

Office of the CIO

National Electronic Health Record

Vision and Direction



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Foreword

We have set out the overall plan for delivery of a digitally connected health experience – our Knowledge and Information Plan – in June of this year. The delivery of a National Electronic Health Record to enable a transformation in care delivery is a cornerstone of this plan. It is a goal pursued by many countries in order to enhance healthcare provision and ensure sustainability in the face of challenging demands. Importantly, it is essential if we are to achieve truly integrated care in Ireland, allowing our citizens to have a seamless experience across the health system and our clinicians to be well informed in their interactions. Citizens can benefit through increased access to their medical information, enhanced patient safety, and improved care outcomes.

Over the past 6 months we have been in discussions with many stakeholders on the overall direction for a National EHR, including a structured engagement with the eHealth industry to learn from their experiences. This document is based on the discussions to date and on broader analysis of the health landscape in Ireland. It presents our vision for the National EHR and the critical drivers that demand a change in approach to achieve this long term outcome. There is no quick fix in the delivery of an initiative of this scale and we believe that we are embarking on a long term transformation programme, enabled by EHR technology, over a 15 year horizon.

We are now beginning to define what we should deliver over this overall timeframe and how we will achieve the necessary change to allow us to adopt this technology in a meaningful way. Our dialogue with stakeholders will extend and continue, with particular focus on clinical engagement, to enable us to make decisions on programme design and drive out the necessary detail as a case for support.



Áine Carroll



Richard Corbridge



Executive Summary

A National EHR for Ireland

Like many healthcare systems internationally, Ireland is currently on a journey of significant reform in the delivery of healthcare. This is essential to deal with the ongoing challenges across the system, in particular the impacts of an ageing population, and related prevalence of chronic illness, with limited resources. Continuing on the current trajectory is unsustainable.

High quality, comprehensive and accurate information provided in a timely manner is a prerequisite for the delivery of patient centred, efficient and effective care. An Electronic Health Record, containing shareable patient information across health and social care encounters, is a cornerstone of achieving this.

The Office of the CIO has been leading preparatory work to identify the overall direction for a national EHR. This has included an extensive engagement with eHealth industry vendors and other stakeholders. In addition an assessment of the current system landscape in the HSE has been undertaken. This Vision and Direction document outlines the strategic roadmap and rationale for a national EHR.

Vision and Scope

When adopted across the healthcare system the Electronic Health Record will transform the delivery of health and social care by creating shared patient records that are the primary information source for all health and social care professionals. This record can also be made available to patients, service users and carers.

The realisation of this vision across the full extent of the healthcare system represents a long-term goal (circa 15 years) to transform the overall delivery of care. The Electronic Health Record is an important enabler in a programme of change, including new models of care and greater standardisation of care processes and pathways that leverage leading technology solutions.

The scope of the overall technical solution has been defined in a published blueprint, with support from industry. The national EHR will consist of core operational solutions (with functions such as ePrescribing and Case Management), along with the ability to aggregate data from these systems into a comprehensive national record. This record will be accessible via a portal to health and social care professionals, patients, service users and carers. As part of the Knowledge and Information Strategy of the Office of the CIO, the national EHR is defined as a core capability requirement.

Delivery of the programme will incorporate the pragmatic use and leverage of existing systems,

where appropriate and cost effective, alongside procurement of new elements.

The Imperative to Act Differently

Investments to date in elements of the overall blueprint, such as the implementation of the National Integrated Medical Imaging System (NIMIS), provide part of the long term solution. However, the approach and pace of change has been constrained by resources and has resulted in some silos of capability that are not integrated and fully leveraged at a national level.

There is an imperative now to act at in a more strategic manner and at a different scale necessary to achieve wider benefits. There are several drivers for a change in approach:

- *Improving quality of care:* An EHR is essential to address fragmented information, enable sharing of clinical records across multi-disciplinary teams and locations and support collaboration and effective decision making.
- *Enabling reform:* Implementing an EHR provides an essential capability for delivering reform, in particular key programmes such as Integrated Care, formation of Hospital Groups and Community Health Organisations, and the realisation of the Health and Wellbeing strategy. These reforms must be underpinned by better quality shared information.
- *Releasing potential in national systems:* the investments already completed and currently underway can only be fully leveraged to deliver the broader benefits within an integrated national approach.
- *Delivering the digital ambitions of the National Children's Hospital:* the ICT strategy for the hospital features an EHR as a core element. Decisions on this must be taken in the context of an overall national approach which now demands immediate focus on the strategic options.

Immediate Focus

The HSE will now develop a business case which will outline an options appraisal, the scale of the overall investment, the implementation approach and the high level benefits associated with the programme.

A comprehensive consultation with stakeholders from clinical, technical, operational, system leadership and international perspectives will underpin this work.

The HSE is now focused on fully mobilising the National Electronic Health Records programme.

Introduction

“eHealth is a critical enabler of best-practice health systems and optimum healthcare delivery. Embedded in the management of delivery processes, eHealth is essential to ensure significant continuous improvements in efficiency, effectiveness, quality and safety of patient services and underpins organisational transformation and development. The availability of high quality, accurate and timely information is fundamental to enhanced provider-patient relationships with the resultant improvements in outcomes.

It is now accepted that successful reform of healthcare systems and delivery is highly dependent on realising the potential of eHealth as a change catalyst and enabler in addressing the challenges of new and existing models of healthcare.”

eHealth Strategy for Ireland, 2013

This section provides an introduction to the national Electronic Health Record programme and its position within the overall eHealth landscape in Ireland.

Background to document

The current system of health and social care delivery in Ireland is unsustainable without significant reform. There is a recognised need to do things differently and take the opportunity to redesign care delivery with a shift in emphasis from acute care and take the opportunity to leverage technology as part of this change. A national Electronic Health Record (EHR) has been identified as a key capability requirement for the future delivery of healthcare. Its implementation will represent a significant programme of change, including new models of care and greater standardisation of care processes and pathways that leverage leading technology solutions. This document acts as a foundation document for the definition of the national EHR Programme and for subsequent strategies, plans and business cases once the overall roadmap is defined.

ICT within healthcare reform

ICT will be an increasingly critical element in healthcare reform. Ireland is set on an ambitious journey in the reform of healthcare in recognition of the need to radically transform healthcare provision to meet the challenge of delivering sustainable high quality care for the entire population. Information and knowledge are a core asset of our health systems and the provision of high quality, comprehensive information in a timely manner is critical to improving performance across the system. The ability to record and share key information on patients' and service users' interaction across organisations and care settings is a key component of eHealth and will provide benefits to patients, service users, carers, health and social care professionals and wider stakeholders in the health system. The programme aims to exploit the capability of ICT to be more consistent in our delivery of safer, better and increasingly, personalised care.

EHR as cornerstone of eHealth Strategy

An EHR for Ireland is the cornerstone of the eHealth Strategy. A national EHR is a comprehensive and combined solution that supports the creation and sharing of key patient information. The national EHR will consist of core operational solutions (with functions such as ePrescribing and Case Management), along with the ability to aggregate data from these systems into a comprehensive national record, accessible to health and social care professionals, and also to patients, service users and carers. The opportunity afforded by a national EHR is to create a future environment that is information rich, supporting improvements in care, and making a step change in the availability of patient information across the various organisations within the remit of the HSE. As part of the Knowledge and Information Strategy of the Office of the CIO, the national EHR has been identified as a core capability.

The implementation of a national EHR can also have broader economic benefits, offering the opportunity for a range of leading and innovative eHealth companies in Ireland to provide part of the long term solution.

National EHR Programme

The national EHR programme is being established within the Office of the CIO to design and support the overall delivery of this critical element in the eHealth landscape. The HSE has been engaged in a dialogue with technology vendors to clarify the overall strategy for a national EHR, confirm the blueprint and vision for the technical environment and assess the commercial and funding options for the delivery of this programme.

The programme is now focused on the design of the overall implementation approach and roadmap that:

- Combines pragmatic use of existing systems
- Meets specific needs such as the opening of the Children's Hospital Group as a 'digital hospital' in 2019
- Supports the broader strategic objectives of HSE reform
- Extends the capability offered across organisations and care settings in a phased approach.

This design phase will involve extensive consultation with clinical, administrative, managerial and technical stakeholders to ensure the design is led by the needs of these groups with the necessary support to ensure success in future deployment. This is a complex and sizable transformation programme, requiring a significant investment over 10 - 15 years.

Strategic Context

“The Health Service Executive (HSE) is taking the opportunity to reform the way in which healthcare is provided to the whole country. At the centre of this reform is the absolute need to increase the capability and capacity to build knowledge and provide access to information that supports the provision of health care for public, patients and clinicians alike.”

HSE Knowledge & Information Strategy

This section sets out the broad strategic context for the development and implementation of a national EHR for Ireland. It serves as a high level articulation of the intent of the overall health reforms and the strategic priorities of the HSE in improving care delivery, and the role that technology and information will play in achieving this intent.

Overall Health Reform

International trends in health reform are characterised by an increasing decentralisation of care, in terms of a movement in the location of care towards less intensive environments, such as community settings and patients' homes, and an increasing reliance on patients, informal carers and support networks. These trends are driven in part by the increasing costs of healthcare in developed countries with aging populations, and also by an imperative to deliver safe care in the most appropriate settings for individual patient requirements. They also align with increasing public expectations of active patient participation in healthcare and broader societal trends for 'self-service'.

In Ireland, the overall intent of the HSE system reform programme is to create a health and social care service around patients and service users and their individual needs, with high quality care delivered as close to the patient's home as is safely possible. *Building a high quality health service for a healthier Ireland, Health Service Executive Corporate Plan 2015-2017* sets out five goals:

- "Goal 1: Promote health and wellbeing as part of everything we do so that people will be healthier
- Goal 2: Provide fair, equitable and timely access to quality, safe health services that people need
- Goal 3: Foster a culture that is honest, compassionate, transparent and accountable
- Goal 4: Engage, develop and value our workforce to deliver the best possible care and services to the people who depend on them
- Goal 5: Manage resources in a way that delivers best health outcomes, improves people's experience of using the service and demonstrates value for money."

Future Health – A Strategic Framework for Reform of the Health Service 2012–2015 is built on four key inter-dependent pillars of reform:

- Health and wellbeing
- Service reform
- Structural reform
- Financial reform

National Integrated Care Programmes will deliver a key element of the vision for service reform in healthcare delivery: to ensure that patients and service users are supported in the setting that is most appropriate to their needs with collaboration between professionals across organisations and care settings. To realise the vision for integrated care, there must be an "information environment" that supports clinical collaboration and the sharing of patient information among professionals. In short, integrated care is only possible with integrated information, and this requires technology solutions, combined with changes to policies, processes and procedures.

The *HSE National Service Plan 2015* defines system wide priorities in addition to integrated care. Several of these require technology as an enabling mechanism including:

- Improve service user experience
- Improve medication management and healthcare associated infections
- Implement a system wide approach to managing delayed discharges.

The plan also defines key reform programmes, including:

- Establish and develop Hospital Groups, including the Children's Hospital Group
- Establish and develop Community Healthcare Organisations
- Develop clinically led, multidisciplinary, patient centred Integrated Models of Care Programmes.

These reforms and the Corporate Plan's five goals require significant change programmes in their own right and require multi-year commitment of resources to deliver that change. The changes must incorporate people, process and technology dimensions and offer the opportunity to introduce and leverage new technology in a way that will deliver the ambition for the programme.

Vision for eHealth in Ireland

The *eHealth Strategy for Ireland* recognises the strategic importance of ICT in health and social care, as an enabler for quality and efficiency improvements. The strategy also highlights the benefits of eHealth beyond the improvement of care delivery, to include the impact on population wellbeing and broader benefits within an Economic Development context.

The strategy clearly places the patient at the centre and there is a recognition that eHealth must be viewed as an infrastructural investment akin to the investments in other national infrastructures such as the national motorway network.

The focus of the eHealth strategy is on the information and knowledge that could be more

effectively created and shared among key actors informed in the delivery of healthcare, and the underpinning systems that enable this. An overview of the environment envisaged within eHealth is represented in Figure 1 below.



Figure 1: eHealth Environment Overview

The HSE's *Knowledge & Information Plan* builds on the eHealth strategy, outlining, "...how integrated information and enabling technology will support the delivery of innovative, safe and high quality patient care to meet the needs of our population across all patient pathways and care settings." Five focus areas are identified to deliver the capability requirements that are key to facilitating integrated care. Electronic Health Records are one of the focus areas, as illustrated

in Figure 2, below. The strategy describes how the EHR will enrich patient information within organisations, support clinical decision-making, share patient information between organisations and settings and extend access to records to patients and service users. A national EHR is therefore positioned as a key enabler of the HSE's plans to transform the delivery of care to patient and service users.

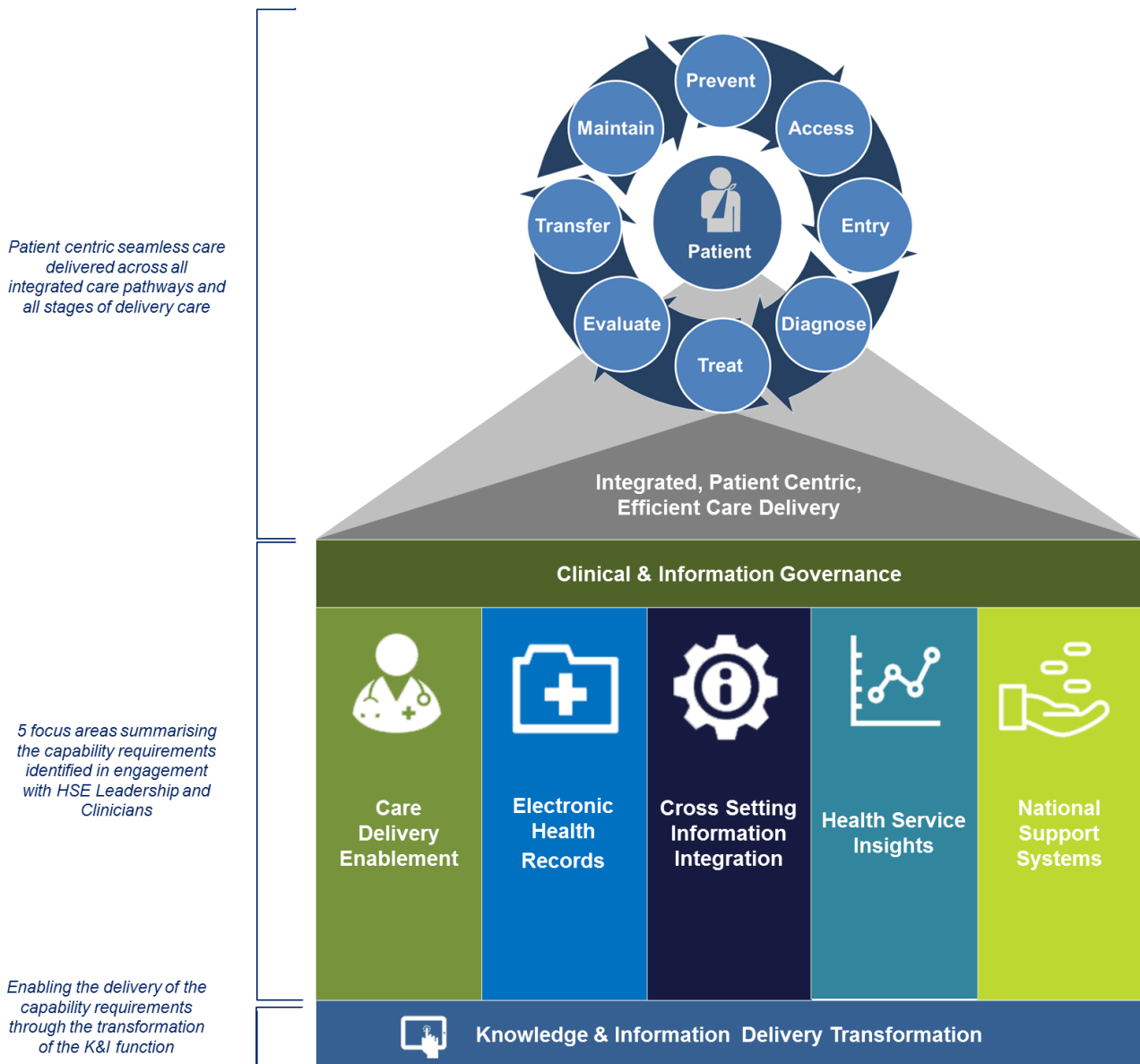


Figure 2: eHealth Environment Overview



**National EHR -
Transforming
Healthcare**

This section sets out the overall vision for a national Electronic Health Record, presents the scope and benefits of the overall solution, and outlines the key characteristics of delivering this across the Irish healthcare environment. Finally it outlines the imperative for action to deliver this programme in line with wider system needs and reforms.

Vision

The Electronic Health Record for Ireland will transform the delivery of health and social care by creating a shared patient record that is the primary information source for all health and social care professionals, and is extended to patients, service users and carers.

This vision represents a long-term aspiration for the adoption and exploitation of technology in a way that benefits patients, service users, carers, clinicians and extended stakeholders, and transforms the overall delivery of healthcare in Ireland. It spans a programme of activity that will continue over a 10 to 15 year horizon to reach a level that could be considered comparable with the best in the world. In truth, it will continue indefinitely as technology continues to change and offer enhanced capabilities, including the increasingly sophisticated use of technology by the population, as part of their daily lives.

Scope

The Health Information Management Systems Society (HIMSS) defines an EHR in this way:

“The Electronic Health Record (EHR) is a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates and streamlines the clinician’s workflow. The EHR has the ability to generate a complete record of a clinical patient encounter - as well as supporting other care-related activities directly or indirectly via interface - including evidence-based decision support, quality management, and outcomes reporting.”

Within an Irish context it is envisaged that the national approach to EHR will deliver operational systems within Hospital Groups and Community Healthcare Organisations, as well as supporting broader health and wellbeing objectives. A national portal or summary care record will contain key patient data from the operational solutions, and clinical collaboration in patient care will be supported between organisations and care

settings. These solutions will be integrated with general practice systems and other existing national systems via a national integration platform. Health and social care professionals will access national and local records, and patients, service users and carers will also have appropriate access. Solutions will be integrated with medical devices in healthcare settings and at home.

While the overall technical solution is complex and has many different constituent components across different care settings it can be classified into four broad areas as depicted within the National eHealth Blueprint set out in Figure 3 below:

- **Operational Systems** – these are discrete functional components that offer specific capability to end users within organisations, e.g. to enable the recording of a clinical assessment, the prescribing and administration of medications, and to support clinical decision making
- **Portal Solution** – a key means of providing access to specific records to user groups such as patients, service users, carers and clinicians. This offers the ability to access and integrate the information and data from various disparate systems into a view that is meaningful and useful for the end user.
- **Integration and Access** – the technical solution that communicates patient data between solutions, enabling the delivery of comprehensive national records, while maintaining the integrity and security of that information.
- **Data and Analytics** – the core data repositories that store and manage national level data and the analytic tools that are developed to support more meaningful use of that data in reporting, planning, audit and clinical research.

In the delivery of this overall solution there are national systems that currently exist or are being deployed across the HSE ICT landscape, which will be leveraged to deliver components of the national EHR. Other relevant national solutions are in development, and in particular an Individual Health Identifier for Ireland is a key enabler of a national EHR, and work to deliver this is currently underway with initial implementation of the identifier planned for mid-2015.

National eHealth Blueprint

Stakeholders

Healthcare Providers

Patients

Corporate Administrators and Managers

Clinical Management / Point of Care Environment



National EHR Integration and Access Layer



National EHR Registries and Domains



HSE Integrated Service Framework (ISF) - National EHR Core Infrastructure Services

Secure Health Network

Infrastructure Security

Mobile Device Platform

- Operational systems
- Integration and Access
- Portal Solution
- Data Repositories

Figure 3: National eHealth Blueprint

Benefits

At a high level, these new capabilities will enable transformations in the delivery of healthcare that have the potential to deliver improvements as described in Table 1 below.

From	To ¹
Decisions made on incomplete information and patients ‘falling through the cracks’, leading to increased admission rates, poorer outcomes, and unsatisfactory patient experience	Integrated long-term condition management, based on robust communications between professionals and complete clinical records, leading to improved clinical outcomes and avoidance of admissions
Lack of effective planning across care settings leading to delayed discharges, poor community and social care support at home and emergency readmissions	Effective planning between professionals leading to reduced length of stay, improved clinical outcomes and a reduction in emergency readmissions
Disconnect between patient self-management and healthcare professionals due to lack of inclusion of self-management data in clinical records, and lack of a view of clinical records for expert patients, service users and carers	Improved patient, service user and carer participation in care and safer self-management, leading to empowered patients and service users, with the potential to reduce hospital attendances and improve clinical outcomes
Medications prescribed and administered based on incomplete paper medication records and paper or static web-based protocols	Safer and more cost-effective prescribing and administration of medications , based on a complete electronic medication, allergy and adverse reaction record with decision support
Duplicate investigations requested due to incomplete records of requests and results	Reductions in duplicate investigation requests , due to complete and up to date views of existing requests and results across all organisations
Opportunities for early effective intervention missed due to lack of available clinical data and lack of advanced decision support algorithms, leading to delays in specialist clinical involvement	Improved management of the acutely ill and/or deteriorating patient , based on a complete patient record, advanced decision support and effective communication between professionals
National outpatient ‘Did not attend’ rates of 17.5% (2012)	Reduced ‘Did not attend’ outpatient rates and associated costs through improved communications with patients
Variable, often rigid, reporting capabilities, hampered by often poor data quality	Accurate, agile and near real-time reports to enable effective planning , enabled by powerful business intelligence capabilities and improved data quality
Handover of care and requests for specialist clinical involvement dependent either on paper documentation, often sent by post with consequent delays in receipt, or on phone conversations with consequent poor record keeping and governance	Safer handover of care and more timely involvement of specialist clinical involvement , enabled by electronic messaging of handover documentation, referrals and consultation requests, with automatic notification to recipients, who will then have the ability to access patient clinical data
Clinical decision-making supported by paper or static web protocols and guidelines with no systematic capability to actively encourage or track adherence	Improved clinical decision-making and outcomes, underpinned by stronger clinical governance , based on evidence based intelligent algorithms that leverage rich patient clinical data to guide practice, and track clinicians’ adherence to or variance from recommended practice
Weak security controls for access to paper and electronic records.	Improved patient privacy , based on robust security, access control and audit.

Table 1: EHR Capabilities to Enable Transformation

Potential benefits are illustrated by narrative use cases, included in Appendix A

¹ The benefits shown are illustrative of the potential for a national EHR. Actual benefits will be defined as part of the development process for business cases.

Delivery

The realisation of the vision for a national EHR must be viewed primarily as a national transformation programme, not simply as a technology implementation. Delivering a national EHR means:

- The overall programme is led by and composed of executive, clinical and operational teams, as this will steer delivery towards enabling improvements that are aligned to clinical and corporate priorities
- Healthcare organisations will establish the capability and capacity to deliver transformation of services within and between organisations to ensure benefits are realised
- Exploiting the opportunities afforded by shared clinical records and robust collaboration and decision support tools, by:
 - Redesigning services to ensure that patients are appropriately treated and cared for in environments as close to home as possible, with quality and safety underpinned by easily accessible comprehensive clinical records
 - Training and education of professionals to allow them to gain the skills required to deliver high quality treatment and care to patients and service users within redesigned services
 - Standardising clinical pathways, practice and processes within and across organisations
 - Introducing communication and collaboration between professionals across organisations, within sound governance frameworks

- Making records available to patients, service users and carers, to allow them to act as active partners in their healthcare, rather than just recipients of care.
- Improving data quality and the use of data for decision support, business intelligence, clinical audit and clinical research
- Improving security and audit for access to patient records.

The approach taken in this programme is to establish the overall design of the future EHR environment at a national level to deliver:

- A defined standardised solution set, that enables transformation initiatives to deliver overall health reform objectives, while supporting regional and local capabilities to improve care delivery
- Consistent quality of solutions from a user perspective and a level of standardisation that supports patients and users moving between care settings or organisations
- Easier access to a comprehensive health record for patients, service users and carers, based on nationally aggregated information
- An ability to gain greater insight into population health and national level data that will support policy and strategy decision-making in healthcare
- Lower costs of solution implementation, hosting, management and support due to economies of scale.

The national EHR will also deliver key capabilities to realise the ambitions of the eHealth agenda as described in the HSE Knowledge and Information Plan, and illustrated in Figure 4 below.

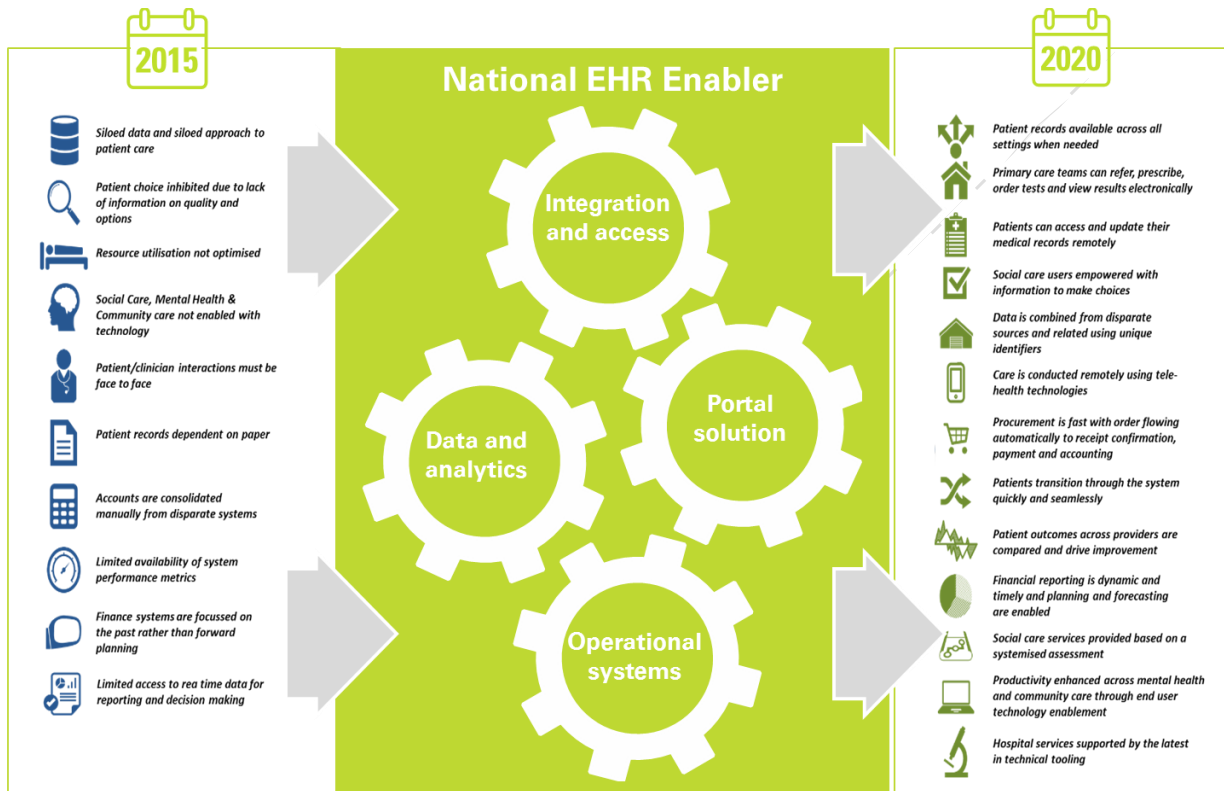


Figure 4: National EHR Capabilities

The need to act differently

There is an imperative to act now, in a more strategic manner, and at an appropriate scale.

Adopting a national approach to the Electronic Health Record is critical if the direct and wider benefits are to be achieved. There are several key drivers of this:

- **Improving quality of care:** the current state of health records is one of largely paper based patient notes, siloed within organisations, and clinicians often make clinical decisions based on unstructured and incomplete patient information. There is poor collaboration between care settings, and little in the way of intelligent decision support tools to inform clinical decision-making.
- **The need for reform:** Key reforms are at risk without a national EHR. The lack of a national solution will significantly hamper the delivery of overall health reform. For example:
 - **Integrated care** - this requires consolidated patient data accessible across organisations, to enable the effective planning and delivery of care, ensuring that patients are safely managed in the setting most appropriate to their needs. This cannot be achieved without specific operational systems and the necessary integration platform from a national EHR to support the capture and sharing of key information.
 - **Formation of Hospital Groups and Community Healthcare Organisations** – these entities must each operate as a single organisation and have sufficient ICT solution capabilities to record, store and share information, and support clinical decision-making. This requires core EHR functions such as scheduling, order communications and clinical documentation and these are not all widely deployed at present.
- **Health and wellbeing** – if patients and service users are to participate effectively in the management of their own health, they will require access to their health records, with the ability to communicate electronically with professionals to receive personalised support and signposting to trusted sources of information and support relevant to their individual needs.
- **Releasing potential in national systems:** there are currently national systems in place and implementations underway, which start to address key issues in the management of information within and between organisations. They will deliver significantly greater benefits if leveraged within the context of a national EHR that can aggregate patient data from these systems into a single patient record. Continuing on the current approach will result in siloed patient records, with no single view of a patient information, and limited capabilities for clinical collaboration across care settings, organisations and specialties, and limited opportunities for the participation of patients, service users and carers in the delivery of care.
- **Delivering the digital ambition of the National Children's Hospital:** The National Children's Hospital is focused on the delivery of a "digital hospital" with ambitious timescales for opening satellite facilities in 2017 and the main hospital in 2019. The hospital ICT strategy features an EHR as a core element of its operations, with an ambition to reach HIMSS Stage 6 in the early operation of the new hospital. This could form the initial implementation of a Hospital Group operational system as a component of the national EHR solution, presenting a platform for wider deployment across Hospital Groups. Decisions on this must be taken in the context of a national approach.





Market Perspectives

As part of the work to date to develop the overall vision and high level approach to a national EHR, the HSE initiated a wide ranging engagement with the international eHealth sector to gain insight into experience in other countries and inform the development of the programme in Ireland. This section sets out the background to that engagement and summarises the outputs from a series of discussions and workshops across the eHealth vendor community.

Background

During the latter part of 2014 the HSE engaged with over 150 eHealth industry vendors through an event at Croke Park and held some more detailed discussions with large System Integrators and vendors that might act as a prime contractor within any overall eHealth programme. Subsequently the engagement was refocused to deal specifically with the EHR vendor community and to gain specific insight to support the design and implementation of a national EHR in Ireland.

The overall purpose of this engagement was to gain insight into the capabilities of EHR vendors across the range of solutions and services required to deliver a national EHR, and also vendors' preferences and recommendations for implementation, procurement and commercial approaches. A set of assumptions was defined, including an overall eHealth Blueprint focusing on the core components of an EHR, the indicative intent of the HSE and considerations around the implementation programme, and these were communicated with vendors in advance of individual sessions.

The engagement was also intended to test the validity of the eHealth Blueprint with respect to what could be provided by the market, and to understand rough order of magnitude estimates of the cost of implementing core components of the national EHR.

Outcome of vendor engagement

The process delivered a series of key insights that inform the "design" of the overall approach to delivering a national EHR. This section presents a summary of main conclusions and how these have informed specific options that are now being developed and considered with stakeholders.

The national EHR programme is primarily a transformation programme: success will be dependent on putting transformation at the centre of the programme, not treating it primarily as a system implementation programme.

Clinical leadership and engagement are critical to achieving transformation: it was clear that the level of change and transformation required across the healthcare environment demanded strong clinical leadership, support and involvement from the early design stages. This is

critical to ensuring a focus on the right objectives from the perspective of those that will use any solutions in the future to deliver patient care and improved models of working. Executive leadership is also an important factor.

The National eHealth Blueprint is a valid overarching view: the blueprint provided an effective backdrop for discussion and an acceptable articulation of the desired future state across the Irish health system. There is a recognition that additional detail derived from this blueprint, such as specific functions and features of different component systems, will support a more detailed debate on final solutions. It will therefore act as a guiding framework through subsequent stages of the programme.

A modular and phased approach is desirable: the overall modularity of solutions and the ability of the market to offer separately different components, such as a patient and professional portal, integration platform and acute and community operational solutions, offers the opportunity to take a modular and phased approach to implementation. In addition it was widely felt that, given the overall scope and scale of the requirement across different care settings, a "big bang" approach was not feasible in an Irish healthcare context. The phasing of different modules in implementation offers the opportunity for discrete benefits to be delivered within a reasonable timescale and cost and to reduce overall risk in deployment and adoption.

A core set of functional modules could provide a first phase deployment of acute operational solutions: the delivery of a set of EHR operational modules as a sub-set of our overall vision is endorsed as an appropriate first phase when combined with broader integration and portal solutions. Views varied on the make-up of this core set and further consultation with stakeholders is required to gain greater insight into what would deliver most effectively on key requirements within a manageable scope.

Existing HSE systems can be leveraged within a national EHR: vendors largely offered the ability to integrate their solutions with existing and/or planned systems deployed across the HSE ICT landscape. However, the challenge of integration requires further definition and must be carefully planned for within the programme.

The approach to procurement must support effective dialogue: the overall solution landscape set out in the National eHealth Blueprint is complex and varied across care settings and organisations. The market does not offer a uniform solution either within or across care settings and expressed a strong desire for sufficient dialogue during any procurement process to ensure that the outcome could be successful for all parties.

The Individual Health Identifier will be a critical enabler for a national EHR: a single national patient identifier is a requirement to enable robust matching of patients from diverse solutions to create a national patient record.

Core ICT infrastructure will be required: the implementation of a national EHR is dependent on extensive ICT infrastructure deployments both nationally and within individual HSE organisations.

Overall implementation resources are significant and require further clarification: there was a broad range of views on the level of resources required in terms of financial outlay and personnel to support implementation. Most vendors outlined significant levels of resource

required to support change and transformation. Principle areas of cost will be:

- Solution and third party software licence costs
- Vendor solution implementation costs
- HSE solution implementation costs
- HSE transformation costs
- ICT infrastructure costs for implementation
- Ongoing operational costs, including solution hosting, service management, back office function and support and replacement of ICT infrastructure.

Options

The vendor engagement process described various high-level dimensions that will define the overall delivery of a national EHR, each of which will have options. Each of these dimensions is summarised in Table 2 below in terms of potential options, and these summary descriptions will be analysed and defined in increasing detail at the next stage of mobilising and defining the overall programme.

Dimension	Options summary
Solution	<ul style="list-style-type: none"> • There are various options for how the different component solutions of a national EHR (Hospital Group and CHO operational solutions, portal solution, integration and access and data repository) could be structured and deployed within this programme. These range from, a solution that encompasses many elements within a core platform with strong integration, to more individual solutions that are “best of breed” but require additional investment in integration.
Implementation	<ul style="list-style-type: none"> • An implementation approach could be phased in various ways, including by organisation, care setting, geography and solution scope (e.g. limiting scope to ePrescribing). • Implementation could include leveraging a variety of existing national solutions.
Operational	<ul style="list-style-type: none"> • The operational management of the national EHR could have differing levels of HSE and supplier responsibilities for areas such as hosting, service management and back office functions.
Procurement	<ul style="list-style-type: none"> • Any OJEU procurement process could follow an open, restricted, competitive dialogue or negotiated procedure - discussions with the market and HSE procurement confirm negotiated procedure as the preferred option. • There are further options on how a procurement may be structured, including the approach to lots and the potential inclusion of framework agreements.
Commercial	<ul style="list-style-type: none"> • Different contracting models are possible, including contracting directly with solutions suppliers or via a Systems Integrator. • Different pricing models are possible, with options including outcome based pricing and pay per use, and with the potential to vary capital and revenue expenditure profiles.

Table 2: EHR Dimensions and Options Overview

The background is a dark blue grid with various geometric shapes and lines in light blue and yellow. There are hexagons, circles, and dashed lines scattered across the page. A prominent yellow rounded rectangle is positioned in the upper left quadrant, containing the title text.

Planning and Business Case

This section sets out a roadmap to support key decisions on the planning and allocation of resources in a staged manner to successfully deliver the programme.

This document is situated within a business case and strategy development process, which culminates in the production and approval of various full business cases. The overall process informs decision making, including the allocation of resources across a complex and multi-dimensional programme. This process is illustrated at a high level in Figure 5 below, and will be further defined, to include a detailed timeline for approval processes, during the next stage of work in this programme.

The HSE is now focused on fully mobilising the National EHR programme and shaping the roadmap for change. This will involve detailed consideration of options and development of a strategic business case outlining the overall investment and implementation approach. A comprehensive consultation with stakeholders from clinical, technical, operational and system leadership perspectives will underpin this work. The intent is also to finalise the design of the first phase of what will be a multi-phase implementation and secure the necessary support to proceed.

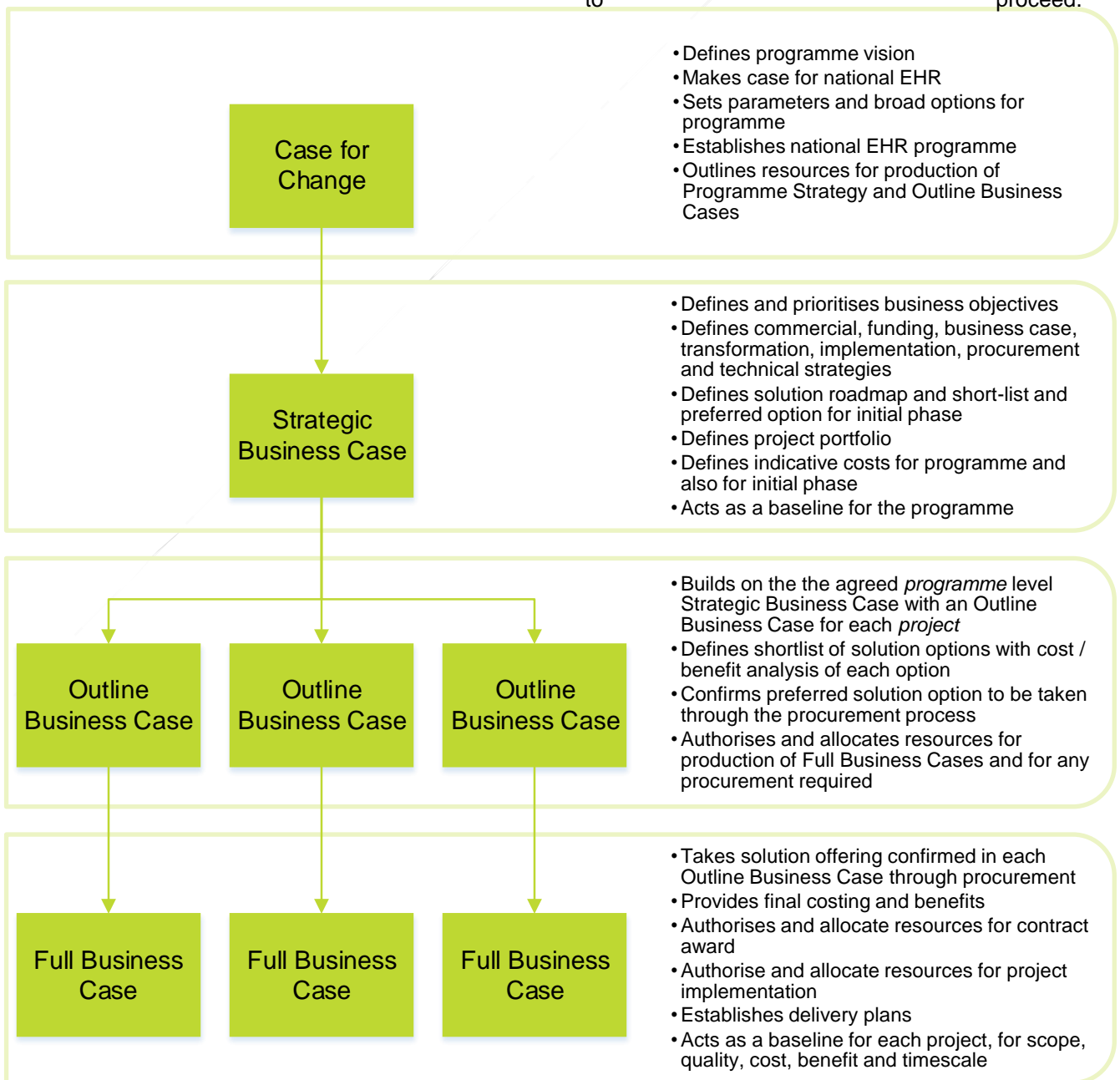
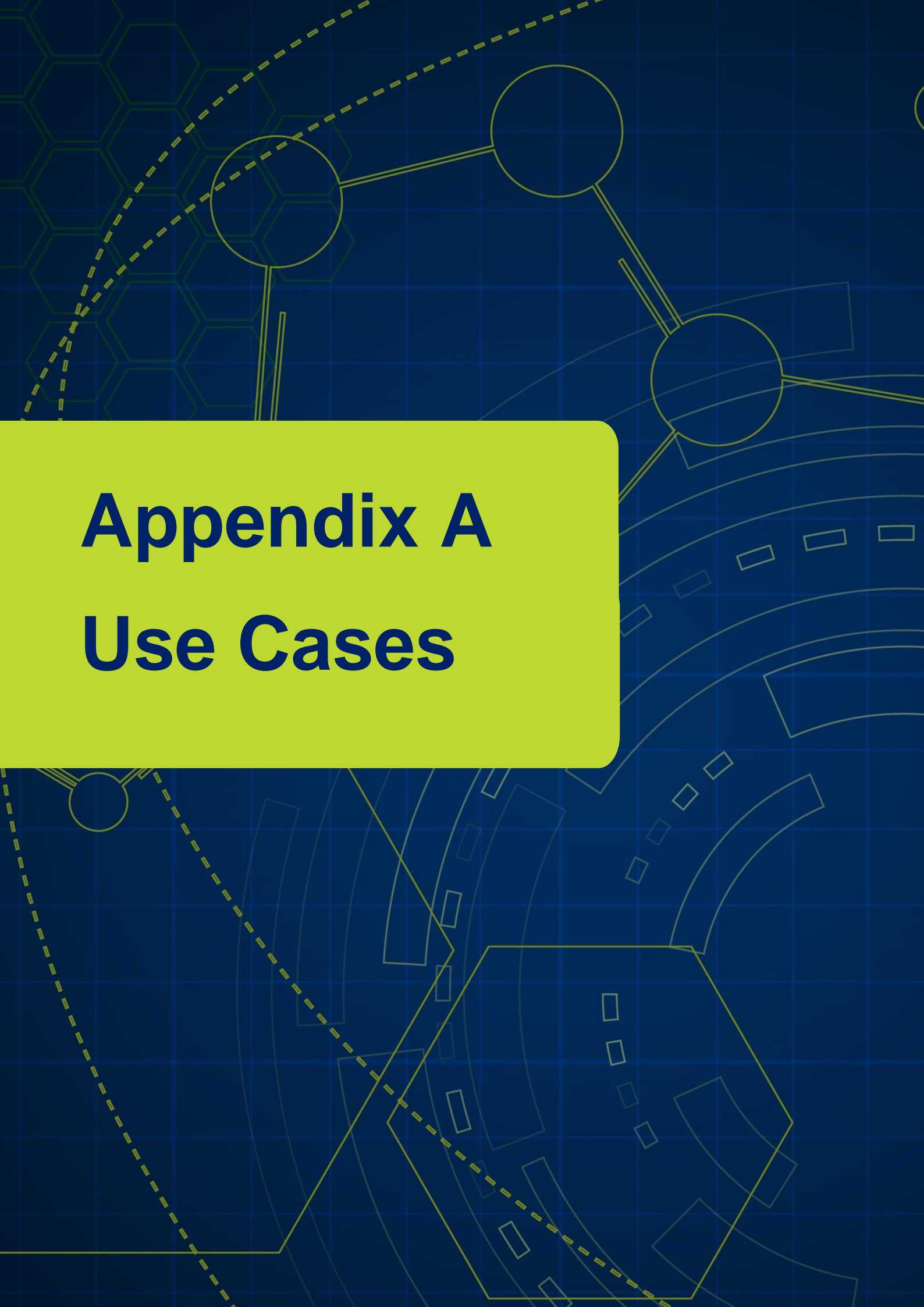


Figure 5: Business Case Development Process



Appendix A

Use Cases

Use cases are included in this Appendix to illustrate the potential benefits that could be realised through the implementation of a national EHR.

Use case 1: Integrated care for long-term condition management

A patient with end-stage kidney disease and diabetes moves from hospital based to home haemodialysis. At each dialysis session, the haemodialysis machine updates the hospital clinical system via a secure Internet connection, and the patient updates his record if he experiences any symptoms during a session. The system alerts a hospital home haemodialysis team member in the case of any potentially clinically concerning readings, trends or events, and the session records are reviewed at regular intervals. The patient's glucometer also automatically updates his record with blood glucose readings. A trend in the blood glucose readings falls outside of defined acceptable parameters, and a member of the general practice team is alerted. The patient is asked to attend his general practice surgery. *The change from patient held blood glucose paper diaries to an electronic record integrated with the glucometer is illustrated in Figure 7 below.*

When the patient sees his practice nurse to agree a plan to manage his blood glucose levels, he also mentions that his haemodialysis access fistula is sometimes painful. The nurse reviews his national record, examines the fistula and sends an electronic message to the home haemodialysis team. The patient is then phoned and asked to attend the dialysis unit for assessment.

This scenario is enabled by operational acute systems integrated with home medical devices, general practice operational systems, a national portal or summary care record with clinical collaboration capabilities, allowing both professional and patient access, all underpinned by a national integration platform. These components of the national EHR enable patients to be managed safely at home and in general practice, with specialist support available when required. This results in improvements to patient clinical outcomes and quality of life, and reduced organisational and patient expenditure.



Date	Value (mg/dl)	When Taken	Source	Notes
9/15/2013 5:15 PM	227	Before dinner	Tango Magee via ehealth2go patient portal	
9/15/2013 11:35 AM	35	After exercise	Tango Magee via ehealth2go patient portal	shaking, juice and 1/2 sandwich, then lunch
9/15/2013 7:05 AM	120	Before breakfast	Tango Magee via ehealth2go patient portal	
9/14/2013 8:30 PM	106	Before dinner	Tango Magee via ehealth2go patient portal	
9/14/2013 12:20 PM	195	Before lunch	Tango Magee via ehealth2go patient portal	
9/14/2013 7:00 AM	66	Fasting	Tango Magee via ehealth2go patient portal	skim milk

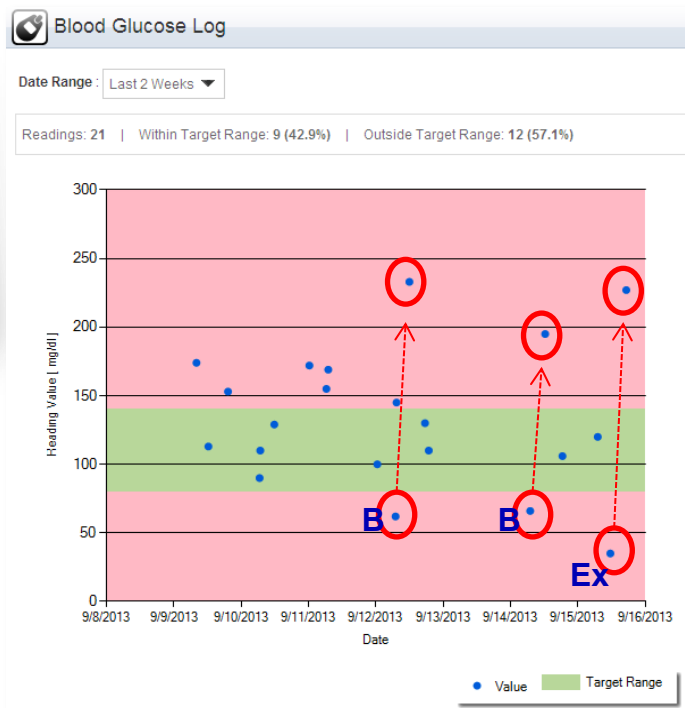


Figure 7: Illustration of blood glucometer device integration with electronic health record

Use case 2: Unscheduled care

A child presents at her local emergency department with a mild fever. Her parents advise that she is being treated for a long-term condition at the National Children's Hospital. The paediatric emergency medicine doctor looks up her electronic national record and views her summary, including key clinical contacts and a plan in case of attendance at a local emergency department. He phones the child's lead consultant and they agree, in conjunction with the local consultant paediatrician, that as her symptoms appear mild, they will admit her locally for observation, and review with the National Children's Hospital lead consultant the next day. The local paediatrician admits the child, and the ward medical and nursing team access her national electronic record, which includes medication history and other key clinical information.

This scenario is enabled by operational acute systems, and a national portal or summary care record, allowing professional access, all underpinned by a national integration platform. These components of the national EHR enable professionals working in unscheduled care settings to deliver high quality care, based on a comprehensive view of patient history, even if patients have complex needs which are treated in external organisations.

Use Case 3: Service user participation in care

A long-term mental health service user and her consultant psychiatrist agree a depression management plan to monitor her symptoms and achieve specific goals. The psychiatrist accesses the CHO operational system and creates the plan, including a regular self-assessment schedule using a standard depression assessment tool, and goals. They agree that they will allow her general practitioner access to view these components of her mental health record, as she attends the practice regularly for a separate condition.

The service user receives an SMS reminder when it is time to complete a self-assessment and update progress against goals. The service user and her mental health team members are able to securely message each other within the electronic clinical record. If a pre-defined outcome to a self-assessment is recorded, the CHO mental health team is alerted. The team can also signpost the service user towards support groups and trusted sources of information about depression.

This scenario is enabled by operational CHO systems, and a national portal or summary care record, allowing professional and service user access, all underpinned by a national integration

platform. These components of the national EHR enable CHO patients and service users to participate more fully in their care with safeguards to ensure professional involvement if required.

Use Case 4: Discharge management

Hospital IT systems notify community teams of a patient's planned discharge as soon as an admission date is scheduled, or on admission if unscheduled. The hospital and clinical teams then use shared electronic tools, integrated with acute, community and general practice systems to collaboratively agree the individual patient's requirements for community, social and nursing home care, any equipment or adjustments to housing, and transportation home. Teams then track and manage progress towards the completion of these arrangements during the pre-admission stage and inpatient stay.

The hospital clinical team records the patient's progress towards clinical fitness for discharge and, if relevant, the patient's and/or carer's progress against competency goals for safe self-care. Any change in the expected discharge date is automatically communicated to community teams. Hospital bed management teams have access to up to date information of all planned discharges, enabling them to manage proactively any delays in discharge arrangements and to plan future bed availability.

On the day of discharge, shared information optimises the efficient use of discharge lounges, in case of any delays in transportation or in the dispensing of discharge medications, and prompts timely actions to make beds available again. GPs and community teams receive timely discharge summary documentation and can access the broader patient record. Following discharge, the national EHR enables ongoing communication between GPs, community teams, and hospital clinical teams to manage patients safely in their own homes.

This scenario is enabled by operational acute and CHO systems, and a national portal or summary care record accessible to professionals across all care settings, all underpinned by a national integration platform. These components of the national EHR enable professionals to plan discharges collaboratively and track progress against the discharge plan to ensure a safe and timely discharge.

The national EHR also enables innovative models of care such as virtual wards where patients return home but remain under the care of the hospital consultant and team.



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