, or levels of activation should be included. Following this, programme teams and evaluators should ensure that data collection to support the robust assessment of any patient and service user-focused objectives are embedded from an early stage.

Recommendation 8: Further research and evaluation to support future programme and policy development: The programme's scale and focus provide a rare opportunity for learning about the value of remote monitoring technologies. NHSX should take stock of the different forms of evaluation currently underway across the programme, to ensure that longer-term evaluation needs, as set out in section 7.5 below, are addressed.

7.4.2 Programme team

Recommendation 9: Continued sharing. The programme team should continue to collect and share emerging results from project level evaluations through the Innovation Collaborative workspace on the FutureNHS collaboration platform or encourage publications. There is an appetite from project teams for continued shared learning. It may also help to engage clinicians into projects.

Recommendation 10: Continued collections of benefits data. The programme team should continue to review the quality of benefits data, and review the benefits register in conjunction with any future impact evaluation work planned to ensure data is collected against the anticipated long-term benefits of the programme.

Recommendation 11: Technologies supported. Some issues with underperforming digital platforms were reported, where their assessment during procurement focussed largely on pricing rather than a detailed assessment of the technical and functional value proposition of bids. This suggests that in future, regional and sub-regional stakeholders will benefit from clearer guidance on how products should be assessed, or further support in the form of expert resources to undertake in-depth assessment of a supplier's value proposition as part of the procurement process.

Recommendation 12: Reporting requirements. Reporting requirements and data requests for future initiatives should be commensurate to the progress that can reasonably be expected from projects funded. Any benefits mapping undertaken in the design of such future programmes needs to carefully balance the timings of anticipated outcomes and impacts with a need to report on the cost-effectiveness of such programmes.

Recommendation 13: Procurement. For future programmes focussing on adoption and rapid scaling of remote monitoring, the Digital Technology Assessment Criteria (DTAC) should be used for baseline assessment, coupled with a local specification. If a framework or DPS is established in the future, consideration should be given to the ability to direct award or narrow down suppliers in an agile way.

Recommendation 14: Sustainability. By referring to sustainability plans provided by projects, the programme team should identify common dependencies that may affect the sustainability of projects, and whether any action from the programme or regions may help.

Recommendation 15: Improvement science. NHSX should ensure that projects develop and share plans to apply improvement science methods during implementation. The evaluation identified that the rapid pace of implementation was felt by some projects to prevent the use of these methods. Ensuring improvement science is embedded in plans from an early stage may assist in overcoming this barrier.

7.5 The status of this evaluation, and further recommended work

7.5.1 Strengths of the evaluation

The fieldwork undertaken in this study offers rich qualitative insights into the nature and impacts of regional scaling projects funded; these insights were supported by analysis of the programme's benefits database, and quantitative evidence of early impacts provided by some projects This has provided a detailed understanding of how the funded settings are approaching their digital transformation, what they have learned in doing so, and how they are using remote monitoring technology within their specific context.

The study's methodological focus on collecting qualitative feedback from a wide range of local stakeholders, operating at different levels of the system, has also provided insights into how the introduction of the technology has 'disrupted' existing models of care (generally for the better), as well as impacted on the relationships within local systems. This methodological focus also elicits how the implementation of interventions has differed depending on the specific setting they're implemented in, health conditions targeted as well as the individual products/ technologies chosen.

Through interviews with staff who are in the early stages of using the technologies for the first time, the evaluation provides initial insights into the day-to-day experience of using the tools, what it is like for them to work differently, and an initial view on whether and how the tools are an improvement on the traditional delivery of care.

7.5.2 Future evaluation opportunities

Several possibilities for future evaluation of the initiative have been discussed with NHSX over the course of the present study. These would add significantly to the evidence collected to date and address some key limitations of the present study. Future evaluation activities should look to enable a comprehensive, summative assessment of the long-term impacts and cost efficiencies of the initiative. The following future evaluation opportunities should be explored.

- Evaluating long-term impacts of the national programme: As discussed above, the full long-term impacts of the initiative will only become apparent after further time has elapsed. A comprehensive evaluation of long term-impacts could be undertaken towards the middle of 2022 and should include in-depth consultations with project stakeholders at local level and regional leads to illustrate how the initiative has led to any long-term benefits reported. Allowing more time to elapse will also enable such a future study to build on the benefits realisation evidence collected, as well as economic evaluation studies commissioned by individual ICSs or other settings.

- Evaluating the extent to which, and how, the projects continued or grew their activities after the programme concluded.

- Evaluating the extent to which the programme contributed to scaling beyond the funded projects, how this took place, and the role of ICSs and the regions in achieving this.

- Evaluating the long-term benefits of individual technologies: The present study did not focus on the relative benefits and drawbacks of individual technologies funded through the programme. Therefore, a meta-review of evaluation work commissioned at the project level, complemented with a comprehensive assessment of technologies where no local evaluation has been commissioned, would have value. In addition, further comparative research involving care home residents and NHS patients is essential to understand the experience of such technologies. Such an analysis should also examine more formally relational changes at the organisation level brought about by the introduction of the technologies.

- Economic evaluation: The programme may provide an opportunity for detailed economic evaluation of these sorts of projects to take place. If this is pursued, data collection requirements should be agreed imminently. Our review of the wider evidence suggests that there is a particular need for further empirical research to examine the cost-effectiveness of remote monitoring technologies within residential care settings with larger patient groups, to understand the cost savings materialised and the specific prerequisites for such cost savings. This economic analysis should also explore the workforce changes required to implement the technologies over the short term, then continue to use them over the longer-term. Key questions will include what resources (including in the form of staff time) are required to implement them, and what resources are saved through this.

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