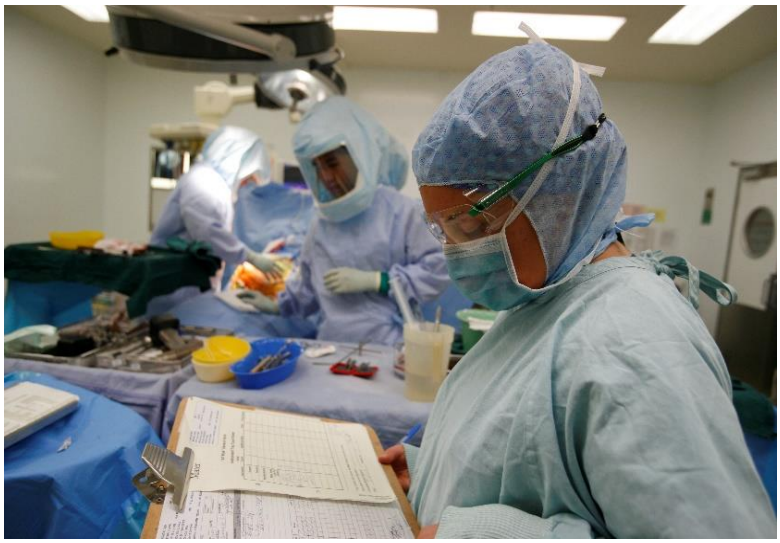
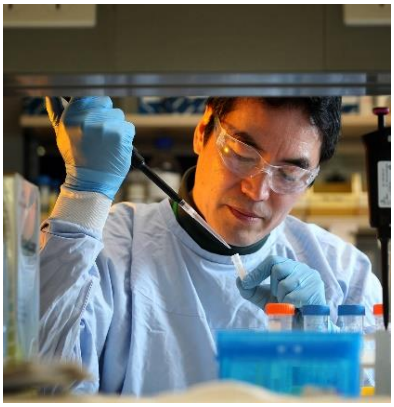
ST VINCENT'S HEALTH NETWORK
SYDNEY
A SERVICE OF ST VINCENT'S HEALTH AUSTRALIA

St Vincent's Health Network Sydney
EMR Business Case Submission

A modern digital and clinical transformation enabling an exemplary patient experience





Glossary

Abbreviation	Definition
ADE	Adverse Drug Event
AMT	Australian Medicines Terminology
BAFO	Best and Final Offer
BAU	Business as Usual
BCP	Business Continuity Planning
CPI	Consumer Price Index
DR	Disaster Recovery
EMPI	Enterprise Master Patient Index
EMR	Electronic Medical Record
EMRAM	Electronic Medical Record Adoption Model
FTE	Full Time Equivalent
HIM	Health Information Management
HIMSS	Health Information and Management Systems Society
HITH	Hospital in The Home
HVHR	High Value High Risk
ICU	Intensive Care Unit
ICT	Information Communication Technology
IPS	Implementation Planning Study
IT	Information Technology
JCAPS	Java Composite Application Platform Suite
LOS	Length of Stay
MoH	Ministry of Health
PAS	Patient Administration System
PBS	Pharmaceutical Benefits Scheme
PMO	Project Management Office
RFT	Request for Tender
ROI	Return on Investment
SLA	Service Level Agreement
SME	Subject Matter Expert
SVHA	St Vincent's Health Australia (referred to as St Vincent's)

Abbreviation	Definition
SVHM	St Vincent's Hospital Melbourne
SVHNS	St Vincent's Health Network Sydney (St Vincent's Hospital Sydney, Sacred Heart Health Service and St Joseph's Hospital)
SVHP	St Vincent's Health Private
SVHS	St Vincent's Hospital Sydney
TCO	Total Cost of Ownership

Executive Summary

Purpose

The purpose of this document is to urgently progress St Vincent's Network Sydney (SVHNS) towards the implementation of an enterprise Electronic Medical Record (EMR) for the benefit of public patients in NSW. This EMR will directly support the eHealth Strategy for NSW Health toward a "digitally enabled and integrated health system delivering patient-centred health experiences and quality health outcomes"[1].

Whilst the business case provides details of a whole of organisation approach for all of St Vincent's Health Australia (SVHA) hospitals, this document is focused on the scope, cost and benefits for SVHNS only. The business case requests from the NSW Ministry of Health (MoH) a capital investment to support the important state-wide role SVHNS plays in the delivery of local and referral healthcare services in NSW.

Case for change

SVHNS is a nominated specialty health network in the NSW public health system and the only Non-Government Network in NSW, recognising the state-wide significance of the services delivered by SVHNS to the residents and visitors to NSW. St Vincent's Hospital Sydney, Sacred Heart Health Service and St Joseph's Hospital Auburn are Affiliated Health Organisations under the *Health Services Act*.

SVHNS operates St Vincent's Hospital Sydney (SVHS) an A1 Principal Referral hospital, with significant training and research activities and centres of excellence providing state-wide services in heart and lung transplantation, bone marrow transplantation, cardiology, cancer, acquired immune deficiency syndrome/HIV, respiratory medicine mental health and drug and alcohol services. SVHS has a longstanding relationship providing tertiary referral services to Murrumbidgee LHD. Sacred Heart Health Service and St Joseph's Hospital Auburn are sub-acute public facilities providing networked services to South Eastern Sydney LHD and Western Sydney LHD.

SVHNS prioritises health services to the mentally ill, drug and alcohol addicted, homeless, Aboriginal and Torres Strait Islander people and prisoners and plays a key role in the provision of services to metropolitan and rural patients in NSW.

Despite its critical role in supporting NSW's public health system, SVHS is currently significantly hindered in optimising patient care, clinical time and operational performance due to the reliance on a hybrid of paper-based record systems and disparate and ageing digital clinical systems. Extracting real time aggregated data for operational and clinical decisions is not possible and structured data from a longitudinal clinical record to support research and drive improvements in clinical care is not available. Importantly SVHNS has a limited capability for sharing clinical information with other public hospitals (e.g. patient referrals and historical treatment) creating clinical risk for SVHNS and other Local Health Districts.

With the current COVID pandemic these limitations have been further highlighted, presenting significant challenges for the organisation. In addition, the current processes limit our ability to react effectively to new national, state-based strategies and the Premier's priorities[2]. Current high risks and

[1] eHealth Strategy for NSW Health 2016-2026

[2] Premier's Priorities https://www.nsw.gov.au/premiers-priorities

gaps include the Patient Administration System (CorePAS) which is now end of life and a priority for replacement, the Emergency Department's need for a modern digital system is now critical, as is the requirement for a scheduling system for outpatients and a scanning solution for the organisation.

As a tertiary referral hospital, SVHS has requirements to support information flow to and from other facilities in the NSW health system, as well as between the co-located public and private hospitals on the St Vincent's Integrated Healthcare Campus at Darlinghurst.

These issues are not unique to SVHS. The NSW Government has invested heavily in health technology, to address these issues faced by NSW Health hospitals and will continue to do so over the next decade. The aim is to optimise these systems with integration of health services enhancements to digital health information access. Most NSW Health hospitals now have an EMR and the next aim is to ensure all EMR systems support integrated health services and enhance access to digital health information. While benefits can accumulate with individual EMR hospitals, even greater benefits will accrue from interoperability across all hospitals in the State.

A continued delay in EMR investment at SVHNS could potentially lead to an increased risk in patient outcomes and could compromise the NSW Government Health priorities.

Solution

St Vincent's Health Australia's strategy is to implement a single longitudinal patient record across it's organisation, as well as supporting the interaction and seamless flow of patient information to state digital systems to support the care continuum.

While other aspects of the organisation may leverage and utilise the EMR, this business case focuses on the inpatient services at St Vincent's Hospital Sydney (SVHS), Sacred Heart Health Service and St Joseph's Hospital and their associated existing community and outreach services.

The options analysis reviewed potential solutions to determine the recommended option of an Enterprise EMR with a modern and technologically advanced platform that would serve the organisation and the Government's requirements and initiatives well into the future. This includes a wholly integrated wed-based EMR and Patient Administration System (PAS) with full mobility and interoperability.

NSW's Single Digital Patient Record (SDPR) initiative is aiming to further develop electronic medical record (EMR) maturity and capabilities, creating greater consistency across the state and into the future. SVHNS is not on this path and even if they were, the timelines for implementation are too protracted relative to our current urgent needs.

SVHNS has considered a number of options including the Ministry offer to adopt a state instance of Cerner. This offer has been carefully considered, however presents a less compelling option given:

- Without Ministry approval this option does not support the seamless movement of patients across the Darlinghurst campus i.e. sharing of clinical information with the adjacent Darlinghurst Private Hospital:
- It Is not deemed financially beneficial: and
- The SESLHD option would provide an inferior solution as it's based on an old technology that does not support virtual and mobile health care.

For this reason, St Vincent's has re-assessed the market and completed an in-depth evaluation and competitive tendering exercise to identify an EMR vendor who can provide the best fit with our requirements and the best value-for-money. Our proposed vendor of choice is MEDITECH with their Expanse solution (the detailed analysis is outlined in 7. Strategic Options). MEDITECH have implemented their PAS, billing and clinical components in Australia. The solution will be fully hosted as an off-site service and will include an application management service. During the next six months

we will conduct an Implementation Planning Study (IPS) to fully prepare the organisation for the implementation and to identify key areas of risk that need focus.

A modern digital and clinical transformation enabling an exemplary patient experience

We will achieve this through these areas of focus using cutting-edge innovations:

- *Implementing contemporary models of care*
- *Equipping our clinicians with digital tools*
- *Engaging our patients actively in their care*
- *Initiating comprehensive research initiatives*
  Pursuing cutting-edge innovations

The St Vincent's 10-year Total Cost of Ownership (TCO) for the EMR initiative is $337 million. SVHNS is seeking an 80% contribution to the New South Wales public component of the capital cost ($63 million). This contribution would equate to $50 million for the NSW Ministry of Health (MoH) over three years, approximately $16.6 million per annum.

The SVHA wide procurement approach provides significant benefits over the alternate path of each SVHA hospital progressing their own independent EMR. The approach delivers value and is economical compared to other health services for the investment.

Our strong commitment to providing safer public health care on behalf of the State Government is a key driver to finding an EMR solution. The solution will provide a solid foundation to continue this commitment and support initiatives to actively deliver many of the Government's strategic priorities[3] and initiatives including:

- Towards zero suicide
- Improving outpatient and community care
- Preventative health and tailored patient engagement
- Improving service levels in hospitals
- Delivering care virtually

This will be achieved through the functionality of the EMR, the scope of data captured, and the ability to share information and to manage continuity of care.

Background

St Vincent's evaluated several EMR vendors to support their requirements and enable innovation well into the future. Given the relatively late timing of the program, St Vincent's need a modern technology platform as the starting point for this transformational exercise.

EPIC and Cerner participated in a Request for Tender in 2018. EPIC was not progressed as the financial component was unfavourable. Subsequently, MEDITECH, a company with 50 years of EMR experience, re-platformed their product in 2018 to a fully web enabled and cloud-based EMR, known as Expanse, emerged and was reviewed and compared with Cerner in April 2020. MEDITECH Expanse rated higher than Cerner Millennium in functionality and data analytics and was determined to align

[3] Reference: Aligning Government Policy in Appendices

more closely to St Vincent's requirements after a detailed technical, functional, financial and commercial review was completed as part of the Discovery Phase. In addition, the pricing from MEDITECH was favourable to Cerner for the scope and depth of functionality and services provided this will deliver a modern web-based, cloud hosted fully supported platform designed for advanced clinical efficient workflows and functionality and will support and enable SVHNS to align with state and national strategies with a value for money solution.

MEDITECH has been contracted to undertake an Implementation Planning Study (IPS) from December 2020 –June 2021. Funding has been provided for this exercise by St Vincent's Health Australia.

About the Program

A six-eight month IPS has been initiated with the proposed EMR vendor, MEDITECH. The IPS will enable an in-depth analysis of the solution and the development of a robust implementation approach and plan to de-risk the EMR project. SVHA and SVHNS will ensure eHealth is engaged and updated through the IPS process.

The EMR Program and approach has in principle support from the St Vincent's Executive and Board. A governance framework has been established that has oversight of the IPS to ensure the solution addresses the requirements and can be implemented as proposed.

The functional scope currently under consideration from MEDITECH and supporting third-party system providers that will be assessed during the IPS is depicted below:

Figure 1: EMR Functional Scope

Legend:

- Core patient and encounter management capability
- Clinical applications and specialist departmental solutions
- Patient engagement portal
- Supporting reporting, data and analytics capabilities
- Integration, standards and complementary capabilities

The EMR Program will implement an integrated Patient Administration System as well as patient billing, a comprehensive mobile platform, a patient portal and remote clinician access. A fundamental project requirement for St Vincent's is the acquisition of a comprehensive integrated solution to minimise the dependency on interfaces and integration thereby delivering the benefits of seamless and real-time information sharing to both patients and staff across our hospitals.

It is acknowledged that this scope is broader than the usual Australian EMR implementation, however, it is believed that this more comprehensive integrated solution will provide greater benefits to clinical and administrative workflows across all facilities. Further, it will facilitate the retirement of many outdated systems, some of which are supported in-house.

Benefits of the Program

There is strong evidence from both international and national research demonstrating the benefits of implementing EMRs[4]. Adoption of an enterprise EMR system will take SVHS to a HIMMS Stage 6 accreditation.

The implementation of the St Vincent's EMR Program will improve:

- Patient safety and health outcomes
- Patient experiences and engagement
- Clinician satisfaction
- Workplace productivity
- Data availability for management and research

Clinical decision support, order sets and standardised clinical workflows embedded in the EMR solution are pivotal to improving patients' clinical outcomes. Recent data from the Royal Children's Hospital (Melbourne) and Princess Alexandra Hospital (Brisbane), whose EMR systems have resulted in a HIMSS Stage 6 assessment, highlight the profound quality and safety benefits. There are currently no hospitals in NSW with HIMSS Stage 6 assessment.

Given the proposed scope of the EMR program, there are likely to be savings realised from the retirement of systems that will be replaced. The scope of the saving will be determined during the IPS.

Financial Benefits

The anticipated total quantifiable cash and non-cash benefits for NSW over an eight-year period commencing in Year 3 following an approximate two-year implementation is $61.9 million.

Table 1: Anticipated Quantifiable Benefits

Benefit	Benefit Type	Amount $
Reduced Length of Stay (LOS)	Capacity	26.8
Increased Theatre Utilisation	Capacity	4.2
Reduced Clinical Documentation	Cashable	7.1

[4] Value of EMRAM, HIMSS, 2017

Benefit	Benefit Type	Amount $
Reduced Clinical Pathology Tests	Cashable	1.3
Reduced Imaging Orders	Cashable	0.8
Increased Private Patient Revenue	Cashable	12.5
Avoidable Readmissions	Capacity	1.0
Reduced Software Costs – Software & Hard	Cashable	8.2
Total Benefits		**$61.9m**

Further, the establishment of the EMR Program will create approximately 200 new jobs across St Vincent's and the EMR vendor over the course of the implementation. This increased opportunity complements the objectives articulated in the NSW Budget 2020/21 Jobs Plus Program.[5]

Program Costs

The total capital cost for the Enterprise EMR implementation at SVHNS is $63 million. This business case is seeking a one-off capital investment from the NSW Government to implement the EMR at SVHNS hospitals of $50 million, comprising 80% of the capital cost. The investment is sought over a three-year period, starting in the 2021-22 financial year, that is, $16.6 million per year. SVHNS will self-fund the remaining investment required to implement across SVHNS, that is, $13 million.

SVHA are seeking a similar contribution from the Victorian Government for SVHA public hospitals in Victoria. The St Vincent's Private Divisions will fund the private hospital's contribution to the full Total Cost of Ownership (TCO).

In addition to the proposed co-contribution from SVHNS to the EMR implementation for SVHNS hospitals, there is additional value to the State from St Vincent's proposed enterprise procurement approach, which delivers significant economies of scale relative to each hospital progressing independently. The organisation is also currently investing in a major network modernisation program as a precursor to the EMR.

Overall, St Vincent's will fund the major portion of the EMR program, that is, $242 million of the full TCO of $337 million.

St Vincent's has 16 public and private facilities across the eastern seaboard. Given that enterprise scope, it was necessary to determine an appropriate method to allocate the associated costs. This was based on a number of factors, with activity the primary driver.

The key factors used to determine the cost allocation between public and private hospitals include the following criteria (other factors were considered with lower weighting):

- Activity – Inpatient;
- Activity – Outpatient (higher weighting based on system usage);
- Activity – Emergency; and
- Beds (Inpatient and ICU).

[5] 2020-21 NSW State Budget, Jobs Plus Program

Table 2: Public Private Distribution Model (indicative summary of key factors, weightings not included)

Criteria	Beds	Inpatients Visits	Outpatient Visits	Emergency Visits	ICU Beds	Distribution Overall
Public Hospitals	35%	18%	100%	81%	42%	**58%**
Private Hospitals	65%	82%	0%	19%	58%	**42%**

Cost allocation details have been reviewed, agreed and audited across St Vincent's. For the purposes of transparency, additional information can be provided to government departments should this be required. Funding contributions that have been requested from jurisdictions are strictly for Public (capital) only components of the EMR program.

A similar approach has been used to determine the distribution within St Vincent's Public Hospital Division between St Vincent's New South Wales (NSW) and Victorian public hospitals. That analysis resulted in the following ratio of cost allocation based on throughput and scale:

- New South Wales Public Hospitals: 48%
- Victorian Public Hospitals: 52%

The program costs compare favourably to similar initiatives on a cost-per-bed ratio. The St Vincent's EMR (with an integrated PAS) will cost $112,000 per bed. When compared to other organisations that have a similar or greater cost per bed for an EMR only, this implementation shows significant value for the investment. In addition, there are substantial economies of scale from the St Vincent's approach that delivers a better return on investment for the NSW MoH contribution. The program will engage with an external organisation to validate overall costs, risk and contingency allocation as part of project assurance.

The expected SVHNS Operating costs of the EMR is $31 million over eight years largely in hosting, application management and vendor support. SVHNS is estimated to derive cashable benefits of $21.8 million and productivity and capacity benefits of $32 million over the same period.

Implementation Approach

The St Vincent's EMR Program will be led by an experienced project team with an internal Program Management Office (PMO). The project framework will align with international standards based assurance methodologies.

As noted above, the enterprise-wide Program approach that will be adopted for this implementation will not only deliver economies of scale; it will also provide an unparalleled opportunity to establish best-practice clinical pathways across public and private sector hospitals in the three largest states of Australia. The resultant insights will provide valuable guidance to many other healthcare organisations and health funders including the NSW MoH.

The staff of SVHNS recognise the potential available with this new platform that will allow their care delivery processes to further evolve and exploit the value that can be realised from digital solutions.

An EMR program team will lead the entire lifecycle, thus ensuring alignment with design principles and consistency throughout the deployment. The approach to be adopted for the NSW hospitals covers the following phases noting the relevant scope:

1. Implementation Planning Study - St Vincent's
2. Project Initiation - St Vincent's
3. Standard Build - St Vincent's
4. Localisation and Build - NSW
5. Patient Administration System Deployment – NSW
6. Clinical Systems Deployment – NSW public / private precinct

7. Clinical Systems Deployment – NSW All public / private hospitals.

The IPS will confirm the timing of the deployment but an indicative schedule aims to have SVHNS live with all functionality by November 2023. There may also be an opportunity to fast track the PAS replacement to address this particular vulnerability.

Conclusion

An EMR is foundational to the effective and safe delivery of healthcare in this digital age. It is essential to SVHNS's ongoing provision of world class healthcare as well as being an expectation from our clinicians and patients. As such, the investment is urgent. SVHS is now one of the last public hospital without a modern EMR and, based on current planning, the earliest that SVHNS could expect to go live with a project commencing in early 2022, is mid to late 2023.

A fully integrated digital environment will support the provision of safe, high quality care. It will enable enhanced innovation, research and progressive models of care. It will establish a more rewarding environment for clinicians. It will directly engage patients in the management of their care.

This business case seeks a capital investment of **$50 million over three years** from the NSW Government commencing in the **2021/2022** financial year. The contribution from SVHNS to this Program will be **$13 million** (CAPEX only). There is an additional operating cost to SVHNS of $31 million over eight years.

Summary Financials

Table 3: Summary Overview of Key Program Statistics – St Vincent's IPS and EMR

Description	2020/21 $m	2021/22 $m	2022/23 $m	2023/24 $m	Total $m	Opex 8 years $m	Opex Benefits 8 Years $m
St Vincent's Australia IPS Funding *1	3.5	-	-	-	**3.5**	-	-
SVHNS Public Contribution – Capital	-	4.3	4.3	4.3	**13**	-	-
Government Funding Sought – Capital	-	16.6	16.6	16.6	**50**	-	-
Operational Expenses – SVHNS					**31**	31	-
Financial and Productivity Benefits – SVHNS							(62m)
TOTAL	$3.5m	$20.9m	$20.9m	$20.9m	$98m	$31m	(62m)

Note 1: This is the overall St Vincent's IPS cost.

Table 4: St Vincent's 10 Year Total Cost of Ownership, Capital breakdown and Ministry of Health request for Capital Funding

Cost Category	CapEx $m	OpEx $m	Total $m	CapEx Private (42%) $m	CapEx Public (58%) $m	Total CapEx NSW Public $m	NSW CapEx Request $m
Program Resources – St Vincent's	59	0	**59**	25	34	16.5	13
Device Integration & EMR Peripherals	14	6	**20**	6	8	4	3.5
Hosting and Application Management	7	54	**61**	3	4	2	1.5
Training and Activation Support	19	0	**19**	9	11	5.5	4.5
Assurance, Advisory, Project Office Expenses	28	0	**28**	11	16	8	6
Vendor Implementation, Software and Support	73	53	**126**	30	43	20	16
Contingency	23	0	**23**	10	14	7	5.5
TOTAL	$224m	$113m	$337m	$94m of $224	$130m of $224m	$63m of $130m	$50m of $63m

Table 5: Summary Overview of Program Schedule

Description	Commence	Complete	Comments
Implementation Planning Study	Nov-20	Jul-21	IPS: Risk and Cost Validation
Project Initiation	Jul-21	Dec-21	Project Initiation, Planning and Setup
Standard Build across St Vincent's	Jan-22	Oct-22	Overall St Vincent's Initial Build
Localisation and Build	Oct-22	Apr-23	NSW Configuration and Build
Patient Administration System Deployment - NSW	Apr-23	Aug-23	Public/Private Precinct Deployment
Clinical Systems Deployment – NSW Public/Private Precinct	Aug-23	**Nov-23**	Go-Live EMR/PAS NSW Precinct
Clinical Systems Deployment – Sydney all Public/Private Hospitals	Nov-23	**Jul-24**	Go-Live EMR/PAS NSW Public/Privates

Contents

1. Introduction & Background 16
2. Key Objectives and Scope 19
3. About St Vincent's and SVHNS 22
4. Problems 24
5. Benefits 28
6. Transforming Research 38
7. Strategic Options 42
8. Program Implementation Approach 46
9. Solution Deliverability 50
10. Program Management 61
11. Integration Architecture 70
12. Infrastructure and Devices Scope 72

Appendices

Benefits 75
Problem Statement 83
Alignment with Government Strategy 86
Discovery and Scope 90
Program Costs 104

Index of Tables

Table 1: Anticipated Quantifiable Benefits 8
Table 2: Public Private Distribution Model (indicative summary of key factors, weightings not included) 10
Table 3: Summary Overview of Key Program Statistics – St Vincent's IPS and EMR 12
Table 4: St Vincent's 10 Year Total Cost of Ownership, Capital breakdown and Ministry of Health request for Capital Funding 12
Table 5: Summary Overview of Program Schedule 12
Table 6: Investment Logic Summary 24
Table 7: Cash Releasing Benefits 29
Table 8: ACSQHC National Safety and Quality Health Service Standards 31
Table 9: Strategic Options Analysis Detail 42
Table 10: Option Analysis Ranking 45
Table 11: SVHNS Indicative Program Timeline 47
Table 12: Key Selection Components 50
Table 13: St Vincent's Facilities 55
Table 14: Public Private Distribution Model 56
Table 15: Ten Year Total Cost of Ownership - Public / Private Allocation 56

Table 16: Ten Year Total Cost of Ownership – Government Funding Request 57
Table 17: Capital Cost Distribution 57
Table 18: Capital Cost by Cost Category 58
Table 19: CapEx Costs by Functional Capability 58
Table 20: Ten Year Opex Costs 58
Table 21: Opex Costs over EMR Program Lifetime 59
Table 22: SVHA EMR Program Costs Notes & Assumptions 59
Table 23: Risk & Contingency Cost Provisions 60
Table 24: Governance Roles & Responsibilities 61
Table 25: Risk Management Matrix 63
Table 26: St Vincent's Risk Monitoring & Reporting 63
Table 27: EMR Implementation High & Very High Risks 64
Table 28: Anticipated Quantifiable Cash Releasing Benefits 76
Table 29: Potential Savings - System Retirement 81
Table 30: Benefit Profile 81
Table 31: SVHNS System Environment 83
Table 32: Discovery Phase Findings 90
Table 33: EMR Core Functional Scope 97
Table 34: EMR Full Functional Scope 98
Table 35: EMR Future Functional Scope Extensions 99
Table 36: St Vincent's Proposed System Retirement Options 100
Table 37: Existing Interface Considerations 101
Table 38: Indicative New Interface Requirements 102
Table 39: St Vincent's Facilities 104
Table 40: St Vincent's Summary Statistics 104
Table 41: Cost Allocation Modelling 105
Table 42: Public Private Distribution Model 105
Table 43: Ten Year Total Cost of Ownership – Base Costs 105
Table 44: Contingency Allocation 106

Index of Figures

Figure 1: EMR Functional Scope 7
Figure 2: SVHNS High Level Functional Overview 17
Figure 3: St Vincent's EMR Journey 18
Figure 4: SVHNS High Level 52
Figure 5: MEDITECH EMR Assessment 54
Figure 6: Decision Insights Report Outcomes 54
Figure 7: St Vincent's Governance Framework 61
Figure 8: SVHNS Investment Logic Map 75

1. Introduction & Background

1.1. Why an Enterprise EMR is needed

The population that SVHNS serves is changing in terms of demographics, health and well-being and expectations of healthcare which is placing additional demand, cost and workforce pressures on the health system. Concurrently, emerging models of care are placing increased focus on prevention, a shift towards ambulatory and community care to reduce demand on inpatient services, greater equity of access to healthcare services, and critically, better integration and coordination of care delivery. These shifts are occurring within an environment of accelerating innovation (e.g. precision medicine, mobility, predictive analytics, artificial intelligence, wearable health devices), which are disrupting the way healthcare is delivered.

Effectively responding to these challenges and the opportunities they create requires a contemporary enterprise EMR environment that provides the right clinical information and tools, to the right person at the right place and time to support the delivery of high-quality and integrated person-centred care. Such an environment is critical to efficient and sustainable healthcare delivery, a productive and engaged workforce and performing high-impact clinical and translational research, all of which are core tenants of St Vincent's *Go Beyond* 2020 Strategy.

The current complex and hybrid information environment at SVHNS creates risks for patient care and impedes our ability to meet current and future health care delivery needs. The eHealth Strategy for NSW Health 2016–2026[6], details a 10-year program of innovation, investment and implementation to mature NSW's core digital systems, to leverage these systems to deliver seamless continuum of care and to progressively shift the healthcare focus toward preventative health and tailored patient engagement.

An enterprise EMR will be a key enabler for SVHNS to enable optimal alignment with national strategies, jurisdictional and accreditation requirements.

1.2. What is the St Vincent's EMR Program?

The St Vincent's EMR Program is the implementation of an enterprise EMR across all 16 hospitals, both public and private, in NSW, VIC and QLD. This business case is focused on the SVHNS EMR project and the details pertain to SVHNS hospitals; references to the broader program of work have been included for context and clarification.

The EMR is a solid foundation that will enable St Vincent's to support its current models and facilitate future models of care, irrespective of location and care type.

The high-level functional scope of the St Vincent's EMR has been determined by gathering organisational requirements, adopting lessons learnt from previous EMR implementations and based on the following key principles:

- **Patient centred** – One patient, one record with accessible interfaces for patients and carers;
- **Enhance the adoption of care models**– To support existing and new models of care with no deprecation in functionality across SVHNS, increased capability;
- **Supports clinical decision making** - Reporting capabilities and data analytics to satisfy statutory, legislative, management research and clinical needs;

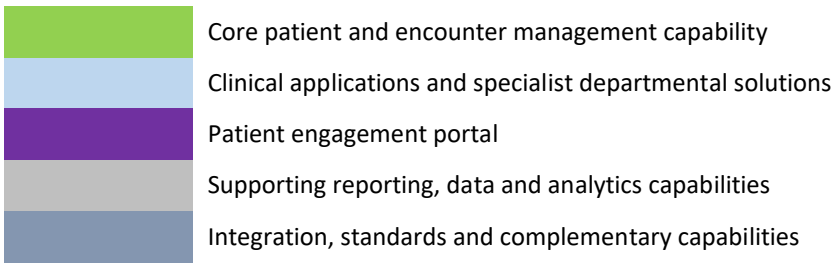
[6] eHealth Strategy for NSW 2016-2026

- **Intuitive interface** – Same look and feel across applications; simple to use, displaying information to the right person at the right time;
- **Integrated solution** – Seamless uninterrupted flow of information; reduced costs and maintenance;
- **Flexible infrastructure** - The infrastructure meets the needs of the statutory and digital requirements of three jurisdictions (New South Wales, Victoria and Queensland) as well as meeting the needs of both the public and private health division;
- **High reliance** - The infrastructure will be resilient (high availability) and have robust business continuity processes to support both planned and unplanned downtimes and cloud hosted;
- **Modern technologies** – Modern platform that supports current and future innovation and new technologies; and
- **National and Jurisdictional alignment** – Alignment with national standards and initiatives.

This high-level functional scope will be supported by the capabilities depicted in the following diagram:

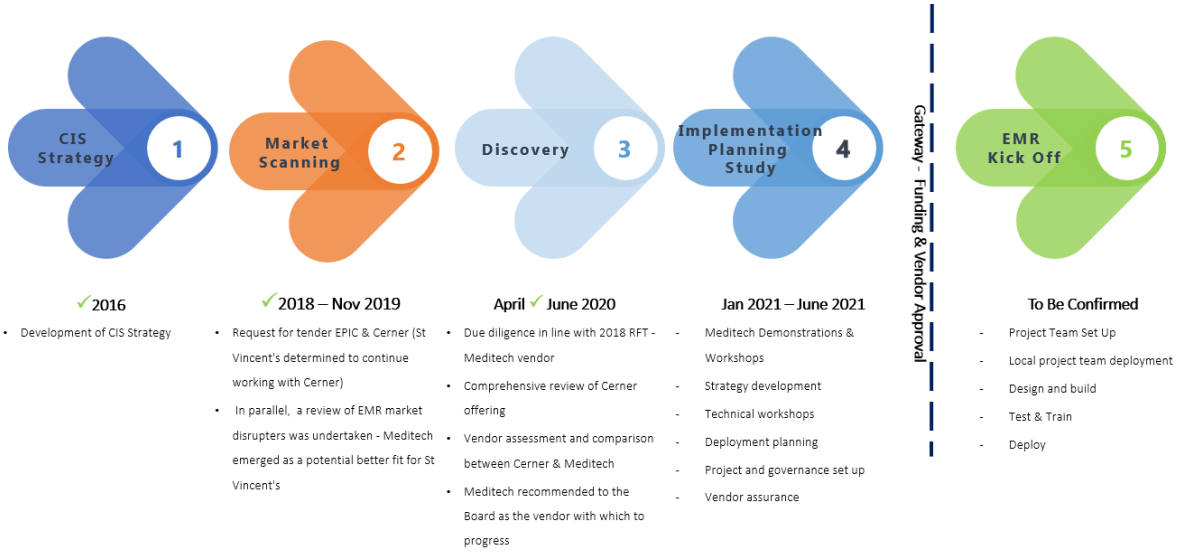
Figure 2: SVHNS High Level Functional Overview

Legend:



1.3. Journey to date

Figure 3: St Vincent's EMR Journey



In 2016, St Vincent's developed a Clinical Information System (CIS) Strategy which set out its vision for digital health care across the six public and ten private hospitals. A foundation of the CIS Strategy was a single patient clinical record delivered by a single EMR that would support the seamless movement across our organisation. For Sydney, this means patient care across the continuum from acute to sub-acute to community-based care will be more seamless, safe and efficient.

In 2018, following the Request for Tender (RFT) process (which invited EPIC and Cerner to respond) and an in-depth vendor evaluation process, Cerner was invited to submit a Best and Final Offer (BAFO). A draft Business Case was submitted to the NSW MoH in 2018, with subsequent feedback received. In the meantime, MEDITECH was identified as another vendor with a potential better fit for St Vincent's. MEDITECH was invited to participate in the same vendor evaluation process that was undertaken in 2018.

In 2020, MEDITECH participated in a Discovery Phase where a fully commercial, financial, technical and high-level usability review was undertaken by key St Vincent's stakeholders. The outcome of the Discovery Phase was favourable and the St Vincent's Board approved undertaking an implementation planning study with MEDITECH.

2. Key Objectives and Scope

2.1. Key Objectives

The overarching objective of the SVHNS EMR Program is that each patient will have a single comprehensive patient record available to clinicians, researchers, patients and administrative staff in a relevant, informative and secure manner.

Information will be available in real-time facilitating the decision making for the individual patient as well as providing aggregated data that will inform and drive real time organisational management. The single record across facilities and sites will support the seamless delivery of care, reduce the duplication of tasks and improve the patient experience.

Key objectives of the program are:

- One source of truth for patient records;
- Safe, integrated and best-practice care;
- Support operational efficiency, productivity and sustainability;
- Enhance connectivity and engagement with patients;
- Accelerate clinical and translational research; and
- To maintain the reputation of SVHS as one of the top Australian hospitals.

2.2. Functional Scope

2.2.1. In scope

The full scope of functionality to be deployed at each hospital will be determined during the IPS and will consider state strategy and solutions e.g. eRIC, Surginet, FirstNet in ED, Patient Flow Portal etc.

- **Patient Administration System** – Admissions, Discharge, Transfer, Outpatient Scheduling, Waitlist Management, Referral Management, Coding, Billing and Scanning, Correspondence, Bed Management, A single patient St Vincent's record;
- **Clinical Applications** – Nursing & Medical Assessments & Documentation, Allergies and Alerts, Medication Management, Diagnostic Orders & Results, Real Time Quality Surveillance (e.g. Sepsis Alerts), Image capture, Messaging and Task management;
- **Departmental Applications** – Anaesthetics, Emergency Department, Theatre management, Intensive Care Unit, Allied Health, Ambulatory & Practice Management and Inpatient Oncology;
- **Data Analytics** – Real Time Dashboards (Administrative & Clinical) to analyse trends and target performance improvements, Statutory Reporting, Research capability, Clinician self-service analytics and Operational reports;
- **Mobility & Devices** – Medical device integration e.g. telemetry and spot monitoring. Fully web enabled with secure accessibility on mobile devices including apps for patients and clinicians;
- **Additional Third Party** – Integrated Intelligent Medical Objects (IMO) and Voice Dictation (M*Model) and iProcedures, Medispan (Wolters Kluwer) and Capsule Integration;
- **Support & Business Continuity** – Full disaster recovery, 24/7 support; and
- **Application Support** – Application monitoring and support as a service.

2.2.2. Out of Scope

The following functionality is not currently included in the EMR Program scope and therefore is not included in the costs or planning presented in this paper. The EMR foundation however supports this capability and any future decision to incorporate this functionality. This decision will continue to be reviewed in IPS.

- **Oncology** – Outpatient clinical oncology module excluded as St Vincent's has recently implemented Mosaiq;
- **Women's Health** – Obstetric clinical module excluded as there are no obstetric services at SVHS;
- **Supply Chain** – Supply chain management module. (The size, scope and complexity of this change is unlikely to be achieved within the project timelines and may delay the overall project).

2.3. Building Capability

Executive, clinical and project leadership is critical to the success of the EMR Program at SVHNS.

St Vincent's has appointed an experienced EMR leadership and advisory team that has been guiding the organisation over the last 20 months. Collectively, the team's experience includes the implementation of PAS, EMR, billing, LIMS, other clinical applications and large capital projects. The team also has experience working with State and National Government bodies.

The Chief Executive and leadership team at SVHNS have a proven ability to manage large-scale transformation:

- The Chief Executive of SVHNS was responsible for mobilising the hospital network and leadership to respond very swiftly and effectively to the challenges of managing a centrally-

located public hospital during a pandemic. The response model was highly successful and been emulated by other health care organisations;

- The executive leadership team have considerable experience leading clinical information system role outs which recently include the successful implementation of eRIC and the upgrade of MedChart; and
- SVHNS has an established Transformation hub which will provide a framework to drive implementation, track milestones and measure quality and performance indicators.
- The SVHNS Executive Leadership team have individual career experience with the NSW EMR implementations.

3. About St Vincent's and SVHNS

St Vincent's is the largest not-for-profit health and aged care provider in Australia today. We enjoy national and international recognition for leadership in clinical practice, education and medical research.

St Vincent's operates six public hospitals, 10 private hospitals and 20 aged care facilities in Queensland, New South Wales and Victoria. Along with three co-located research institutes – the Victor Chang Cardiac Research Institute, the Garvan Institute of Medical Research and St Vincent's Institute of Medical Research. Our close partnerships with other research bodies, our pre-eminent university partners and other health care providers contribute to our consistent reputation for achieving incredible health outcomes benefiting all Australians.

Our largest hospital, St Vincent's Hospital Sydney (SVHS) is a full service acute and sub-acute teaching public hospital providing 78,000 NWAU, with significant training and research activities and centres of excellence in heart and lung transplantation, bone marrow transplantation, cardiology, cancer, acquired immune deficiency syndrome/HIV, respiratory medicine, mental health and drug and alcohol services. SVHS prioritises health services to the mentally ill, drug and alcohol addicted, homeless, Aboriginal and Torres Strait Islander people and prisoners.

Today, our mission to serve those most in need continues through every facet of our clinical and support services. These extend beyond our hospital's walls into NSW's metropolitan, rural and regional communities and into correctional health.

The Hospital's clinical education program is high achieving and award-winning. Its research program has a strong international reputation in translational research and clinical trials. The EMR project would greatly advance our research initiatives by providing an integrated comprehensive EMR that is interoperable with other organisations, therefore providing access to consistent and reliable data to support research and innovation.

St Vincent's Hospital

St Vincent's Hospital Sydney is a full service acute teaching public hospital, with significant training and research activities and centres of excellence in heart and lung transplantation, bone marrow transplantation, cardiology, cancer, acquired immune deficiency syndrome/HIV, respiratory medicine, mental health and drug and alcohol services.

Sacred Heart Health Service

A publicly funded sub-acute facility, co-located with St Vincent's Hospital Sydney, Sacred Heart Health Service is one of Australia's largest and leading palliative care and rehabilitation providers and offers inpatient and outpatient services. It also incorporates the Cunningham Centre for Palliative Care: an academic centre that offers palliative care professional development opportunities and research in medicine, nursing and allied health.

St Joseph's Hospital

A publicly funded sub-acute facility, St Joseph's Hospital is a major public hospital in western Sydney with core services in palliative care, medical rehabilitation, aged care and aged care psychiatry, support groups and outreach programs

Throughout 2020 SVHS stood tall in its response to the COVID-19 outbreak in Sydney. We were at the forefront in acute patient care, suburban testing clinics, outreach support and rapid pathology services, which the people of NSW came to depend on as part of the battle to remove the virus from the community and keep vulnerable populations safe.

Within record time SVHNS extended its capacity to treat patients through the expansion of telehealth and pop-up testing clinics. Again, having an enterprise EMR would have greatly assisted SVHNS in its COVID-19 response.

4. Problems

4.1. Definition of Problem

Despite its critical role in supporting NSW's public health system, SVHNS's existing environment is low in digital maturity with a hybrid of paper-based and disparate digital systems to collate and access patient information. In addition, SVHS has an in-house developed PAS which is ageing and end of life.

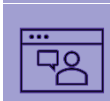
This situation potentially creates data entry / transcription / omission errors and the generation of incomplete, inaccessible or lost information, all of which contribute to increased patient safety risks. Patient outcomes may be compromised leading to increased clinical complications and higher costs/adverse events. Additionally, the ability to share information and integration with the broader NSW Health sector is not able to be supported with the current limited technological foundations in place.

4.2. Problem Statement

The problem statements identified in the Investment Logic Model (ILM) detailed in the Appendices reflect the implications of the disparate digital environment, reliance of mainly paper-based medical records and manual clinical and administrative processes resulting in the absence of a single source of truth for patient information. Following is a high-level summary of the outcomes:

Table 6: Investment Logic Summary

Problem Statements		ILM Weight	Description
	An inability to form a timely, consolidated view of a patient's circumstances delays, limits and constrains the provision of safe and appropriate care	30%	Manual processes yield unnecessary delays in key patient information, both intra- and inter-hospital. This restricts clinicians' access to critical patient information at the point of care in a timely manner, leading to avoidable errors, risk of complications, wasted clinician and patient time, and negative impacts on overall outcomes and the hospital experience for patients and their families. Difficult to deliver care beyond the hospital walls
	Poor awareness of hospital performance and lack of comprehensive clinical and administrative data impacts our ability to respond and adapt to health care needs	20%	The lack of a consolidated, end-to-end view of patient care limits the ability of clinicians, hospital support staff to identify and minimise inefficiencies in service delivery. The lack of this data also increases the difficulty in understanding the changing requirements of delivering care to patients, populations and the broader community, which limits SVHNS' ability to respond effectively. Evidence based research and innovation is limited by access to comprehensive clinical data, impacts the ability to conduct research, improve health services capability and gain insight into the causal linkages between clinical care decisions and patient outcomes.
	A lack of clinical decision support tools mean that staff do not receive support to make safer	20%	The absence of Clinical Decision Support given the reliance on paper-based records impacts the quality and safety of care through the lack of timely and appropriate alerts and error detection at the point of care to address infection control, patient deterioration

Problem Statements		ILM Weight	Description
	decisions related to patient care.		(e.g. sepsis), and adherence to best practice clinical pathways. As a result, the provision of health care becomes reactive rather than preventative – exposing patients to unnecessary complications and risks.
	Inadequate digital support for specialist clinical departments and specific care requirements impacts care delivery.	10%	Critical areas such as ICU, Anaesthesia and Surgery experience disjointed, fragmented care pathways with reliance on unconnected systems, paper recording and no specialty specific clinical decision support or efficient care planning. The "broken workflows" that result from the current environment impose an undue cognitive burden on clinicians.
	Opportunities to involve patients or share effective information about their care are not available due to manual paper-based processes	10%	The use of manual paper-based records relies on patients continually repeating information previously shared resulting in frustration and decreased patient satisfaction. Further, this situation limits the opportunity to engage patients in their care and share pertinent information via an effective means of communication.
	A lack of certainty that patient information is being reliably and securely transmitted and received on time exposes patients to avoidable risks	10%	Current manual processes, for example, information exchange via faxes, expose patients to unnecessary risks as there is no guarantee that records are received / viewed by relevant counterparties only in a timely manner. This may result in SVHNS clinicians having to make decisions without having access to all relevant patient information. There are also privacy risks associated with the use of such paper-based transmission methods given these are largely unsecured in nature.

4.3. Timing and the Broader Context

The timing is urgent. A number of risks are highlighted with continued delays in EMR investment at SVHS and other facilities in NSW that relate to poorer patient and clinician outcomes and potentially higher future costs:

- Risks to patient outcomes (Leading Better Value Care);
- NSW Health may fail to deliver reform agenda;
- Impact on the ability to conduct research into the future due to requirements by funders for sites to have an EMR.
- Increased future cost due to increased system complexity; and
- Increased prevalence of clinician burnout leading to poorer patient outcomes.

Risks to patient outcomes (quality and safety)

The key risk in delaying EMR implementation is the continued risks to patient outcomes. As discussed in the preceding sub-sections, the lack of an EMR platform will continue to see patient safety, outcomes, and quality of care compromised.

NSW Health may fail to deliver on its key objectives

Specifically, NSW Health may fail to meet its key objectives laid out in eHealth Strategy for NSW Health 2016 – 2026[7] that outlines the directions for clinical change and transformation for NSW and relies on the foundational EMR platform as a key component.

SVHS is an important public hospital in the Sydney Metropolitan area. With the exception of SVHS, most public hospitals in NSW have progressed further in their implementation of digital systems to support clinical care.

At present SVHS lags behind other facilities in terms of progress towards establishing a robust digital environment to support high-quality, safe care. Given its important role as an acute teaching public hospital, and a centre of excellence in heart and lung transplantation, bone marrow transplantation, and various other services, there is a very real risk that this situation will lead to negative health outcomes for the NSW public.

Delays in implementation may add to future cost/risk

Delays in implementation may lead to further investment in existing patchwork of systems and add to the future cost of implementing an EMR platform.

Without an EMR platform, the patchwork of manual workarounds may continue to grow over time as clinicians react to (growing) health care challenges. The longer this environment persists, the more complex the patchwork becomes. This results in greater costs required to build and maintain these systems, in addition to the increased burden on staff in managing within these complexities. Overtime, this cost is higher than if an earlier investment in EMR is made.

Staff adapting to non-EMR environment

The mobile junior medical and nursing workforce who work in other hospitals in NSW where an EMR is already implemented will struggle to adapt to a non-EMR environment where they need to consider safety issues which would, elsewhere, be prevented by an EMR. This presents risks to workforce recruitment and retention and risks to patients.

The aim of the EMR is to improve service delivery, provide integrated care and enhance access to digital health information. While benefits can accumulate with individual hospitals realising the benefits from an EMR, even greater benefits will accrue from establishing the capability for interoperability across all hospitals in the State.

The State and Commonwealth Governments are implementing many measures to improve access to services, enhance the quality of care and to ensure the sustainability of healthcare services. Quality areas that the EMR would directly enable include:

- Enhancing care for patients with delirium;
- Reducing harm and deaths from sepsis; and
- Identifying opportunities to improve patient flow.

[7] eHealth Strategy for NSW Health 2016-2026

The clinical decision support functionality available in the EMR can support improved delirium detection to reduce falls and shorten hospital stays for older patients.

Accreditation and other legislative requirements mandate working towards compliance in several areas that are further supported with the scope and deliverables of an enterprise EMR:

- Upload of clinical documents in the appropriate digital formats to My Health Record
- Use of standardised terminology such as AMT (Australian Medicines Terminology) and SNOMED CT (clinical terms) to share a patient's clinical information consistently, securely and safely with authorised clinicians in other settings
- Adoption of real time prescription monitoring (access to up-to-date prescription history to reduce overdose and identify patients at risk of dependency) which will only be possible through implementation of electronic medication management via the EMR
- An effective quality improvement system operating across the organisation.

A continued delay in EMR investment at SVHNS may lead to increased risk in patient outcomes (quality and care). Given its important role as a third schedule hospital under the NSW legislation, providing formal support to other key outer metropolitan, regional and rural hospitals, there is a very real risk that this situation will lead to negative health outcomes for the NSW public. We need to start now as a funded project would not see the SVHNS live until mid to late 2023.

5. Benefits

5.1. Benefits Introduction

There is strong evidence, from both international and national research, demonstrating the benefits of implementing EMRs. Adoption of an enterprise EMR system with functionality to achieve a HIMSS Stage 6 accreditation will ensure the best possible patient care in and across all St Vincent's Health Services.

The implementation of the SVHNS EMR Program will improve:

- Patient safety and health outcomes;
- Patient experience and engagement;
- Access to clinical trials;
- Clinician satisfaction;
- Workplace productivity; and
- Data availability for management and research.

Clinical decision support, order sets and standardised clinical workflows embedded in the EMR solution are pivotal to improving patients' clinical outcomes. Recent data from the Royal Children's Hospital (Melbourne) and Princess Alexandra Hospital (Brisbane), whose EMR systems have resulted in a HIMSS Stage 6 assessment, highlight the profound quality and safety benefits.

Reported benefits to patients have demonstrated improvements in:

- Avoidance of medication errors;
- Minimisation of clinical incidents;
- Incidence of hospital acquired infections;
- Management of length of stay;
- Measurement of hospital standardised mortality ratio; and
- Monitoring of deteriorating patients.

Implementation of an EMR can also realise financial benefits. Direct financial benefits include a reduction in costs for transcription and paper. EMR systems have also been proven to substantially reduce unnecessary and / or duplicate laboratory testing and imaging. There are also revenue opportunities through improved data capture and resulting billing.

Our recording of allergies and medications across multiple systems creates challenges for our clinicians to review and reconcile the information and therefore exposes the organisation to human-based error.

5.2. SVHNS Benefits Approach

Data used in the benefits calculations by SVHNS have been based on the financial year 2018/19 being the most recent representation of typical activity prior to any impact of the COVID-19 pandemic.

The benefits have been documented and agreed with the SVHNS Executives and are based on their hospital current baseline, clinical improvement pathway and the full implementation scope.

The anticipated total quantifiable cash releasing benefits over an eight-year period commencing in Year three following an approximate two-year implementation is $61.9 million.

Table 7: Cash Releasing Benefits

Benefit	Benefit Type	Amount $
Reduced Length of Stay (LOS)	Capacity	26.8
Increased Theatre Utilisation	Capacity	4.2
Reduced Clinical Documentation	Cashable	7.1
Reduced Clinical Pathology Tests	Cashable	1.3
Reduced Imaging Orders	Cashable	0.8
Increased Private Patient Revenue	Cashable	12.5
Avoidable Readmissions	Capacity	1.0
Reduced Software Costs – Software and Hardware	Cashable	8.2
Total Benefits		**$61.9m**

The process and supporting information that determined these potential Benefits is outlined in the Appendices. It is noted that the potential for Increased Private Patient Revenue is likely to be impacted by the imminent changes to Commonwealth Medical Benefit Scheme (CMBS) funding rules with respect to follow-up ambulatory care and the potential to charge.

It is highlighted that these benefits will be validated during the IPS. Further, given the proposed scope, there are likely to be additional benefit opportunities identified.

5.3. Benefits Opportunities

SVHNS has additional benefits to be realised given the proposed scope of the EMR program. These include the retirement of existing and ageing systems that are becoming increasingly unreliable causing business and clinical disruption and the rationalisation of vendor contracts and services. These financial benefits will be quantified during the IPS.

Digital technologies are rapidly advancing. Over the next few years, new system enhancements, technologies and evidence will emerge. The benefits of the EMR Program will need to be continually monitored through the life of the project and beyond. As SVHNS embeds the EMR into daily clinical operations, it will gain a better picture of its local opportunities and impacts. To achieve the full benefits of an EMR, there must be a long-term commitment with clinician engagement and focussed leadership.

5.3.1. Patient Safety and Health Outcomes

There are many patient safety benefits that do not always translate into financial benefits, however, they must be the primary focus of the SVHNS EMR Program. Evidence indicates patient safety benefits will facilitate reduced length of stay, release staff time to care, improve clinical outcomes for patients and improve both patients and staff satisfaction.

Although evidence-based interventions are known to improve patient safety and reduce patient harm, many barriers prevent the implementation of these interventions. These barriers include the fact that clinicians work on paper, rely on their memory and clinical information is stored in multiple

specialist systems. This challenge is compounded by the speed in which decisions must be made and the resultant cognitive load as well as the sheer volume of tasks that must be completed for each patient.

Patient harm is known to be attributable to human error. Evidence based; personalised digital systems have been developed for health services. These digital systems reduce human error in clinical decisions and practice and ensure patients' safety. Patient care will continue to be compromised if digital technologies are not implemented in a timely manner.

With the rapid advances in pharmacology, medical technology, genetic medicine and research, the paper record is no longer adequate. The SVHNS EMR will enable the standardisation of care, timely access to information and translation of new knowledge into clinical practice. The EMR will also provide decision making tools that highlight compliance with agreed peer practice resulting in significant benefits to patients' safety.

Reduction in the Incidence of Preventable Harm to Patients

Reducing avoidable harm in the healthcare system remains a major challenge for Government, Boards, Management and Clinicians. The EMR will reduce both medication errors and hospital acquired infections, two highly prevalent and preventable causes of harm in Australian hospitals.

Medication Errors

The impact of medication errors on patient outcomes includes increased length of hospital admission, disability and death.

Australian studies report 2-5% of drug charts contain prescribing errors. In addition, 5-18% of medications are administered in error (wrong drug, wrong patient, wrong route, wrong dose and / or wrong time). The Royal Children's Hospital in Melbourne reported a 13.4% reduction in medication errors (prescribing and administration)[8].

Hospital Acquired Infections (HAIs)

Hospital acquired infections, such as central line associated bloodstream infections, surgical site infections and staphylococcus aureus bacteraemia are associated with increased morbidity, mortality rates and healthcare costs. To effectively address potential sources of patient harm associated with hospital acquired infections, an EMR will standardise care, improve communication and provide timely access to decision support and information critical to patient care.

Since the EMR go-live at Princess Alexandra Hospital, the hospital acquired infections have reduced by 28%. HAC data at SVHNS[9] was 44. Even a 10% reduction across SVHNS, would result in approximately 4.4 fewer hospital acquired infections per year.

Reduction in the Risk of Death and Serious Injury

The Australian Commission on Safety and Quality in Healthcare (ACSQHC) has developed a range of key performance indicators to support national reporting on safety and quality in healthcare. The hospital standardised mortality ratio (HSMR) is a whole of hospital mortality indicator.

Deterioration in patients while in hospital often goes unnoticed for prolonged periods of time. This delay can result in otherwise preventable cardiopulmonary arrest, admission to the intensive care unit and death. In most cases, measurable changes in vital signs can signify deterioration. The SVHNS EMR Program facilitates timely recognition of abnormal parameters in patients who are

[8] HIC Melbourne 2019 – Professor Mike South - Clinical benefits of a Big-Bang EMR implementation RCH EMR Team – Slide 20 – Medication safety. Pulse+IT Aug-19 HIC 2019: Royal Children's reaping the benefits from its big bang theory

[9] SVHNS Riskman, 2018-2019

deteriorating. It automatically aggregates patient information to alert clinicians to the need for intervention.

- After the implementation of a HIMSS Stage 6 accredited EMR system in a US hospital, the mean monthly adjusted mortality rate decreased by 20%[10].
- The Grattan Institute recently published the average cost of an acute inpatient hospital death at $47,000[11].

The St Vincent's EMR patient safety benefits have been linked to the ACSQHC National Safety and Quality Health Service Standards and specifically include:

Table 8: ACSQHC National Safety and Quality Health Service Standards

National Standard	Description	Safety Benefit
	1. Clinical Governance	Reduction in the risk adjusted mortality rate Improved recognition and recording of alerts associated with family and occupational violence Compliance with risk assessments Compliance with care pathways
	2. Partnering with Consumers	Improved consumer involvement in care and treatment decisions Improved consumer satisfaction
	3. Preventing & Controlling Healthcare Associated Infections	Reduction in the rate of hospital acquired infections
	4. Medication Safety	Reduction in medication related errors Reduction in the rate of Venous Thrombosis Emboli incidents
	5. Comprehensive Care	Reduction in the rate of hospital acquired pressure injuries Reduction in the rate of inpatient falls with serious injuries Reduction in the incidence of sepsis
	6. Communicating for Safety	Reduction in the number of incidents related to clinical handover Reduction in incidents related to missed test results Reduction in the incidents associated with positive patient identification and procedure matching
	7. Blood Management	Reduction in the inappropriate use of blood and blood products
	8. Recognising & Responding to Acute Deterioration	Improved identification and response to clinical deterioration

[10] Longhurst, 2010

[11] Swerrissen, 2014

The SVHNS will add further site-specific patient safety indicators throughout the implementation and refine these for ongoing benefit measurements. The EMR supports clinical decision making and data analytic capabilities which provides each organisation with a platform to actively monitor and improve patient care and safety benefits.

5.3.2. Patient Experience

Improved engagement with patients is one of the key outcomes expected of the St Vincent's EMR. This will be realised from a range of different perspectives with some of the potential benefits to be realised summarised following.

Reduction in unwanted variation in care

One primary contributor to improve the quality and safety of care provided is the ability to embed clinically agreed evidence-based pathways into the EMR to reduce unwarranted variation in care. The Australian Commission on Safety and Quality in Health Care released in November 2015 the first *Australian Atlas of Healthcare Variation*, highlighted variation in health care provision across Australia.

The report acknowledges that some variation is desirable and warranted – it reflects differences in people's need for health care or personal preferences. However, where variation is unwarranted, it signals that people may not be getting appropriate care. Understanding this variation, which is greatly enhanced through an EMR, is critical to improving the quality, value and appropriateness of health care.[12]

Clinical Care Standards are nationally agreed statements on the care patient should be offered by health professional and health services based on best available evidence and established clinical consensus. Implementing clinical care standards electronically rather than on paper, will ensure a more consistent and sustainable approach to improving patient care.

The St Vincent's EMR will require all hospitals to review workflows both within and across facilities. This will lead to a review of practice variation and will promote a consistent adoption of best practice. The EMR will also provide clinicians and administrators with access to the data and information they need to compare performance and results[13], identify compliance with various risk assessment and clinical process (e.g. clinical handover) where non-compliance results in unwarranted variation in care has occurred.

Reduction in clinical incidents

Clinical incidents with patient harm can be a result of incidents such as falls, hospital acquired pressure injuries, sepsis and venous thromboembolism. Evidence supports a reduction in these clinical incidents and better patient outcomes following the introduction of an EMRAM Stage 6 EMR.

Improve test result follow up

The World Health Organisation – World Alliance for patient safety has identified test result management as a priority area. Poor test result follow-up can have major consequences for patients, including missed diagnoses and suboptimal care. A systematic review completed in 2011[14] identified the lack of follow up of test results of hospitalised inpatients ranged from 20% to 61%. The consequences of missed test result for patient care can be catastrophic. An EMR has been shown to improve the management of missed test results.

---

[12] Australian Commission on Safety and Quality in Health Care November 2015 the first *Australian Atlas of Healthcare Variation*

[13] Better, Safer Care: Delivering a world-leading healthcare system, October 2016. State of Victoria. Department of Health and Human Services.

[14] CallenJ, Georgiou A, LiJ, Westbrook JI (2011). The safety implications of missed test results for hospitalised patients: a systematic review. British Medical Journal of Quality and Safety. 20:194-9.

Improved Patient Satisfaction

The EMR will deliver immediate access to information when patients are transferred or care is transitioned to another hospital or department within SVHNS. This access to information, combined with standardised documentation and handover processes will improve timeliness and continuity of care. Patients will be confident in the fact that their clinicians "know about them, their treatment and what their plan is" through the use of the EMR. They will not be asked to answer the same questions repeatedly thereby improving their overall experience.

Promotion of Patient Engagement

The implementation of a Patient Portal as part of the EMR scope allows patients to access their own information, communicate directly with their clinician, make their own or request an appointment and provide us with information about their progress and outcomes (e.g. patient reported outcome measurement tools).

A Patient Portal provides patients with more convenience. Patients will have a greater sense of empowerment and feel more involved in their own health care and treatment decisions and therefore better able to self-manage. Patient satisfaction surveys and patient portal sign-up and usage will be measured post go-live to evaluate this benefit.

Reduction in unplanned readmissions

The Second Australian Atlas of Healthcare Variation[15] highlighted that almost half (47%) of the potentially preventable hospitalisations in Australia in 2014–15 were due to the five conditions examined in this chapter: chronic obstructive pulmonary disease (COPD), heart failure, cellulitis, kidney infections and urinary tract infections (UTIs), and diabetes complications. Substantial variation was observed between Statistical Area Level 3 (SA3) areas in the rates of hospitalisation for each condition. Variation was greatest for COPD (16-fold difference), diabetes complications and cellulitis (approximately 12-fold difference for both). Rates of hospitalisation for heart failure and UTIs varied seven-fold and six-fold, respectively.

Management of these conditions will benefit from the capabilities delivered by an EMR. These capabilities include promotion of appropriate clinical pathways, guidance on test ordering and proactive discharge planning.

5.3.3. Clinician Satisfaction

Ready access to accurate and relevant information is critical for clinicians to provide timely and appropriate patient care. The compounding factors of incomplete information only available in paper-based formats inhibits all clinicians from performing their role in the most effective way.

It is highlighted that the EMR will deliver benefits for all clinicians including medical, nursing, allied health and supporting disciplines. Access to a single source of truth in the consolidated digital patient record will facilitate collaboration and multi-disciplinary models of care.

Increased Staff Satisfaction

Although increasing clinician satisfaction will not result in a direct financial benefit, it will contribute to improved workplace productivity and releasing time to care benefits.

The EMR will increase staff satisfaction and assist them to provide better care through access to new technologies and the general improvement of the ICT network. Staff interaction within and across Hospitals will help to create a better sense of shared responsibility for patient care.

[15] Second Atlas of Healthcare Variation, ACSQHC, 2017

A staff satisfaction survey and feedback will be measured post go-live to evaluate this benefit.[16]

More Staff Time Released to Patient Care

The EMR will save clinicians' time. Immediate access to information on a single consolidated digital point of access will reduce the time spent looking for information. Actions will be instigated based on the most current information. Controls will ensure interventions are not unnecessarily duplicated.

Digital clinical documentation will build on information already available in the patient's record. Connecting patient monitors directly with the EMR will reduce time spent by nurses, midwives and anaesthetists manually transcribing vital signs.

Electronic medication charts will no longer need to be re-written every ten days nor will nurses and midwives be required to write total fluid balances daily. In addition, staff will have the option to do more 'on the go' with the ability to complete tasks on mobile devices. Medical staff will not have to return to the patient's ward to prescribe a new medication or order a test.

Saving clinical staff time may not reduce the overall FTE. However, it has been estimated that the EMR could release significant time to enable clinicians to focus on patient care. This aligns with strategic priorities of patient centred care, quality and safety activities, learning and research.

Enhanced Teaching and Training Opportunities

Availability of digital tools is an expectation of the contemporary health care organisation and of clinical staff when seeking appointment. Adoption of an EMR will allow SVHNS to continue their tradition of excellence in teaching and training and position them to attract best of breed.

The capabilities provided by the EMR will facilitate training through the guidance incorporated with respect to international and locally defined best practice. Clinical decision support will support the definition of the most appropriate and safe care processes. Further, the EMR will establish the ability to digitally collaborate between clinical peers.

Beyond the actual use, the EMR will result in access to a large and comprehensive data set that can be interrogated to monitor trends, analyse outcomes and plan future service provision.

5.3.4. Workplace productivity

Workplace productivity benefits may not always result in a direct cashable benefit. They will deliver indirect financial benefits and opportunities through a range of interconnected activities related to increased patient throughput and more staff time released for patient care.

The SVHNS EMR will provide close monitoring of the patient and clinician activity. This information will better inform resource allocation, clinical improvement strategies and will provide a deeper understanding of the operations of the business. The EMR will enable monitoring of individual compliance and performance which cannot currently be achieved given the manual paper-based processes.

Access to data will provide management and clinicians with the ability to monitor activity in real time. Nurse Unit Managers (NUMs) will be able to easily access an overview of the clinical status and safety scores related to each patient. Medical and Surgical department heads will be able to understand the patients more easily in their service in much greater detail than they do today. Data will follow the patients as they move through the system.

Reduction in unnecessary diagnostic tests

[16] Connecting Care, A digital program to transform patient care and research in Parkville, 2017

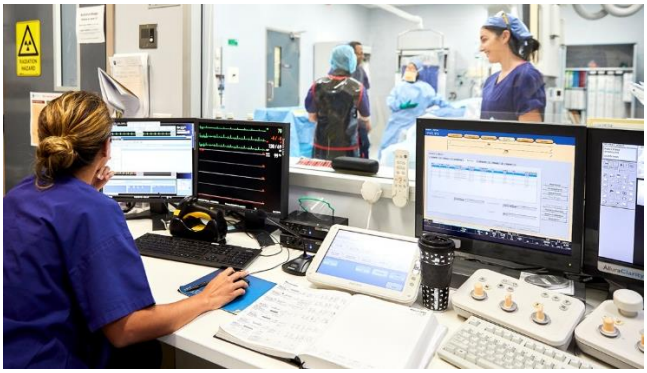
The Third Australian Atlas of Healthcare Variation[17] was released on 11 December 2018 and investigates healthcare use in four clinical areas: Neonatal and paediatric health, Cardiac tests, Thyroid investigations and treatments and Gastrointestinal investigations and treatments. It also examines patterns of medicines use over time for four common groups of medicines.

Focussing on cardiac stress tests and imaging which are used in people with symptoms suggestive of coronary heart disease for accurate diagnosis, risk assessment and treatment planning (for example, treatment with revascularisation by stenting or bypass surgery). One of the recommendations is that clinical decision support systems could guide the appropriate choice and frequency of cardiac stress tests and imaging, especially if they were incorporated into healthcare software to ensure that the most appropriate tests are ordered. Medicare Benefits Schedule (MBS) financial reimbursement should reflect evidence-based best practice. Regular review of MBS claims for reimbursement could ensure that they meet the identified criteria.

Equitable access to cardiac imaging is important for improving cardiac care and outcomes in people at high risk of coronary artery disease in Australia. Appropriate use of these tests is also important for the sustainability of the health system, as they account for a substantial portion of the health budget. Use of cardiac imaging has grown at about twice the rate of treatment with revascularisation – suggesting that some testing is unnecessary and that healthcare resources could be better used.

"Clinical decision support systems could guide the appropriate choice and frequency of cardiac stress tests and imaging, especially if they were incorporated into healthcare software to ensure that the most appropriate tests are ordered."

Third Australian Atlas of Healthcare Variation
Australian Commission on Safety and Quality in Health Care



Increase in Patient Throughput

Given the respective case mix SVHNS will target a reduction in length of stay (LOS) due to improved clinical guidelines, clinical decision support, improved turnaround time due to better integration of electronic orders, increased and enhanced access to real-time actionable information and improved discharge planning. The target number of days saved will be determined based on the outcome of the IPS. A reduction in the vicinity of 2.3-5.0% is not an unreasonable estimate.

The achievement of this savings target will be supported by several strategies including:

- Increasing the number of patients treated with existing resources and / or reduction of staffed bed numbers;
- Increased revenue through more efficient throughput and case mix management; and
- Reducing the overall bed day cost through more effective assignment and management of resources.

In addition to improvements in inpatient service efficiency, there is the potential to improve the throughput in Ambulatory Services. Establishment of engagement via the Patient Portal will

[17] Third Australian Atlas of Healthcare Variation, ACSQHC, 2018

contribute to lower "fail to attend" rates. Streamlined referrals and resource management will be more effectively managed through more sophisticated scheduling capability and alignment with appropriate clinical workflows.

Improvements to Ambulatory Services will be measured via:

- Ratio of new versus review appointments;
- Advanced management of patient wait lists and scheduling ;
- Better monitoring of "Do not attend" rates and follow up; and
- Increased number of outpatient appointments given more efficient scheduling.

5.3.5. Data availability for management and research

Ready access to data at scale is severely constrained in the current environment at St Vincent's. Minimal data is available digitally and most information needs to be sourced from manual scan of paper-based patient records. This requires substantial effort, often by skilled resources who have the knowledge to identify relevant records. This is a high-cost and highly inefficient process.

The implementation of the EMR and the associated data warehouse will provide access to a timely, comprehensive and reliable source of data. The inclusion of the PAS in this Program will extend that scope and remove the need to align information captured in different systems with the EMR and the PAS being the primary sources of data.

Improved benefits from real-time data availability

Data is a significant and under-realised asset in many healthcare organisations. Moving from a paper-based approach to a digital model results in the capture of increased volumes of data. Often this data is still not readily accessible as the implementation focus concentrates on the user-facing functionality.

Inclusion of a data warehouse deliverable as well as relevant statutory reporting means that St Vincent's will be able to establish an enterprise approach to reporting and analytics from the clinical, business and research perspectives. Realising the value of this data will help St Vincent's address immediate operational requirements as well as provide insights into future service planning.

Increased Research Benefits

Implementation of the EMR will result in a comprehensive, standardised data set to support research initiatives.

The scope includes the establishment of a data warehouse with compatible analytics capability. Data will be aligned with a common data dictionary and be presented in an accessible format. The availability of this data in a digital format will significantly improve the value.

The provision of this data warehouse will also remove the need to collate data from manual hard-copy records which will provide productivity improvements.

One of the major benefits of the EMR is that data that is currently unstructured or recorded on paper can be collected in a structured format, while adhering to international data standards and nomenclatures. Showing clinicians how this structured data can be used to improve patient care, improve access to the clinical trials program and accelerate research will be an incentive for them to enter the data and align their work practices. In addition, data that remains unstructured can be queried using tools such as natural language processing to identify common elements across multiple patients.

5.4. Benefits Realisation

Delivery of benefits from an EMR requires organisational focus with strong leadership and clinician engagement. Each Hospital will be responsible and accountable for the delivery of their EMR benefits. While the focus is often on the financial benefits, SVHNS recognise that this will only partially off-set the recurrent cost of the EMR. To achieve the full EMR benefits, the need to create workplace productivity and realise the improvements in quality and safety must be a focused long-term commitment.

Executive or operational owners via governance structures will monitor and develop a benefits realisation framework inclusive of a template for individual benefit plans.

The following artefacts will be developed to further assist in the realisation of benefits:

- Benefits realisation plan
- EMR benefits realisation working party
- Detailed benefit action plans for each individual benefit
- Quarterly management reports
- Inclusion of benefits into performance reporting.

A Benefit Profile will be used to document and monitor each nominated benefit. The template of the Benefit Profile is included for reference in the Appendices.

6. Transforming Research

6.1. Overview

SVHNS has a proud tradition of research excellence and in pioneering advances in clinical practice. SVHNS and our partners connect science, health and engineering to discover new ways of transforming health care and tackling our greatest health challenges.

Our reputation for pursuing and applying new, evidence-based treatment options and innovative models of care, is what attracts the best to work and partner with us. Generating and implementing evidence into clinical practice, is a cornerstone of high-quality health care. A thriving research environment, with high-calibre research programs and dedicated research leaders, underpins recruitment of the brightest clinicians and delivers better patient outcomes and experiences.

SVHS, as a leading tertiary academic health service, is ideally placed to drive the rapid translation of evidence into clinical practice and to define and solve questions from the bedside so that we can deliver the best care and health experiences for our communities.

SVHS' research program spans basic science, clinical trials, bedside implementation and clinician-led innovation. As one of the five pillars in the enVision 2025 Strategy for St Vincent's, research is supported at all levels and driven by expert clinicians, scientists and researchers, all focused on improving care for our communities.

Delivering research commitments will lead to a future where:

- *We embrace the pursuit of research to improve clinical practice and deliver exceptional care*
- *Our new-generation researchers are engaged and capable*
- *Everyone at SVHNS participates in research*
- *We have collaborative research community where partnerships thrive*
- *We generate value for our organisation and our communities*

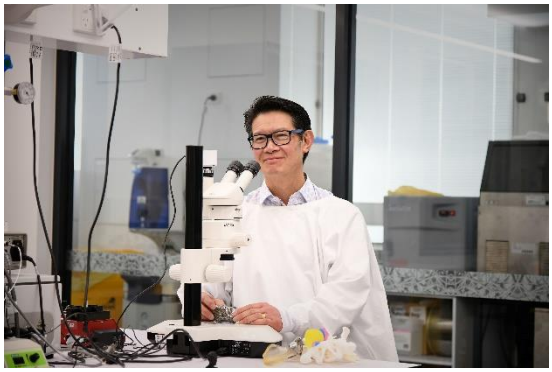
The Centre for Applied Medical Research Clinical Research Program (CRP) provides high quality multidisciplinary clinical trial services across SVHS for the implementation of academic, pharmaceutical sponsored and investigator initiated clinical studies. The CRP has extensive clinical trials expertise in multi-centred, investigator driven research projects which remains a major focus of the CRP into the future. The program is currently running 120 research projects across a growing portfolio of clinical specialities including HIV, viral hepatitis, infectious diseases, HIV associated and anal cancers, neurology including degenerative neurological diseases, palliative care, rehabilitation and pain medicine.

The SVHS Heart and Lung Transplantation program is the largest and longest running programs in Australia, with survival rates that exceed that of the international benchmarks. As part of the program, the Heart Lung Research Group is involved in a variety of research projects, consisting of sponsored clinical trials, interventional studies, investigator-initiated studies, multiple national and local registries and various dedicated multidisciplinary team meetings. A key focus of the research is related to improving the outcomes for heart and lung transplant recipients and patients with various end-stage diseases, who have limited treatment options. These include, but are not limited to advanced lung disease, pulmonary arterial hypertension and heart failure.

Through the Kinghorn Cancer Centre, SVHS is highly respected for its cancer care services, which include the full array of cancer therapies and (in partnership with the Garvan Institute of Medical Research), a nationally-recognised clinical research program in Precision Cancer therapy linking

cancer genomics to the choice of treatment. Our growing investment and reputation in Precision Healthcare is well exemplified by the following example of an ongoing Clinical and Research program which is moving onto a national stage. St Vincent's Oncology Clinical Trials Unit located in the Kinghorn Cancer Centre won the NSW Premier's Award for best Cancer Clinical Trials Unit in November 2018.

In providing the NSW Premier's award, the Cancer Institute NSW acknowledged that St Vincent's has ***"brought together researchers and clinicians onto a single site, The Kinghorn Cancer Centre, fosters laboratory research directly driven by clinical challenges. The focus of clinical research at The Kinghorn Cancer Centre is in the areas of breast, prostate, gastrointestinal (pancreas and colorectal cancer) and haematological cancer."***



The following examples highlight the opportunities to support our research activities through the implementation of the EMR.

6.1.1. Standardising Data Collection

The majority of research protocols require the collection of core data elements that provide specific information about individual research participant's history and current clinical care. At present, many records are paper-based and disparate electronic sources of information difficult to access, large amounts of combined clinical and research data is stored in siloed databases. This situation results in the same data being manually entered into multiple systems, in different formats and of varying quality.

EMR solutions collect and store aggregated, comprehensive and high-quality data throughout the patient's journey. A data element can be stored in a single field across the comprehensive patient record reducing the need for duplication and the potential for error. This quality data can be made available to associated data repositories.

Research data sets such as genomic information and tissue banks that may not be appropriate to document in the EMR, can be stored in a data warehouse and linked to clinical data.

6.1.2. Collaboration

As detailed in NSW Health and Medical Research Strategic Plan[18], there are multiple existing projects that can be leveraged through implementation of the EMR solution to improve research outcomes for patients.

As part of a ten-year strategic plan to build research capability in NSW, current projects include:

- Improving state-wide capacity to deliver world class health and medical research through the provision of funding for research infrastructure;
- Supporting investment in the development and commercialisation of medical devices and related technologies;

[18] Office for Health and Medical Research, NSW Government

- Fostering the generation of high-quality research and evaluation by funding and administering grants programs and reforming research ethics and governance pre-approvals; and
- Strengthening the research workforce through training programs for early-mid career researchers.

6.1.3. Improving Outcomes

Early victories will be achieved by using the capabilities of the EMR solution and its data warehouse, as structured data is collected from all St Vincent's facilities. Services will develop a framework to enable the exponential growth in data outputs including dashboards, clinical trials, registries and innovative research.

Translating SVHNS research projects into improved primary and hospital care, aged care and better preventative health strategies will help to reduce the burden of illness in the community. Enabling better management and personalised treatment will reduce the cost of healthcare for governments and the community.

The proportion of the Australian population aged over 65 is forecast to increase from 14 per cent in 2010 to 23 per cent by 2050[19]. This will increase the need for more health services, new investment in health infrastructure and an expanded health workforce.

6.1.4. Dashboards and Data Warehouse

The capture of clinical and administrative data will provide a data warehouse for analysis and reporting. These analysis opportunities will span clinical, operational and research perspectives and will contribute to a deeper understanding and support better-informed planning from all aspects. Key benefits will be access to relevant information through reports and dashboards, which can inform the operational and clinical decision making in real-time.

6.1.5. Clinical Trials

Australia has an excellent reputation for delivering significant results from clinical trials and efforts have been made by all levels of Government to streamline ethics and governance arrangements. This work needs to continue to lift Australia's reputation as a preferred location for clinical trials[20]. Clinical trials provide SVHNS patients and clinicians with access to new and innovative treatments and therapies.

St Vincent's Centre for Applied Medical Research Translational Research Centre provides an environment that allows for future expansion of clinical research on the Darlinghurst campus. The clinical consultation and research interview spaces created in the Centre are used for clinical trial study visits for a range of studies and provides an environment for research participants to engage with clinical academics, nurses, study coordinators and administrative staff in a more community-oriented space, rather than acute hospital service. The Garvan Institute of Medical Research's Clinical Research Facility conducts investigator-initiated interventional and non-interventional clinical studies for Diabetes and Metabolism, Bone Biology and Hormones and Cancer.

The efficiency of conducting clinical trials following the introduction of the EMR will be improved by:

- Assessment of trial feasibility due to streamlined opportunities to identify potential candidates based on the extended data set available;

[19] Australia to 2050: future challenges, the 2010 intergenerational report

[20] Australian Government, 2016

- Functionality to highlight the records of patients enrolled in clinical trials increasing visibility to all staff;
- Ability to readily share information with trial management staff when patient's present elsewhere in the hospital;
- Improved compliance with trial protocols through configuration of EMR capabilities to direct clinical practice;
- Capability to capture data in a format that can be used to support trial requirements; and
- Opportunity to engage patients more directly through the medium of the patient portal.

Due to the prevalence of EMR implementations today, recent indications from the Pharma industry are that they may only elect to engage with organisations that have such digital capability for future clinical trials. This would result in a significant negative impact on SVHNS' research initiatives.

6.1.6. Registries

Registries are used to collect standardised data on a defined cohort of patients. Registries are managed at the local, regional and national levels to facilitate reporting and research. In the current environment, the effort to source information to populate registries involves substantial effort in the review of paper-based patient records.

The introduction of the EMR will result in a comprehensive data set that can be interrogated using contemporary analytics tools to identify relevant records. The associated data warehouse will provide an additional resource to support these initiatives. Further, the EMR can be configured to address data capture requirements.

6.1.7. Research Workforce

The benefits of the St Vincent's EMR Program, when combined with Research initiatives, will support the creation of additional research jobs in NSW.

The Program will:

- Facilitate better integration of clinical care with frontline research;
- Assist recruitment and retention of the "best and brightest" through the creation of world-class research data structures;
- Attract additional funding through increased pharmaceutical-sponsored and grant-funded research activity; and
- Establish a platform for greater collaboration and sharing of data as well as sharing research environments and resources.

7. Strategic Options

St Vincent's Clinical Information strategy highlights the need for the organisation to progress with an EMR and as such, the following options have been considered for NSW.

1. Do nothing
2. Replace the PAS and upgrade existing systems
3. Replace the PAS and adopt the State Cerner build (South East Sydney Local Health District [SES])
4. Implement an integrated enterprise PAS and EMR.

The options considered a number of factors, including the following:

- An urgent requirement to replace both the ageing clinical system (deLacy) and the end of life CorePAS solution;
- A requirement to present information to clinicians in an integrated view with seamless information flow;
- The need for SVHS to support cross campus administrative and clinical workflows for contracted services between the public and adjacent private facilities;
- A requirement for a resilient (high availability) solution that has robust business continuity processes to support both planned and unplanned downtimes and is cloud hosted;
- The ability to support existing and new models of care including virtual care;
- The requirement for comprehensive reporting capabilities and data analytics to satisfy statutory, legislative, management, research and clinical needs including decision support e.g. Sepsis, Falls Risk, Suicide Algorithms;
- A modern platform that supports current and future innovation and new technologies;
- A solution that supports alignment with National and State standards and initiatives; and
- A solution that is financially viable to implement, maintain and support.

7.1. Strategic Options Analysis

The options analysis has been tailored to our largest NSW hospital – SVHS.

Table 9: Strategic Options Analysis Detail

Option	Cons	Pros
#1 Do Nothing Retain existing systems and technical environment Note: A summary of the existing SVHS environment is included in the Appendices.	SVHS has a current state of limited integrated digital solutions and paper to support clinical workflows. No single source of truth for key clinical information with significant duplication in the collection and storage of patient data. The disparate systems have limited structured data elements, leading to siloed information and limited reporting and audit capabilities. A number of these systems are end of life and/or need upgrading. Minimal integration which introduces an increased potential of risk in critical processes such as handover and allergy / medication reconciliation. End of life patient administration systems. SVHS' existing Clinical Information System (CIS) is severely limited in capability to share information	Short term lower costs Less organisational change than all other options

Option	Cons	Pros
	with other NSW hospitals and health care providers. Delayed investment will impact ongoing compliance with national and jurisdictional initiatives. A continued delay in EMR investment at SVHS could potentially lead to an increased risk in patient outcomes (Leading Better Value Care) and could compromise the NSW Government Health priorities, highlighted in the NSW State Health Plan: Towards 2021. Absence of consistent clinical decision support. Disparate solutions have increased risk of cyber security threat. Does not entice strong clinician desire for a modern and safer system to support optimal patient outcomes. Maintains the burden on clinical staff to navigate multiple systems.	
#2 Replace PAS and upgrade existing systems SHVS CorePAS has been developed in-house and the current platform is no longer able to be supported and a major upgrade is required.	Given the relative age and disconnected model currently in place, the effort to upgrade existing systems, where possible, would be significant. The overhead to establish the required interoperability would also be large given the current status. While implementation of a new PAS would address some of the ongoing support load and risk, it would not advance the clinical capability of SVHS. Multiple sources of patient information persist. Results in greater costs required to build and maintain these systems. Over time, this cost will be higher due to increased support and a more complex environment to manage. Maintains the burden on clinical staff to navigate multiple systems. Cultural resistance to change and the hybrid approach. An assessment of the latest versions of the Telstra EMR offering has highlighted significant gaps in its functionality not only between Telstra and other EMRs but also between St Vincent's bespoke version of deLacy and the standard Telstra EMR version 21. The financial costs of this option deliver no benefits to SVHA i.e. reduced functionality with significant project costs and effort. Significant gaps in required functionality would persist.	Upgraded PAS and upgraded Clinical Systems. Less organisational change than Option 4.
#3 Replace PAS and adopt State Cerner build	The current Cerner platform across NSW is an older version that does support key requirements e.g. mobility and, web-based platform.	Staff moving between different NSW facilities would require less training.

Option	Cons	Pros
This option assumes an agreement from the executive members of SESLHS and from NSW eHealth that SVHS can join the SESLHD instance of Cerner and undertake the required development and configuration.	This option has a high dependency upon integration which has increased costs and ongoing maintenance risks. Delays the introduction of a new EMR, as the PAS must be implemented prior to the introduction of the SESLHD instance Without Ministry endorsement this option does not support the seamless movement of patients across the Darlinghurst campus i.e. sharing of clinical information with the adjacent Darlinghurst Private Hospital. The costs as determined by Deloitte were not deemed financially beneficial. The SESLHD option would provide an inferior solution as it's based on an old technology that does not support virtual and mobile health care.	The knowledge, collateral and lessons learnt from other Cerner deployments from eHealth NSW could be leveraged. The assurance of ongoing alignment with state initiatives.
#4 Integrated enterprise EMR and PAS A single EMR, PAS and Billing solution across all St Vincent's 16 hospitals.	This option is significant in its complexity, scope and change impact. High initial investment. Reliant upon a single vendor to deliver the required level of functionality to meet both clinical and administrative requirements. Vendor has a small clinical footprint in Australia. Large organisational change impact.	A single longitudinal integrated patient record across St Vincent's. A modern platform with full interoperability to interact with other NSW hospitals for information sharing. Significant uplift in the Digital Maturity of the organisation delivering extensive functionality to enable safer, more efficient patient care. A platform that will support existing and new models of care. Cloud hosted and full disaster recovery. The solution architecture supports concurrent build activities enabling the PAS and Clinical builds to run concurrently. Comprehensive reporting capabilities and data analytics to satisfy statutory, legislative, management research and clinical needs. A financially viable solution that strategically aligns with SVHA as well as ensures alignment with the NSW and any ongoing initiatives. A solution that will enable SVHA to fully align with both national and NSW eHealth standards and initiatives. Provides a long-term solution with higher financial, quality, staff and patient benefits.

7.2. Option Analysis and Ranking

The following information summarises the options considered based on a range of criteria including capital costs, delivery time, technical standards alignment, legislative requirements and sustainability profile which were used to determine the overall ranking.

Table 10: Option Analysis Ranking

Options	#1 Do nothing / status quo	#2 Replace PAS and upgrade existing systems	#3 Replace PAS and adopt State Cerner build	#4 Pursue integrated enterprise EMR and PAS
Capital Costs	Medium	High	High	Medium
Delivery Time	NA	2.5 Years	3 Years	2 Years
Technical Standards	Low	Low	Medium	High
Legislative Requirements	Low	Low	Medium	High
Sustainability Assessment	Low	Low	Medium	High
Risk Profile	High	High	High	Medium
Ranking	4	3	2	1

7.3. Recommended Option

From this assessment, the optimal way forward for St Vincent's has been determined as Option 4: Enterprise PAS and EMR. An Implementation Planning Study (IPS) has been initiated with the proposed EMR vendor, MEDITECH. The IPS will enable an in-depth analysis of the solution and the development of a robust implementation approach and plan to de-risk the EMR project.

8. Program Implementation Approach

8.1. EMR Preparatory Activities

The EMR preparatory activities are those activities that have been initiated by St Vincent's in anticipation of an approved EMR Program. The purpose of these activities is to address key organisational dependencies, de-risk the EMR Program, inform the program implementation approach and embed the EMR into strategic planning. A governance structure and project team have been established to oversee the preparatory activities.

8.2. EMR Readiness Activities

The readiness activities will inform the following development of:

- The current and future state St Vincent's solution architecture mapping;
- An application consolidation strategy;
- An interoperability solution design;
- An identity access management plan;
- A data migration and retention plan;
- A device strategy;
- The development and adoption of a procurement strategy;
- The development of a document scanning strategy; and
- The development of an operations catalogue and plan.

During the IPS, St Vincent's will work with MEDITECH resources who will provide expert solution knowledge to ensure all preparatory activities are aligned and address the key elements of the program.

8.3. EMR Implementation Planning Study (IPS)

MEDITECH has been contracted by St Vincent's to undertake an IPS. The purpose of the IPS is to:

- Validate the St Vincent's EMR vendor selection process;
- Identify any significant challenges (mitigate risk) and either address these ahead of the EMR Program and / or ensure they are incorporated into the overall EMR Program plan;
- Undertake a series of clinical and administrative workshops reviewing current and future state to confirm scope and organisational requirements;
- Engage staff and socialise the MEDITECH Expanse EMR solution;
- Refine the EMR Implementation Plan; and
- Validate key assumptions.

8.4. Program Approach

The proposed program approach has been developed in collaboration with MEDITECH and takes accounts for all St Vincent's facilities, their localisation activities, the solution architecture, as well as the extensive scope of the St Vincent's EMR. The program approach will be finalised during the IPS.

- **Initiation:** Program and site-specific governance and project teams will be established and working groups will be engaged. Organisational readiness activities will be commenced e.g. capacity planning for activation.
- **Standard Build:** A centralised design and build team will be responsible for building the core EMR e.g. Medication & Diagnostic order catalogue. The standard build will be staged, Phase 1 will focus on PAS and Billing with Phase 2 addressing Clinicals. Testing will be iterative during this phase and completed by the central build team.

- **Localisation:** Site-specific build relevant to each hospital with oversight from the central design and build team. For example, reports, dashboards, specific specialty workflows, clinics and devices.
- **Testing:** The local build will be tested iteratively with formal end to end test cycles incorporated.
- **Go Live:** Due to the size and scope of the EMR Go Live it will be staged with a technical go live followed by a Phase 1 PAS and Billing go live and then Phase 2 Clinicals go-live.
- **Transition to Business as Usual:** Transition planning will commence prior to activation. Upon a successful go live, a formal transition from project to business as usual will be completed.
- **Optimisation:** Following a period of stabilisation, the ongoing review, support and application management processes, structured management of change requests and optimisations will be established.

8.5. Phased Delivery

SVHNS needs to meet a variety of national and jurisdictional policy and statuary requirements given the broad level of care delivery. The need to manage flexibility to address a variety of workflows, a single patient record, national initiatives, configuration / deployment and statutory reporting is complex. An assessment of the number of instances of the EMR database and software that best manage this situation is currently underway.

Given the inclusion of PAS functionality in the scope, the provision of required NSW Statutory Reporting has been included in the IPS agenda.

To balance the level of change, delivery effort and implementation effort, the Program will need to deliver a combination of the PAS (including billing, outpatients and emergency) with some basic clinical capability (digital patient record, results viewing, etc.), followed by a rapid and full deployment of EMR capability. The specific details of the approach will be finalised during the IPS.

8.6. Program Timelines

The overall project timeline is expected to run over 40 months across all facilities in Victoria, New South Wales and Queensland.

The IPS will be completed prior to the commencement of the project. Following a six-week project initiation period, it is expected to take ten months to configure and build the core EMR solution (Standard Build).

Following this activity, SVHNS solution localisation activities (workflows, localised system requirements such as specialties, staff, reporting, etc.) will commence at month 17 and run for six months. Once testing is completed, training and activation of each of the PAS and Clinicals components will follow. The figure below shows the high-level implementation plan for SVHNS and a more detailed version is available in the Appendices.

Table 11: SVHNS Indicative Program Timeline

Description	Commence	Complete	Comments
Implementation Planning Study	Nov-20	Jul-21	IPS: Risk and Cost Validation
Project Initiation	Jul-21	Dec-21	Project Initiation, Planning and Setup
Standard Build across St Vincent's	Jan-22	Oct-22	Overall St Vincent's Initial Build
NSW Localisation and Build	Oct-22	Apr-23	NSW Configuration and Build
Patient Administration System Deployment - NSW	Apr-23	Aug-23	Public/Private Precinct Deployment
Clinical Systems Deployment – NSW Public/Private Precincts	Aug-23	**Nov-23**	Go-Live EMR/PAS NSW Precinct

8.7. Technical Dependencies and Assumptions

8.7.1. Core Network Wired and Wireless

St Vincent's local (wired and wireless) and wide area networks have historically been under invested and although largely reliable, the network is not currently scaled to support an EMR in terms of bandwidth, wireless coverage (including location services) and scalability.

The Network Modernisation project has been approved to proceed pending financial support for SVHNSS from the NSW MoH. It has been split into two deliverables:

- Part A will replace the multi-vendor wide area network with a single vendor high speed, resilient and scalable solution
- Part B will replace the local wired and wireless networks with a contemporary, accessible and location grade (wireless to 1 meter) medical grade network

8.7.2. User Identity and Access Management

Identity and Access Management (IDAM) including provisioning, credentialing and provider number management is a critical factor for user access and operational use of the EMR. This includes mechanisms for clinical staff to rapidly and securely log into clinical systems on site or remotely.

A body of work is currently under way to re-design how users are on boarded in a fast and secure manner to enable rapid access to clinical information where and when it is required. Users will be 'on boarded' through our Human Resource platform, Workday, which will also collate credentialing information from the organisation CGOV and perform an automated account creation within Active Directory to provide user access.

8.7.3. Provider Identity and Directory

Provider identity is a critical component for clinical governance, communication with other internal and external systems, ordering and billing within an EMR. Given medical staff are issued with different provider numbers for each facility where they have privileges, St Vincent's will implement and provide a technical solution to meet the required functional needs and ensure interoperability with My Health Record and other key downstream systems. A provider directory will be required to facilitate EMR functionality such as GP and specialist referrals, and delivery of electronic communications.

8.7.4. Single Record & Enterprise Master Patient Index

By implementing an enterprise master patient index (EMPI), St. Vincent's will hold true to the core tenant 'one patient one record'. We are fully cognisant there are many applications outside an EMR that contribute to enabling world class health care such as pathology and radiology systems. Maintaining consistent patient identification (including individual health identifiers (IHI) to facilitate sharing clinical information with My Health Record) will be facilitated through implementing an EMPI as a component of the Enterprise EMR solution.

8.7.5. Cyber Security

Security of patient data is of paramount concern to St Vincent's. Full transactional audit logs will be maintained in the EMR. The redesign work underway in relation to Identity and Access Management (IDAM), Devices and the implementation of a Security Operations Centre (SOC) through St Vincent's network modernisation program to actively monitor and protect against cyber threats will ensure that a modern EMR is both highly functional and offer contemporary levels of security. St Vincent's works closely with eHealth NSW to ensure alignment with State legislation, policy and requirements.

8.7.6. Data, Predictive Analytics & Machine Learning

While an EMR is a critical tool in the seamless provision of 'fingertip access' to relevant clinical information for delivery of world class health care – the EMR is perhaps even more critical in collecting atomic structured datasets that will be used for statutory, operational and ad-hoc reporting.

Additionally, these datasets will be available for research and clinical trials, via appropriate ethics and governance approvals, as well as providing rich information to prevent patient deterioration, readmissions, enabling decision support and for future use cases such as predictive analysis / machine learning, population health and clinical oversight in the event of a pandemic through Big Data.

8.7.7. Point of care devices / access to information

Providing, abundant, fast, easy and reliable access to clinical information is critical to the users experience and access to information. Devices should be agnostic to clinical solutions while also matching the user's device requirements based on their role and work location being in hospital or remote. St. Vincent's is currently undertaking a project to refresh procurement mechanisms and device and access type to ensure end user compute is both ready and scalable for an EMR solution.

8.7.8. Business Continuity

The EMR solution proposed for St. Vincent's follows a 'cloud first' strategy and partners with a vendor to host the highly scalable and resilient infrastructure at 'Tier III' data centres operated by NV1 cleared engineers. Even if an individual St. Vincent's facility is affected with a network outage the EMR will be accessible via 'remote access' terminals and BYOD / mobile phone networks.

Each St Vincent's facility maintains a Business Continuity Plan (BCP) that will be updated with EMR specific requirements such as 'offline' medication charts to ensure safe and reliable care is delivered in the unlikely event of an application-level outage.

The MEDITECH Enterprise EMR will be delivered 'as-a-service' in line with St Vincent's 'cloud first' strategies. MEDITECH partner with Macquarie Data Centres to provision highly scalable and resilient compute and storage infrastructure through multiple in-country geographically diverse locations.

9. Solution Deliverability

9.1. Vendor Selection

A previous Request for Tender (RFT) in 2018 where EPIC and Cerner were invited to respond, including Best and Final Offers from both vendors resulted in the organisation determining to continue to work with Cerner.

In the meantime, several other EMR vendors in the market emerged with offerings that required further investigation and that were potentially "a better fit" for St Vincent's overall. The MEDITECH EMR vendor with a new web-based platform known as Expanse appeared promising and were invited to participate in a detailed review in alignment with the requirements of the 2018 RFT.

Simultaneously, further information and financial clarifications were sought from Cerner due to observed gaps in Cerner's offering.

The process to evaluate MEDITECH and re–evaluate Cerner was known as the Discovery phase and occurred in April / May 2020. Vendor procurement will be in accordance with the Ministry and SVHNS Service Agreement.

Summary Evaluation

MEDITECH Expanse rated higher than Cerner in functionality and data analytics and was determined to align more closely to St Vincent's requirements in a detailed technical, functional, financial and legal review as part of the Discovery Phase.

Table 12: Key Selection Components

Key Selection Components			
Functionality	Intuitive, easy to use system Clinicians mobile workflows, public & private workflows Supports innovation into the future Comprehensive EMR functionality including patient portal	Scope	PAS Billing EMR
Price	Like for like assessment Payment / funding structure Value for money	Data Analytics	Data analytics and business intelligence tools Research
Technology	Hosting Application management Integration Interoperability	Legal	Terms and conditions Indemnities Warranties
Implementation	Approach and methodology Vendor resources Training requirements People readiness – change management	Fit	Culture Partnership Commitment to country

The MEDITECH Expanse platform offers a comprehensive and streamlined EMR that is intuitive and easy to use. Its SQL database and flexible analytics and reporting platform supports St Vincent's

business analytics requirements as well as being easy for clinicians to develop their own reports. The new web-based platform supports mobility, is device agnostic and cloud hosted. The architecture is more flexible which gives St Vincent's more options especially in determining the optimal implementation roll out strategy and optimisation activities. The licensing model is transparent and enables St Vincent's to be more confident of costs as the organisation expands. The integrated PAS, billing and EMR reduces the integration costs and management of multiple vendors.

MEDITECH's roadmap displays the commitment to ongoing research and development of the product and the company is closely aligned to St Vincent's in its mission, culture and service provision. The company has a high retention rate of existing customers (85%) and has seen a significant increase in market share in 2019 with its new Expanse platform. In addition, the pricing from MEDITECH was favourable for the scope and depth of functionality and services provided.

In summary MEDITECH Expanse offers:

- A comprehensive, integrated and streamlined EMR – PAS, Billing and EMR;
- Flexible architecture so we can support the "not one size fits all model;
- Intuitive, easy to use and personalise – developed with significant clinical input;
- Data analytics and research capability is broad - end users can easily develop their own reports and dashboards;
- Evidence based rules, Surveillance boards, Watchlists, Real-time notifications e.g., HAC, Sepsis and Suicide algorithms;
- New web-based platform supports mobility on any device across all care settings;
- Cloud based platform that supports seamless upgrades;
- Modern technology that that will support ongoing innovation e.g. App development (FHIR and API enabled);
- Fully interoperable to share data securely with other systems;
- A single patient record across St Vincent's that enables cross campus working;
- Robust disaster recovery with 24-hour support; and
- Offers telehealth to deliver care virtually.

A comprehensive Vendor Evaluation is available but of particular note is the usability component of the solution which is worth highlighting as many recently published papers feature the inefficiencies of traditional EMRs and the lack of usability. A recent study concluded that "Physicians give EHR usability a Fail" and that "The poor usability has resulted in EHRs that are extremely hard to use compared to other common technologies. Poor EHR usability was also found to be highly correlated with physician burnout, according to the research"[21]. Selecting an EMR that is easy to use and navigate, significantly improves user adoption and satisfaction, reduces the training required to use the system, increases clinician efficiency and ultimately delivers better patient care.

The comparative results of the Discovery Phase are highlighted in the following table where each of the criteria assessed was scored out of a possible total of five. Further detail of the assessment outcome is included in the Appendices.

[21] AMA study: Physicians give EHR usability an 'F' rating, 2019

Figure 4: SVHNS High Level

Selection Criteria	Meditech	Cerner	Key Comments
Functionality	4.1	2.8	**Meditech** - Enhanced clinician friendly user interface, minimal navigation, easy personalisation, one of only two vendors to see significant increase in market share growth in 2019 (KLAS) – new platform **Cerner** – User interface busy and difficult to navigate, inconsistent display between modules , too many clicks to assemble clinical picture and perform functions, no drawing ability for documentation
Price	3.2	3	**Meditech** – Licensing is for all users across the organisation and does not scale in price for additional users. BAFO process yet to be undertaken **Cerner** – User based so as numbers increase costs will increase e.g. mobility is per licensed user. Cerner's price does not include Disaster Recovery (DR)
Technology	3.4	3.2	**Meditech** – Fully web enabled, current technology with a mobile mind -set, device agnostic Private cloud, agnostic hosting in Australia which is flexible and allows for change in future **Cerner** – Not fully web enabled, Hosting controlled by Cerner in QLD data centre, Strong AMS
Implementation	3.1	2.6	**Meditech** – Iterative agile approach over a shorter timeframe with a strong benefits approach **Cerner** – Longer implementation timeframe with higher risk approach , more training required
Scope	3.6	2.9	**Meditech** – Fully integrated PAS & Billing proven in private, Integrated EMR **Cerner** – Unproven PAS and Billing for private, Billing third party solution
Data Analytics	4	3	**Meditech** – SQL server database (DB), replication of production DB which provides highly flexible reporting and analytics platform. Easy for clinicians to develop their own reports **Cerner** – Database access via proprietary language , specialist resources required for reporting
Legal	3	3	Both compliant - More detailed third party financial review in train for Meditech
Fit	3.6	2.3	**Meditech** – Organisational culture aligns more closely with SVHA's mission - Initiatives and sales across the world apply significant discounts for third world countries, considerate of the vulnerable **Cerner** – Sales oriented approach / culture
Total	3.5	2.9	

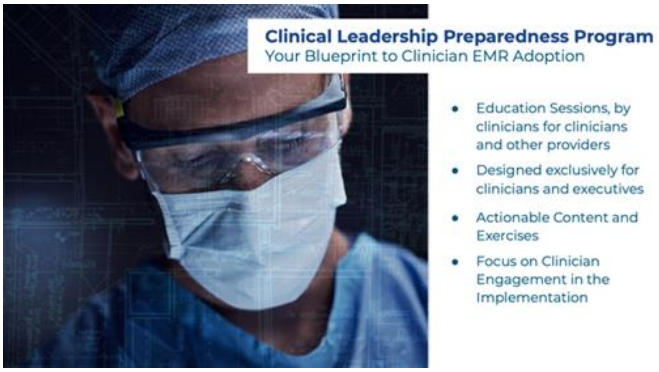
Legend for Summary Evaluation

Symbol	Scores
	1- 1.9 = Does not meet requirements
	2 -2.9 = Requirements partially met
	3 – 3.9 = Requirements fully met
	4 -5 = Exceeds requirements

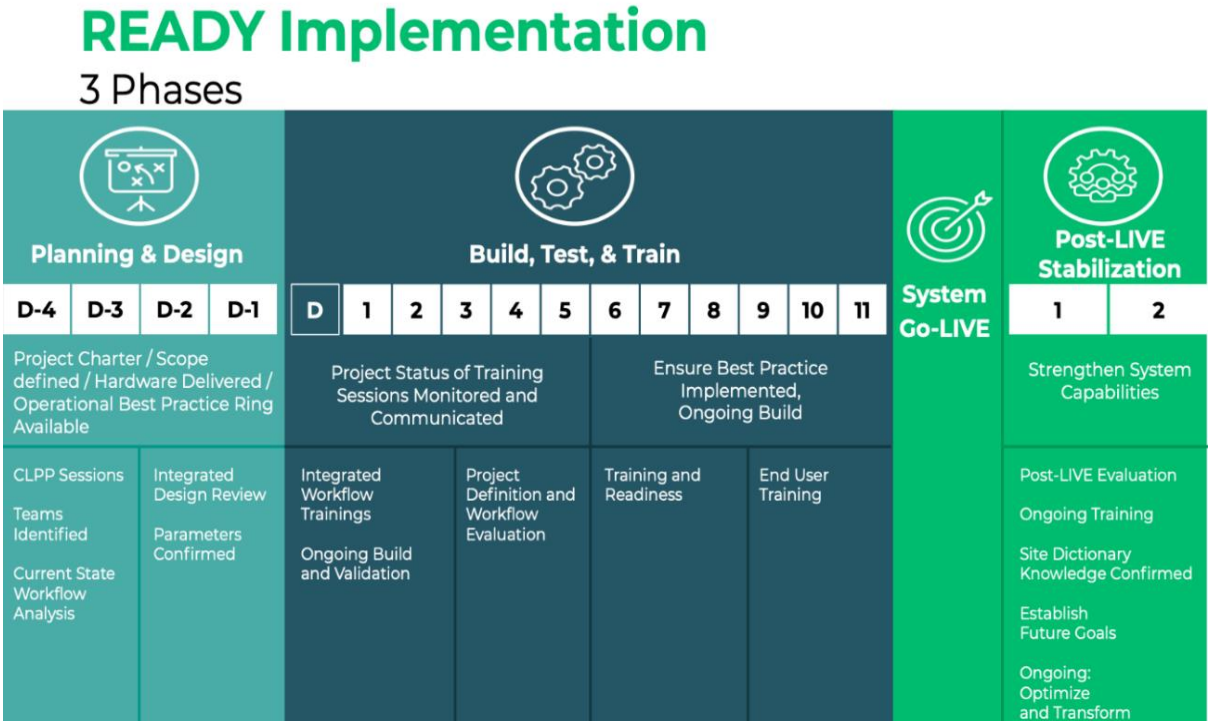
9.2. Vendor Approach

MEDITECH follow an agile implementation approach to prototype the design and build (configuration) of the solution with a clinical focus.

Key stakeholders receive expedient feedback on progress at all stages of the implementation process including the final outcome.



9.3. Vendor Presence

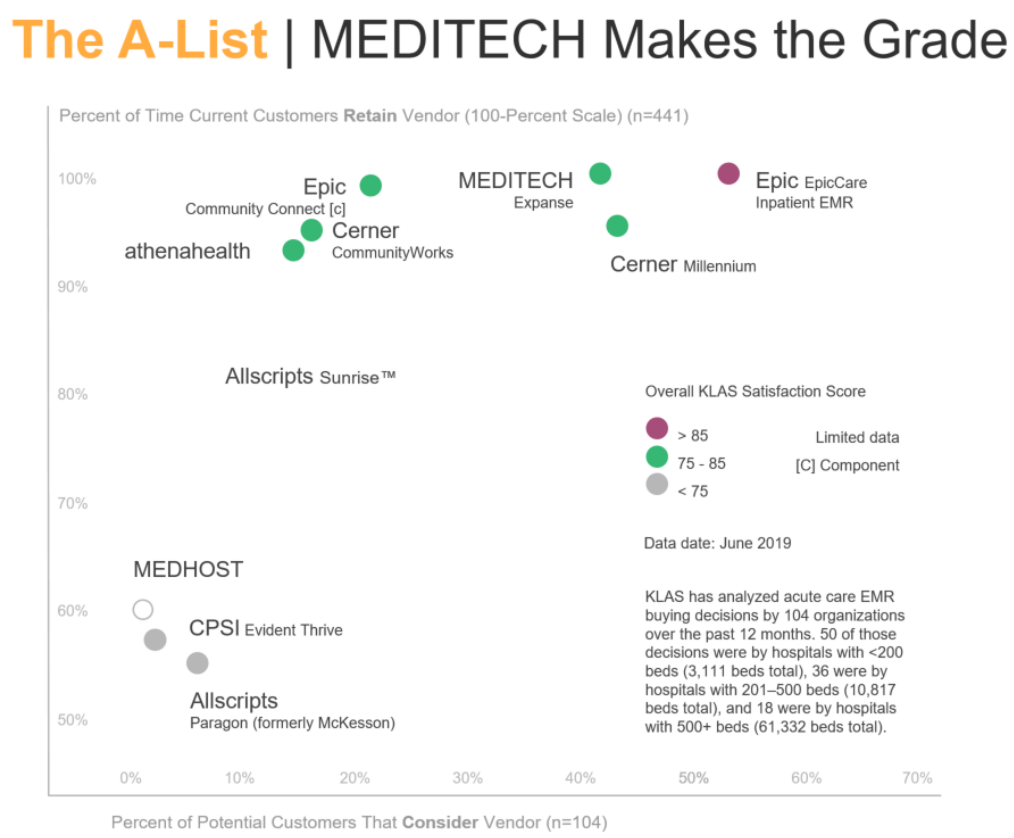


MEDITECH Expanse has been implemented successfully internationally in major tertiary facilities for example Humber River Hospital (Toronto) and Avera Health (USA). Locally MEDITECH has been implemented at Chris O'Brien Lifehouse in NSW and MEDITECH's PAS and billing solution is used in 73 Ramsay Private Hospitals across Australia. While there is a level of concern regarding MEDITECH's Australian presence, MEDITECH has a current Sydney office.

MEDITECH have proven with their NSW implementation their ability to customise content for the Australian market and to develop local statutory reports. MEDITECH also has 47% of the Canadian EMR market and the Canadian healthcare system has many similarities with the socialised Australian healthcare system.

MEDITECH is a Tier 1 EMR with over 50 years' experience and in the 2019 annual report global healthcare research firm KLAS recognised MEDITECH in its annual Best in KLAS: Software & Services report for the fifth year in a row.

Figure 5: MEDITECH EMR Assessment



Source: Decision Insights Report: Acute Care EMR - Buyers Unwilling to Settle, July 2019

Figure 6: Decision Insights Report Outcomes

Source: Decision Insights Report: Acute Care EMR - Buyers Unwilling to Settle, July 2019

9.4. Procurement

The St Vincent's EMR Program contract will be addressed through St Vincent's and will be licenced to SVHN on a per bed basis. Third party vendors will be contracted and managed by MEDITECH and therefore St Vincent's will have one contract and one point of negotiation for application support management services.

In August 2020 MEDITECH submitted to St Vincent's their best and final offer (BAFO). This offer covers a 10 year term and includes perpetual licensing, project resources, implementation support, ongoing 24/7 support, application management services, disaster recovery and hosting.

9.5. Cost Model and Costings

9.5.1. Introduction & Approach

As the EMR Program is being established on an enterprise-wide basis that covers all St Vincent's hospitals, analysis has been undertaken to determine the most appropriate method of cost sharing across the various funding entities. In that context, a Cost Allocation model has been developed. It has been applied to all costs for the purposes of overall cost distribution across public and private and funding requests to government. A final and consolidated costing at the end of the Implementation Planning Study will assign costs in detail.

It is noted that this procurement approach delivers significant economies of scale that would not be realised should each hospital or even region progress independently. Further, the Program approach facilitates the development of a knowledge base across St Vincent's ensuring that design decisions are maintained and that learnings are applied in future engagements.

The information presented in this section outlines the application of the cost allocation model, various cost components of the EMR Program, associated assumptions and identifies the funding requested from Government.

9.5.2. Cost Allocation

To achieve the optimal benefits from the Program from care delivery and clinical engagement perspectives, the EMR will be deployed across all facilities. St Vincent's has 16 public and private facilities across the eastern seaboard as follows:

Table 13: St Vincent's Facilities

Sector	NEW SOUTH WALES	VICTORIA	QUEENSLAND
Public	St Vincent's Darlinghurst Sacred Heart Darlinghurst St Joseph's Auburn	St Vincent's Melbourne St George's Kew Caritas Christi Kew	-
Private	St Vincent's Sydney Mater North Sydney St Vincent's Griffith	St Vincent's Fitzroy St Vincent's East Melbourne St Vincent's Werribee St Vincent's Kew	St Vincent's Chermside St Vincent's Toowoomba St Vincent's Brisbane

Given the enterprise scope, it was necessary to determine an appropriate method to allocate the associated costs. There was potential to assess the breakdown of costs over a range of factors which could include actual usage, functional scope and comparative sizing.

Due to the economies of scale that would be realised through adoption of an enterprise approach, a decision was made that a proportional cost allocation should be considered based on relevant activity factors. This was deemed the most appropriate model given the shared input and benefits that would be realised by all participating hospitals.

The profile used to determine this cost allocation is included in the Appendices. Note that the statistics used cover the year 01/03/2019 to 28/02/2020 as the most recent representative time period due to the skewed impact that the COVID-19 pandemic will have on throughput and service data.

The following metrics were used to determine the distribution of costs between the public and private hospitals of St Vincent's. The key factors used to determine the cost allocation between public and private hospitals included the following criteria (other factors were considered with lower weighting):

- Activity - Inpatient
- Activity – Outpatient (higher weighting based on system usage)
- Activity – Emergency
- Beds (Inpatient and ICU)

Table 14: Public Private Distribution Model

Criteria	Beds	Inpatients Visits	Outpatient Visits	Emergency Visits	ICU Beds	Distribution Overall
Public Hospitals	35%	18%	100%	81%	42%	58%
Private Hospitals	65%	82%	0%	19%	58%	42%

A similar approach has been used to determine the distribution across NSW and Victorian Public Hospitals. That analysis resulted in the following ration of cost allocation:

- New South Wales Public Hospitals: 48%
- Victorian Public Hospitals: 52%

Cost Model

The 10-year Total Cost of Ownership (TCO) for the EMR Program is shown below. It summarises known costs of the EMR Program including estimates for project expenses, contingency on the capital costs and the ongoing operational support.

Table 15: Ten Year Total Cost of Ownership - Public / Private Allocation

Cost Category	CapEx	OpEx	Total	CapEx Private (42%)	CapEx Public (58%)
Labour - St Vincent's	$59m	$0m	$59m	$25m	$34m
Device Integration & EMR Peripherals	$14m	$6m	$20m	$6m	$8m
Hosting	$7m	$26m	$33m	$3m	$4m
Training	$9m	$0m	$9m	$4m	$5m
Activation Support	$11m	$0m	$11m	$5m	$6m
Application Management	$0m	$28m	$28m	$0m	$0m
Assurance, Advisory, Project Expenses	$28m	$0m	$28m	$11m	$16m
Software & Software Support	$41m	$53m	$94m	$17m	$24m
Vendor Implementation	$32m	$0m	$32m	$13m	$19m
Contingency	$23m	$0m	$23m	$10m	$14m
Total	$224m	$113m	$337m	$94m	$130m

Capital Costs

A total cost of **$337 million** will be required for St Vincent's to implement the EMR Program across their 16 hospitals and allow new functionality and capability to be available for use by clinicians, patients and their families. SVHNS request that the NSW Ministry of Health fund **$50 million** or **80%** of the NSW Capital component as their capital investment.

The total capital cost for the Enterprise EMR implementation at SVHNS public is **$63 million** (48% of $130 million). This business case is seeking a one-off capital investment from the NSW Ministry to implement the EMR in SVHNS of **$50 million** (80% contribution). The investment is sought over a three-year period, starting in the 2021-22 financial year. SVHNS will invest the remaining funds (of $63 million) to implement within the public hospitals, of **$13 million**.

St Vincent's Private Divisions will fund the private hospital contribution to the full TCO, which equates to **$44 million** for all Sydney private facilities.

It is noted that the duration of the annual contribution can be varied to suit the NSW Ministry, for example, this could be over three or four years.

Table 16: Ten Year Total Cost of Ownership – Government Funding Request

Cost Category	CapEx	OpEx	Total	CapEx Private (42%)	CapEx Public (58%)	Total CapEx NSW Public	NSW CapEx Request
Program Resources - St Vincent's	$59m	$0m	**$59m**	$25m	$34m	$16.5m	$13m
Device Integration & EMR Peripherals	$14m	$6m	**$20m**	$6m	$8m	$4m	$3.5m
Hosting and Application Management	$7m	$54m	**$61m**	$3m	$4m	$2m	$1.5m
Training and Activation Support	$19m	$0m	**$19m**	$9m	$11m	$5.5m	$4.5m
Assurance, Advisory, Project Office Expenses	$28m	$0m	**$28m**	$11m	$16m	$8m	$6m
Vendor Implementation, Software and Support	$73m	$53m	**$126m**	$30m	$43m	$20m	$16m
Contingency	$23m	$0m	**$23m**	$10m	$14m	$7m	$5.5m
TOTAL	**$224m**	**$113m**	**$337m**	**$94m of $224**	**$130m of $224m**	**$63m of $130m**	**$50m of $63m**

The organisation is currently investing in a major network modernisation program as a precursor to the EMR. With financial support from the NSW MoH required to progress at SVHNS.

The overall capital cost has been reduced by the decision to procure Hosting services which will be managed as an ongoing operational cost and funded by St Vincent's.

The table below shows the overall EMR Program cost allocation including funding requests of Government and includes risk and contingency allocations.

Table 17: Capital Cost Distribution

Capital Expenditure by Entity	YEAR 1	YEAR 2	YEAR 3	CapEx Cost
St Vincent's Health New South Wales	$4.2m	$4.2m	$4.2m	$12.5m
St Vincent's Hospital Melbourne	$7.7m	$7.7m	$7.7m	$23.0m
St Vincent's Private	$31.5m	$31.5m	$31.5m	$94.4m
New South Wales Government	$16.7m	$16.7m	$16.7m	$50.0m
Victorian Government	$14.9m	$14.9m	$14.9m	$45.0m
TOTAL CAPITAL COST	**$74.9m**	**$74.9m**	**$74.9m**	**$224m**

The table below shows the allocation of capital costs by major expense category.

Table 18: Capital Cost by Cost Category

Category	Description	Total Capital Cost
EMR Vendor	Software Licence	$31.7m
	Implementation Services	$32.0m
EMR Infrastructure	Infrastructure	$14.1m
	EMR Peripherals & Device Integration	$10.2m
	Third Party Software	$6.3m
Program Resources	EMR Program & Implementation Team	$58.9m
	Transition Support	$11.1m
Training & Change Management	Training Team (Inc. back fill) & Training Collateral	$9.0m
Program Support	Program Assurance, Advisory & Expenses	$27.8m
Risk & Contingency	Allocation based on level of certainty	$23.6m
	TOTAL CAPITAL	**$224m**

The distribution of the software capital costs over the core capability that will be delivered is summarised following:

Table 19: CapEx Costs by Functional Capability

Function	Comments	CapEx Cost
Patient Administration	PMI, ADT, eReferrals, Scheduling, Scanning, Billing and Bed Management. This includes Interoperability and Data Migration activity.	$12m
Emergency Department	Schedules, Medications, Orders, Visits, Results, Clinical Notes	$3m
EMR Core Capability	Medications, Orders, Results, Patient Portal, VMO Access, MHR, Clinical Documentation, Theatres, ICU & Anaesthetics. This includes Interoperability and Data Migration activity.	$27m
Device Integration	Device Interoperability / Connectivity	$3m
	TOTAL	**$45m**

As the hospitals size and activity may change over time, the proportional shares attributable to each may change. Post implementation, the hospitals may agree to use actual EMR system measures to inform the ongoing proportional cost allocation model.

Recurrent Costs

St Vincent's will be fully responsible for all recurrent (Opex) costs associated with the EMR Program including the cost of the Hosting Service. The total annual recurrent costs are estimated at $16.2 million. These costs will be allocated across the relevant St Vincent's entities as per the Cost Allocation model described previously and shown below.

Table 20: Ten Year Opex Costs

Opex Costs	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	OpEx
St Vincent's Health Network Sydney			$2.6m	$3.5m	$4.0m	$4.1m	$4.1m	$4.2m	$4.3m	$4.3m	$31m
St Vincent's Hospital Melbourne			$2.8m	$3.8m	$4.3m	$4.5m	$4.5m	$4.6m	$4.6m	$4.7m	$34m

Opex Costs	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	OpEx
St Vincent's Private			$3.9m	$5.3m	$6.1m	$6.2m	$6.3m	$6.4m	$6.5m	$6.5m	$47m
TOTAL	-	-	$9.3m	$12.7m	$14.4m	$14.8m	$15.0m	$15.2m	$15.4m	$15.6m	$112m

The Opex costs can be attributed to the various cost categories as shown following.

Table 21: Opex Costs over EMR Program Lifetime

Opex Costs	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	OpEx
Device Integration & EMR Peripherals			$1.7m	$2.1m	$2.6m	$2.6m	$2.7m	$2.7m	$2.8m	$2.9m	$20m
Hosting			$2.9m	$3.3m	$3.6m	$3.9m	$3.9m	$3.9m	$3.9m	$3.9m	$29m
Application Management			$2.3m	$3.5m	$3.5m	$3.5m	$3.5m	$3.5m	$3.5m	$3.5m	$31m
Software & Software Support			$2.4m	$3.3m	$4.1m	$4.2m	$4.3m	$4.4m	$4.5m	$4.6m	$32m
TOTAL	-	-	$9.3m	$12.7m	$14.4m	$14.8m	$15.0m	$15.2m	$15.4m	$15.6m	$112m

Given the enterprise scope of the implementation, the benefit of Application Management services from the EMR vendor will contribute directly to the ongoing control of the EMR. It is also noted that operational savings will be confirmed from Benefit Realisation activities on conclusion of the IPS which is currently underway.

Recurrent costs excluded from the above are noted as follows:

- Operating costs relating to upgrades to ICT network infrastructure;
- Replacement of capital equipment including server infrastructure and point of care devices; and
- Local staff resources such as project management beyond the end of the project.

9.5.3. Costing Assumptions

All costs have been based on the timelines proposed in Section 8 – Solution Deliverability. The following high-level assumptions have been made in costing the capital costs.

Table 22: SVHA EMR Program Costs Notes & Assumptions

Major Cost Category	Notes and Assumptions
EMR Vendor	The software licence and implementation services are based on a vendor quotation provided by MEDITECH in August 2020. The scope and implementation approach will be confirmed during the IPS.
	The IPS will not identify any significant changes in the costs identified as described in this business case.
EMR Infrastructure	Estimated hosting capacity and associated fees will be sufficient to address requirements.
	Medical device integration software licence and hardware are estimated. An audit of all physical locations and equipment is underway and will determined the actual requirements.
	Integration and data migration costs estimated based on experience in other EMR implementations.
	Project office equipment and software is based on the number of staff in the project team.
	Training Centre equipment costs are based on the estimated number of training rooms required.

Major Cost Category	Notes and Assumptions
Project Resources	St Vincent's EMR Program Team – Costs based on estimates from previous experience. All staff costs include 16% on-costs and include award increases.
	Hospital Implementation Teams – Costs based on other Australian EMR implementation experience and local requirements. Includes allowance for back-fill of subject matter experts.
	Health Service transition support including super-users, technical and conversion readiness activities and manual cutover staff – costs based on previous EMR implementation experience and ratios
Training & Change Management	Training costs have been calculated based on training time estimates from other EMR implementations. Training back-fill costs assume backfill only for direct care nurses/midwives, casual staff and selected medical staff.
Assurance, Advisory, Project Expenses	Project office costs, legal, consulting, project assurance and advisory, project team training and travel costs are based on estimates of likely expenditure.

9.5.4. Cost Risk and Contingency Provisions

In keeping with appropriate project management and governance principles, an amount within the funding request has been provisioned for both risk and contingency for those costs over and above the base capital costs required to deliver the EMR Program.

Table 23: Risk & Contingency Cost Provisions

Risk & Contingency Provisions	Total
TOTAL RISK & CONTINGENCY	$23.6m

The risk provisions within this business case are for those costs that are likely but not certain to be incurred in addition to the base Program costs that are expected to be incurred.

In the event that a risk is realised, the EMR Program Director will have delegated authority to access risk funds to allow for the timely conduct of the EMR Program. Actual use of the risk provision will be communicated to the CFO delegate at the time and then reported to the Steering Committee at regular scheduled meetings.

The contingency provisions in this business case are for those costs that are not expected to be incurred but may be necessary in addition to the base EMR Program costs that are expected to be incurred.

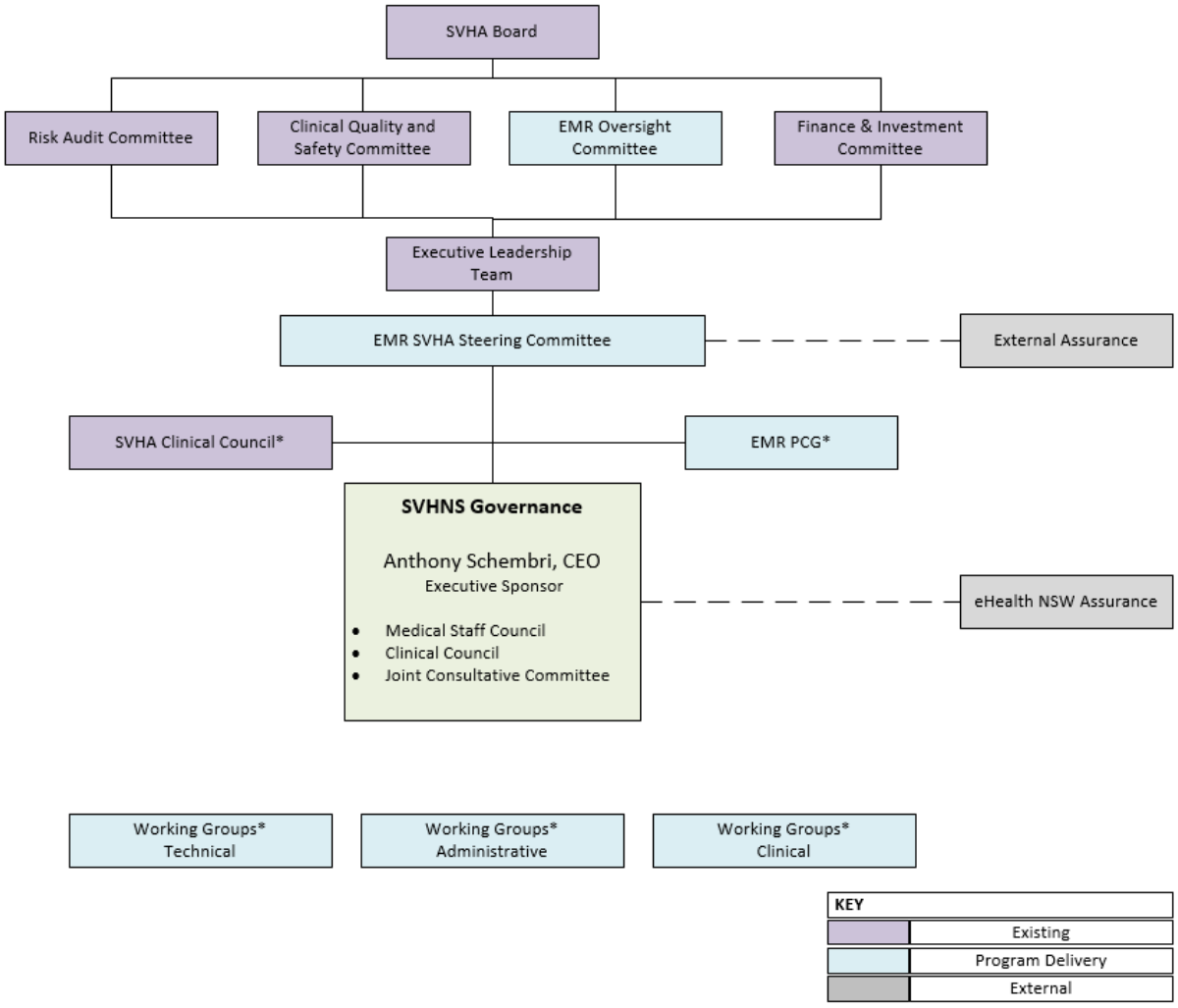
If a contingency risk is realised, the EMR Program Director will need to inform the St Vincent's Finance and Investment Committee prior to obtaining approval from the Steering Committee for use of the contingency provision. Contingency risks will be documented in the Program Risk Register and managed there as per the Program Risk Management process.

10. Program Management

10.1. Governance

St Vincent's and SVHNS recognise that robust governance is critical to the success of the EMR Program. To ensure a best practice model in a complex environment, St Vincent's will provide group oversight and Board assurance. SVHNS will establish its own governance structure which will include alignment with eHealth NSW frameworks.

Figure 7: St Vincent's Governance Framework



The underlying detail of the respective roles and responsibilities is described in the following table.

Table 24: Governance Roles & Responsibilities

Governance Group	Role/Responsibility
St Vincent's Board	The St Vincent's Board will be responsible for approving the EMR Business Case and providing strategic oversight. Any changes outside of the approved scope, timelines or budget will require Board Approval. External Board assurance will be provisioned. The St Vincent's Board will advocate and support the EMR program vision and benefits.
EMR Oversight Committee	A sub-committee of the Board focused on the oversight of the EMR

Governance Group	Role/Responsibility
St Vincent's EMR Steering Committee	Responsible for the overall operational delivery and implementation decision making for the EMR Program, overseeing the project schedule and budget, issues and risks. Approving change requests within budget or agreed delegation. Reviewing health checks and approving progress gateway reviews. Considering and making decisions for any issues escalated from either the Project Control Group, Local Steering Committees, Clinical Council or Working Groups.
SVHNS EMR Steering Committees	Responsible for the operational delivery of the EMR Program. Accountable for SVHNS project status, issue and risk management and organisational readiness. Inform and escalate issues and risk to the St Vincent's EMR Steering Committee. SVHNS governance will align with Ministry frameworks. CE Anthony Schembri will serve as Executive Sponsor and Chair.
Clinical Councils (SVHA & SVHNS)	Provide expert advice and guidance to the EMR Program as well as clinical oversight and assurance to project deliverables, ensuring the adoption of best clinical best practices, and alignment with national standards at Group and Network level
Working Groups	The working groups will be established as necessary by the governance groups above, it will be that group's responsibility to define the working group's term of reference and delegations.

10.2. Risk Management

As a large-scale digital IT implementation, the St Vincent's EMR Program is classified as High Value, High Risk (HVHR). Risk exposure will be reduced by adopting a systematic process to the management of risks, ensuring they are visible, controlled and managed. The Risk Management Framework (RMF) summarises SVHNS's overall risk management process and governance and includes the SVHNS Risk Management Policy, SVHNS Risk Appetite Statements and SVHNS Risk Management Strategy and Function.

The EMR implementation program will be executed in accordance with SVHNS's Risk Management Policy, providing procedural guidance on the management of risk within SVHNS, to assess project risks and define the oversight to design, implement, monitor and continually improve risk management for the life of the project.

The RMF will need to be developed and will be managed collectively across the project. An initial risk assessment has been performed including input from internal and external key stakeholders to identify key risks during implementation. Further detailed risk assessment will be conducted during the IPS and all risks will be fully articulated in the EMR Program Risk Management Plan with associated risk mitigation strategies.

This section provides a high-level summary of how risks are identified and managed and summarises identified risks rated as High (H) and Very High (VH) with the associated Residual Risk based on current knowledge. The Low (L) and Medium (M) rated risks will be finalised during the IPS.

10.3. Risk Assessment and Registration

All project team members, including the Governance Committees, are responsible for identifying and communicating any risks that might impact the project. An initial risk management workshop will be undertaken. Following this, risk workshop(s) will be held when required at all major project milestones to ensure the risks are relevant to the work being conducted at that point in time.

The likelihood (the probability a risk will be realised) and consequence (the impact of the risk being realised) assessment of each risk is central to risk management.

Risks can then be quantified by determining the level of risk exposure, calculated as follows providing an overall risk rating ranging from Low (L) to Very High (VH):

Risk Exposure = Risk Likelihood x Risk Consequence

The risk matrix used in the assessment of EMR Program related risks (as per the St Vincent's Risk Management Policy), is shown in below.

Table 25: Risk Management Matrix

Likelihood	Consequence				
	Minimal (1)	Minor (2)	Moderate (3)	Major (4)	Severe (5)
Almost Certain (5)	Medium (M)	Medium (M)	High (H)	Very High (VH)	Very High (VH)
Likely (4)	Medium (M)	Medium (M)	High (H)	Very High (VH)	Very High (VH)
Possible (3)	Low (L)	Medium (M)	Medium (M)	High (H)	Very High (VH)
Unlikely (2)	Low (L)	Low (L)	Medium (M)	High (H)	High (H)
Rare (1)	Low (L)	Low (L)	Medium (M)	Medium (M)	High (H)

10.4. Risk Treatment

The EMR Program Director and Program Management Office (PMO) will regularly monitor risk using a Program Risk Register. Separate risk review workshops will be facilitated by the Project Manager where there are new risks, a degree of project delay or significant stakeholder impact. These separate risk reviews will include project team members and representatives from affected stakeholder groups. High and Very High risks will be escalated to the EMR Steering Committee that, in turn, will decide whether a risk should be escalated to the Corporate Risk Register as per the SVHNS or St Vincent's Risk Management Policy.

Any changes to the status of risks will be assessed and formally reviewed. Moreover, on at least a monthly basis, the key risk status will be presented to the EMR Steering Committee for review. Those assigned responsibilities for an active risk will be required to maintain an ongoing assessment of the risk and report on its active control throughout the implementation of the project.

A Risk Treatment and Action plan will be documented in the Risk Register for each risk. The PMO will manage all Low and Medium risk items. If required or the risk increases, these will be escalated. All High and Very High risks will be reviewed by the EMR Steering Committee and escalated to the ELT or St Vincent's Board when required.

The table below details risk monitoring and reporting as per the St Vincent's Risk Management Policy.

Table 26: St Vincent's Risk Monitoring & Reporting

Residual Risk Rating	Action Required
Very High (VH)	• Notification to the Divisional CEO and Group CEO, Audit & Risk Committee and other relevant Board Committee as determined by Group CEO • Notification to Group Manager Audit & Risk • ELT member to be assigned as risk owner • Determine and take any immediate action required within 24 hours. An action plan to be put in place within 3-5 days with an expected resolution date and a substantial improvement (if possible) within 30 days.
High (H)	• Notification to the Divisional CEO and Group CEO, Audit & Risk Committee and other relevant Board Committee as determined by Group CEO • Notification to Group Manager Audit & Risk

Residual Risk Rating	Action Required
	• ELT member to be assigned as risk owner • Determine and take any interim action required within 3-5 days. An action plan to be put in place within 30 days with an expected resolution date and a substantial improvement (if possible) within 2-3 months.
Medium (M)	• Notification to Divisional Executive • Divisional Executive Committee Member to be assigned as risk owner • An action plan to be put in place within 45 days with an expected resolution date and a substantial improvement (if possible) within 4-5 months.
Low (L)	• Notification to Department Head • Department Manager to be assigned as risk owner • Timeframe for action is subject to competing priorities and cost/benefit analysis i.e. 6-9 months.

The following table highlights the Risks rated as High and Very High including a Residual Risk classification.

Table 27: EMR Implementation High & Very High Risks

Category	Risk Description	Likelihood	Consequence	Risk Score	Residual Risk	Mitigation Strategy
Financial	The full cost of the Enterprise EMR program may be in excess of the funds available from government and SVHA. This may compromise the program going forward, or reduced scope.	Possible (3)	Severe (5)	Very High (VH)	Low (L)	• Refined costs and a cost model have been established and socialised through SVHA governance – COMPLETE • Reduced Scope: Review costs and scope after the IPS is completed – PLANNED
Management & Strategy	Clinicians do not engage with the EMR program and continue to use paper notes and scripts. Resulting in increased resistance to and poor adoption and usage of the EMR. Increased clinical risk for patient care. Intended benefits of the project are not realised.	Likely (4)	Major (4)	Very High (VH)	Medium (M)	• Strong clinical leadership. Strong organisational leadership and programme governance. • Ensure that the EMR program is positioned as a clinical and operational transformation project, rather than an IT project and that that all communications to the organisation reinforce this. • Implement a clinical governance model for the EMR program to ensure appropriate leadership and guidance from SVHA's clinical leaders. • Clinical engagement, change management and communications will form a core part of the program – PLANNED • SVHA CMO is nominated Business Owner.
Workforce	Availability of internal resources - access to Subject Matter Experts (SMEs) from the relevant clinical, business and technology areas to support the project. Compromised project timelines and user adoption.	Likely (4)	Major (4)	Very High (VH)	Medium (M)	• Good communication. Backfill for clinical staff included in project costs • Executive sponsorship to ensure engagement from business and technical areas – PLANNED • SVHNS acknowledgement this is an organisational imperative

Category	Risk Description	Likelihood	Consequence	Risk Score	Residual Risk	Mitigation Strategy
External	Ongoing disruption from COVID or other external factors: Compromised project timelines, design and build.	Possible (3)	Major (4)	High (H)	Medium (M)	• Extend established engagement plan using existing media, processes and procedures - COMPLETE
Management & Strategy	Applications to be decommissioned as a result of the EMR/PAS implementation are not fully understood. Full benefits for rationalising applications are not fully understood.	Likely (4)	Moderate (3)	High (H)	Low (L)	• An application consolidation strategy will be documented during IPS and socialised/agreed across SVHA
Management & Strategy	Multiple PAS systems are in use for Registration and Scheduling. Data for upload into EMR will have to be extracted and cleansed. Overall data migration will be complex. Duplicate patient records will need to be identified and corrected. Potential impact to timeline or costs.	Likely (4)	Moderate (3)	High (H)	Medium (M)	• Develop detailed plan for data migration, allow for sufficient time for data cleansing and upload. Identify vendors/tools to assist with data cleansing • Ensure that adequate resources and scope for data migration through IPS – IN PROGRESS
Workforce	Establishing and retaining skilled EMR with experience. EMR and PAS resources belong to a specialised market and may be difficult to appoint or replace at short notice and would require upskilling and time.	Possible (3)	Major (4)	High (H)	Low (L)	• Staffing model includes mitigations strategies for EMR project team turnover to reduce the risk of depending on expensive contractors or professional service firms to fill roles during critical project phases • Appropriate funding to be included in the business case to fund proposed EMR Project team resources / staffing model • EMR Program team experienced in EMR implementations and resource management • Ensure professional services are available in the project budget to manage this risk - COMPLETE
Management & Strategy	Inadequate definition of functional scope early in the project leads to multiple requests for change and spiralling costs	Possible (3)	Major (4)	High (H)	Medium (M)	• Functional scope has been rebase-lined and will be reviewed in IPS, prior to contract being in place – IN PROGRESS
Management & Strategy	Implementation of an EMR and the associated clinical and operational transformation is impacted/constrained due to organisational changes including but not limited to organisational restructures and new infrastructure builds/large capital projects. EMR program timeframes and	Possible (3)	Major (4)	High (H)	Medium (M)	• SVHA will work with its facilities to identify dependencies and critical paths will be monitored and adjusted according to other programs as required. • All leadership will be closely engaged throughout all stages of the program to ensure leadership alignment and adequate prioritisation of the EMR program. • Appropriate forecasting and scheduling of the EMR program will be conducted to provide

Category	Risk Description	Likelihood	Consequence	Risk Score	Residual Risk	Mitigation Strategy
	budgets are impacted. The implementation (partially) fails and full benefits are not realised.					leadership with the required visibility of the amount and type of resources required as well as when these resources are required.
Management & Strategy	Impact on patient admin, scheduling and billing. Implementation of the PAS functionality delivered by the EMR creates significant negative impacts on existing processes related to patient administration, scheduling and billing. Resulting in disruption of patient scheduling and administrative processes. Intended benefits of the project not realised. Delay of the EMR implementation and/ or a financial over-run.	Possible (3)	Major (4)	High (H)	Low (L)	• Ensure that the program is positioned as a Change project, not an IT systems implementation project and that that all communications to the organisation reinforce this. • Ensure that administrative personnel are involved in the selection, IPS, design and implementation of the system. • Ensure that there is effective change management and program management to support process modification activities.
Management & Strategy	Change management and consensus across jurisdictions. Digitising workflows will be based on a consensus decision across SVHA that will need to be supported by an appropriate change management and communication program.	Possible (3)	Major (4)	High (H)	Low (L)	• Strong clinical leadership. Strong organisational leadership and programme governance. • Clinical engagement, change management and communications will form a core part of the program.
Management & Strategy	Do nothing approach is not sustainable and does not align with the organisational priorities. NSW PAS is end of life, and DeLacy does not provide enterprise EMR capability and will not in the foreseeable future.	Possible (3)	Major (4)	High (H)	Low (L)	• Organisation will continue to progress the EMR IPS and move toward a consolidated single patient electronic record with T1 capability across SVHA – IN PROGRESS
Management & Strategy	Adopting a jurisdictional EMR (VIC or NSW) option will compromise an overall single patient record for SVHA and will not meet SVHA public, private and jurisdictional reporting and compliance requirements for every state and for public.	Possible (3)	Major (4)	High (H)	Low (L)	• SVHA has assess the best option that meets all needs: Jurisdiction reporting, alignment with corporate jurisdictional programs, national program and regulatory reporting for public, private across multiple states. • SVHA will move to a single vendor solution that can be configured to the various needs of the organisation, jurisdictional and national needs
Service Delivery	Legacy systems cease to be supported before implementation of the new EMR system. Disruption to clinical and business processes affecting the delivery of	Possible (3)	Major (4)	High (H)	High (H)	• Maintenance of legacy systems will be continued where possible to minimise the risk of outages – IN PROGRESS • Ensure that appropriate back up manual workarounds/ systems/ processes are in place minimise

Category	Risk Description	Likelihood	Consequence	Risk Score	Residual Risk	Mitigation Strategy
	services to patients. Reputational damage and loss of public confidence. Increased patient safety risk.					systems failure – ONGOING BAU • Undertake short-term remediation of current systems where appropriate to reduce immediate failure risk - PLANNED

10.5. Program Assurance

The St Vincent's EMR Program is a High Value, High Risk and as such will require additional state and independent expert governance throughout the project lifecycle. The following three elements will be incorporated to the EMR Program:

- **Internal project assurance** – The adoption of gateways at key milestones throughout the project to provide assurance that all key activities have been achieved to a quality and standard that enables the project to progress to the next stage;
- **Sector assurance** – The SVHNS EMR Steering Group membership will be extended to include the NSW MoH Digital Health Project Sector Assurance representative for ongoing project assurance; and
- **External assurance** – The contracting of expert project assurance resources to provide health checks that are fully aligned to the EMR Program milestones.

10.6. Program Resource

A single St Vincent's EMR Program Team will be established for the enterprise with a local SVHNS project team to deliver the EMR at SVHNS. The central team will support the SVHNS project including the design, build, testing, and implementation and go live. Additional resources and backfill have been considered in the cost model for training backfill and go-live.

In addition, SVHNS will have a dedicated project team to manage implementation, change and communications and administrative activities. Medical, Nursing, Allied Health and business support roles will support the Program Clinical Design Leads and Analysts. The SVHNS EMR Project team will comprise 48.0 FTE.

10.7. Program Work Streams

10.7.1. Training

The training approach aims to ensure that users of the EMR are equipped with the skills and knowledge to use the system effectively. Training can positively influence users' willingness to use and be satisfied with the EMR including building their understanding of how the system can be leveraged to improve clinical practice.

Comprehensive planning for education and training is essential for a smooth EMR implementation and beyond. The training plan will include:

- The development of the EMR training program including go-live, refresher and advanced courses, on boarding training and support;
- The delivery methods and channels tailored to end user's requirements;
- The types of training, including informal and formal;
- The resource requirements i.e. number of trainers, length of time, skill sets, etc.;

- The training logistics including the number of sessions, identification and booking of training facilities, including dedicated training areas;
- Development, availability and support of the training domain / environment for consolidated learning;
- Integration of the EMR training into SHVM's training and education programs ongoing;
- Identification of training costs for EMR implementation, backfill requirements and ongoing training costs; and
- The training plan is a deliverable of the IPS phase.

10.7.2. Change Management (People Readiness)

The change management strategy focuses on the "people" side of the project. The implementation of the EMR will result in significant changes for many staff across the organisation. This major clinical transformation requires a robust change management approach to support people through the change to achieve the successful transition and adoption of the new solutions being delivered.

The change management approach aims to establish realistic expectations, minimise impact on staff and maximise benefits. The purpose of the activity is to:

- Ensure that staff know the purpose, scope, expected outcomes and benefits of the change;
- Ensure that staff feel comfortable that they are involved in the project with opportunities to contribute and provide feedback;
- Build a compelling case and create a desire for the change;
- Decrease staff stress and/or resistance to the change;
- Ensure that information about the change is readily available and accessible;
- Ensure that staff will experience a more effective way of doing their work;
- Ensure that by participating, staff will be engaged and feel they have made a meaningful contribution;
- Ensure all gaps, issues and strategies between current state and futures state are identified and managed;
- Align current systems and structures, for example, policies and procedures that need to change to embed the new behaviours;
- Ensure the EMR and associated solutions are implemented effectively and successfully;
- Ensure that ongoing feedback is provided on effectiveness of the change program and adjust as required to gain quick wins and to sustain positive momentum; and
- Ensure that staff are skilled and trained in the new workflows, processes and business rules.

Key to the change management approach is the identification of key stakeholders and an awareness of their objectives, environment, expertise and level of influence. This focus group will enable the facilitation of focused and meaningful engagement and management of stakeholders to reduce risk, tailor mitigation measures and deliver a successful project. It will also support aligning communication and managing expectations.

The change management plan including stakeholder mapping and engagement plan will be delivered in the IPS phase and will be continually reviewed and updated as required during the Program.

10.7.3. Communication

The communication strategy will support leadership and users of the EMR to gain stakeholder engagement, to manage the processes of change and to drive timely access to information throughout the organisation.

The purpose of this activity is to ensure:

- The delivery of the right information, in the right way, to the right stakeholders, at the right time;
- The development of and dissemination of high quality, simple, targeted communication for all stakeholders;
- That stakeholders feel supported during the change;
- That stakeholders are engaged and understand the need for and the benefits of the change;
- That information is engaging and sustains stakeholder's interest in the Program for the entire duration;
- The communications will aim to connect stakeholders to what they deeply value;
- That a range of tools and communication delivery channels are used and targeted to various stakeholder groups noting that direct dialogue with stakeholders will be a valued and key method;
- That managers are prepared and provided with messages that they can reinforce with their staff and increase their capability to deliver and support strategic objectives;
- That stakeholder resistance and disruption is minimised;
- That opportunities for stakeholders to provide feedback are encouraged and supported; and
- That communication activities during the project will be constantly evaluated for effectiveness and adjusted as required.

The initial communication plan will be brief, focusing on the requirements for the IPS with a comprehensive plan to be delivered during the IPS phase. This will serve as a guiding map for all internal and external communications of the project.

11. Integration Architecture

The enterprise EMR will interface to core departmental systems and external information providers / receivers and will be delivered to provide a comprehensive patient record with the most current patient information. This integration will enhance clinical workflows and improve patient safety and outcomes.

The Enterprise EMR Program's integration architecture is based on a current state review and a future state solution design that will be initiated in the IPS phase. This review includes a recommended future state for each application with deployment of an Enterprise EMR (e.g. to be consolidated; to be interfaced; remain as a standalone) and the costing for any new interface development (as appropriate for the application). The IPS will validate the current integration estimates that have been used to support Enterprise EMR budgets.

The Rhapsody integration engine is proposed to be utilised across St Vincent's. An internal business case is being progressed to facilitate a rollout of this technology as a foundation for the enterprise EMR program in other jurisdictions. An assessment of the interfaces should allow implementation for St Vincent's without the need to re-establish (re-code) interfaces when the EMR is implemented.

11.1. Interface Approach

Where an existing application has functionality that is equivalent or less than that in the Enterprise EMR then it is assumed that the current application will be consolidated (and decommissioned) into the Enterprise EMR. The project will seek to convert (where technically feasible and clinically relevant) relevant historic patient data from that application into the Enterprise EMR to form a single ongoing digital medical record.

All systems identified as "likely to be consolidated" will be reviewed through clinical governance during the system design and validation phase before a final decision is taken. This review will ensure that functionality required for patient safety / care is not lost and that existing models of care are supported.

11.2. Single Patient Record

Facilities across St Vincent's may identify an individual patient with up to eight different Unit Record (UR) numbers (assuming that there are no duplicates in the local Patient Administration System) across all sites and two-three URs in a precinct such as Sydney. Currently a patient record that has multiple URs across St Vincent's and where the patient is expected to transition between health facilities is managed manually. Clinical and administrative information is duplicated in each system.

St Vincent's has not implemented an Enterprise Master Patient Index (EMPI) solution to link existing patient records across hospitals to assist in identifying duplicates in the past. The Enterprise EMR will have a single patient record for all facilities in Victoria (Public and Private) and incorporates an EMPI to manage a patient record (clinical and administrative) across the New South Wales / Queensland instance of the EMR. This approach will facilitate a single patient record across St Vincent's and will support a greater capability is managing duplicate patient records. A significant amount of resource will be applied toward migrating and linking patient records for the Enterprise EMR go-live.

11.3. Providers

The implementation of an Enterprise EMR increases St Vincent's ability to communicate directly and securely with external providers and organisations (e.g. specialists, GPs, My Health Record). For this to be achieved, there is an increased requirement for a single directory that contains a definitive list

of all the identifiers required to effectively communicate with external providers in a seamless manner.

To add complexity and increase the importance of establishing a single directory, providers are known by different identifiers which can lead to difficulties in identifying and communicating with the correct provider or organisation.

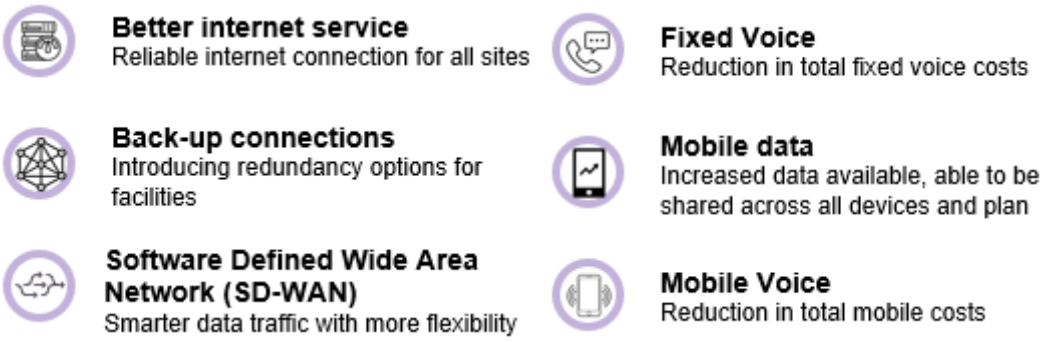
St Vincent's will aim to implement an Enterprise Provider Directory (EPD) solution to establish a single source of information for the providers. St Vincent's will work closely with eHealth NSW to establish an approach that is aligned with NSW standards and leverages national content. This activity is currently underway.

12. Infrastructure and Devices Scope

12.1. Network

St Vincent's is on a pathway to replace its local (apart from Aged Care Services) and wide area networks to support contemporary services including medical grade wired and wireless networks.

Part A of this program will replace all Wide Area Networks, including fixed and mobile telephony with a single vendor. This initiative is in the early stages of implementation planning and will be completed well in advance of an EMR implementation.



Part B of this program will deliver medical grade wired and wireless networks transforming and upgrading the necessary hardware and software, both in facilities and at the foundations, to deliver and manage a medical grade LAN and Wi-Fi network. A medical grade network will remediate existing network performance issues and deliver a new level of performance.

This program will deliver:

- Stronger network performance with more reliable connectivity in and out of facilities
- Decreased risk of network related outages
- Ability to support innovative models of care, roaming resources, at home care and remote services such as medical Internet of Things (IoT) devices
- Future proofed Security Operations Centre (SOC) including active monitoring and threat detection
- Programmed refresh of network hardware and update of software at regular and contracted intervals.

12.2. Hosting

The St Vincent's EMR solution will be delivered 'as-a-service' in a private cloud hosted infrastructure. This approach aligns to St Vincent's strategic direction to leverage financially beneficial 'at scale' infrastructure services with key strategic partners to deploy new technical solutions as 'cloud first'.

Connectivity from across the St Vincent's wide area network will contain multiple redundant links and will be able to scale to meet the bandwidth requirements as needed. The deployment of the EMR application is spread across multiple geographically diverse data centres (all within Australia) with regular off-site data backups to restore to 'point in time' transactions.

The Tier III data centres (as certified by the Uptime institute), at minimum, are certified to the following standards and are operated by NV1 cleared engineers:

ISO 27001 : 2013	PCI DSS 3.2.1	SCEC Zone 4 +
ISO 45001	SSAE SOC 2	ISO 9001
ISO 14001		

A "Modern Service Delivery Model" process has also been initiated. This activity relates to the potential for an outsourced and fully comprehensive service for operations and infrastructure thus allowing SVHNS to concentrate on their core business.

12.3. Medical Device Integration

Medical device integration with the enterprise EMR will improve patient safety, workflows, operational efficiencies, accuracy and clinical decision-making, by capturing and harmonising data from our fleet of biomedical devices.

A review of the current state of medical monitoring devices is scheduled to be undertaken over the following three months and will review both hardware and software capabilities to integrate to an Enterprise EMR. However, it is not expected there will be significant issues in integrating the majority of the biomedical devices as the Enterprise EMR will be enabled with technology solutions of the same type as implemented in the Parkville precinct to 'listen' to over 900 types of biomedical device or vendor device gateway.

12.4. Point Care of Devices

It is critical that clinicians can access the EMR in a variety of situations – at work, at home and in a mobile setting. While the EMR accessing device must be suitable to the environment and functions required to perform tasks, St. Vincent's approach to device allocation is based on requirements of a specific role type known as a 'persona'.

A doctor undertaking rounds may only require a lightweight hand-held device to look up a patient's recent care activity. This process would contrast with a nurse administering medications who would be undertaking positive patient identification functions and would require a more substantial workstation with barcode scanners and lockable medication draws.

A comprehensive set of personas will be designed in consultation with clinical and administrative representatives and will be delivered to be 'fit for purpose'. An important recognition is that St. Vincent's EMR end user application device requirements are very lightweight and only require a supported web browser and network / internet connection with the appropriate security privileges to access a patient record. However, it should be noted that the user's experience will depend upon the size of the devices screen i.e. a small iPhone screen has limitations on how much information can be viewed per page.

The number and location of fixed devices will be determined through the IPS and will detail device types and functions against identified personas. These will include, but not be limited to:

- Fixed Desktop Computers with single or multiple monitors;
- Workstations on Wheels with various types, sizes and accessories depending on the persona requirements;
- Handheld devices such as iPads / iPhones & Surface Pro / Go with appropriate rugged protection and cleaning capabilities;

- Bring your own device (BYOD) will be supported for staff to login either remotely or on site. As the application is 'web enabled' no EMR patient data is stored on a user's physical device;
- Barcode scanner requirements are generic owing to the modern EMR solution architecture. Any TWAIN compliant device, such as an iPhone camera application can read a patient barcode further supporting BYOD solutions;
- St. Vincent's is in final stages of entering into an enterprise print solution to standardise printing devices across all facilities. While this is primarily a commercial activity, a core benefit will be the modernisation of all printing devices to support both clinical and administrative functions. Label / barcode printers will also be available for functions such as specimen collection, medication labels and any legacy paper forms;
- Patient Journey and Information Boards will be implemented in staff only common areas to facilitate the information sharing at a summary level for departmental activity; and
- Devices capable of electronically and securely capturing a patient's signature will be available to record procedure consent.

St. Vincent's is in the early stages of re-defining how end user computing devices are procured and provisioned with the aim of an external partner provisioning devices, with built in hardware refresh periods, across the St Vincent's enterprise.

12.5. IT Service Desk

St. Vincent's is in the early stages of transitioning to a hybrid model of internal and external IT support. It is envisioned that a 24x7 IT service desk will be 'the norm' with warm transfer of support calls to the relevant application support team / provider should the incident not be able to be resolved at the 1st level.

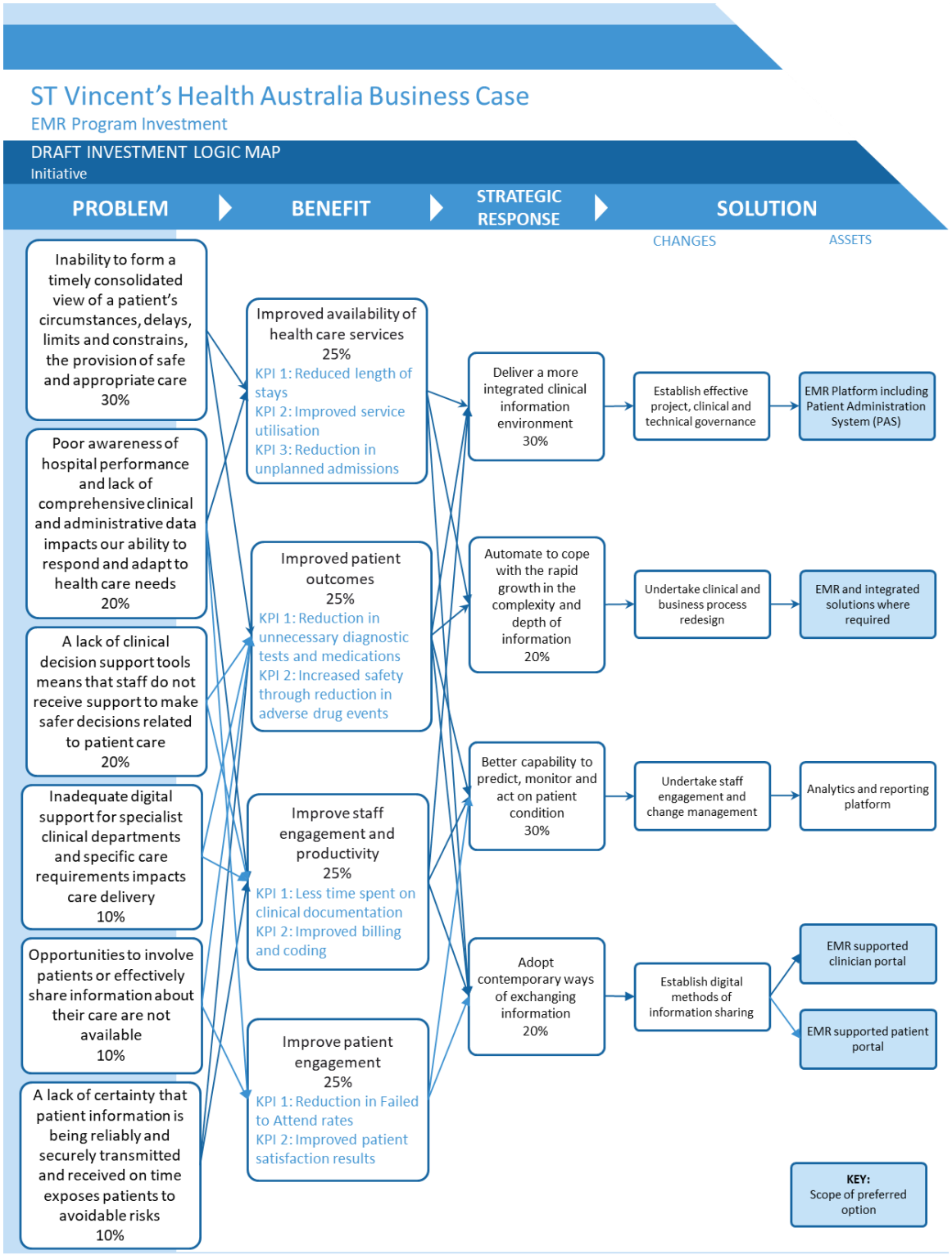
The timeline for this change in IT support model is conducive to the EMR IPS completion.

Appendices

Benefits

Investment Logic Map

Figure 8: SVHNS Investment Logic Map



Benefits Overview

EMR Refresh

St Vincent's Executive Leadership Team requested a refresh of the EMR bankable benefits (capacity and cash) previously developed by the public division hospitals in December 2018. A refresh exercise was undertaken with each public hospital executive team and endorsed by the respective Chief Executive Officers (CEOs). The refresh updated the starting baseline data for the recently completed 2018 / 19 year and reviewed all key assumptions that underpinned bankable benefits. The information provided following compares the refresh benefits as at August 2019 to the initial estimates submitted in December 2018.

Introduction

In 2016 St Vincent's developed a clinical information strategy (CIS) with a view to making a significant investment in technology. The vision was to establish a single, integrated medical record across the enterprise which will provide one source of truth for patient records for all clinical and administrative staff.

The 2016 CIS business case highlighted benefits associated with the implementation of an electronic patient record including tangible benefits against which a cash value could be calculated as well as quality and clinical safety benefits where it is difficult to attribute realisable cash benefits.

Quality and safety benefits include things such as fewer adverse drug events, better management of sepsis, better compliance with VTE assessments, improved falls management, improved infection control, minimising variation in clinical care and compliance with best practice clinical standards.

Since June 2018 St Vincent's have been working on developing a business case and procurement strategy looking at the total cost of ownership over a 10-year period. Separate public hospital business cases were delivered to the Victorian and NSW Health Departments for capital funding consideration in late December.

Benefits Analysis

Please note the following assumptions in estimating the EMR Cash and Productivity / Capacity Benefits for SVHNS. The benefits have been worked up and agreed with each hospital CEO, Chief Financial Officer (CFO), Emergency Departments (EDs), Acute and Performance Improvement based on their hospital current baseline, clinical improvement pathway, and full scope implementation.

While the estimates represent best assessment of incremental benefits over and above the 10 year financial plans of each hospital, areas of Length of Stay (LOS) capacity improvement, theatre utilisation and private practice revenue benefits are expected to be realized in both "business as usual" over the 10 year financial plan and from the EMR implementation.

Total quantifiable benefits for SVHNS were initially reported at $55.9 million in December 2018 with the refresh benefits now estimated at $61.9 million commencing in Year 3 following a two-year implementation phase.

Table 28: Anticipated Quantifiable Cash Releasing Benefits

Benefit	Benefit Type	Amount $
Reduced Length of Stay (LOS)	Capacity	26.8
Increased Theatre Utilisation	Capacity	4.2
Reduced Clinical Documentation	Cashable	7.1

Benefit	Benefit Type	Amount $
Reduced Clinical Pathology Tests	Cashable	1.3
Reduced Imaging Orders	Cashable	0.8
Increased Private Patient Revenue	Cashable	12.5
Avoidable Readmissions	Capacity	1.0
Reduced Software Costs – Software	Cashable	8.2
Total Benefits		**$61.9m**

While Quality and Safety benefits are expected to be delivered improving patient safety and care outcomes, they will be commented on in narrative form in the business case based on published studies of EMR outcomes. These benefits are not considered bankable for the financial analysis and will form part of the economic analysis in the SVHNS business case. The table below is a summary of cash and capacity benefits as at 15 August 2019.

1. **Reduced length of Stay**
   Initial 12/18- LOS treated as a capacity benefit based on improved length of stay that will create hospital capacity to undertake additional funded activity from the Ministry. Additional funded activity performed at marginal cost ranging from 50% up to 55%.

   Refresh 08/19- Baseline data changed to completed 2018/19 year with assumption changes reviewed by each hospital team. Key assumption changes are future funded activity %, case weights, increase in private patient revenue per patient with prosthesis included and change in profile of LOS improvements. Key assumptions driving the estimates and comparison of benefits are:

Assumption	Initial 12/18	Refresh 08/19
Base Year Data	2017/18	2018/19
Starting Acute only activity	55,811 NWAU	53,296 NWAU
Trend in future funded activity	2.25%	2.25%
Public Price 18/19	$4,713 NWAU	$4,925 NWAU
Private Price 18/19	15% Ave Discount RVG	15% Ave Discount RVG
Ave NWAU Weight per case	1.1 per year	1.15 per year
Price Indexation applied	1.5%	1.5%
% Public / Private	65%/35%	65%/35%
Additional Private Revenue	$2,322 pp	$2,816 pp
Multiday LOS June 2018	5.6 days	5.3 days
LOS % Improvement BAU	4.0%	4.0%
LOS % Improvement EMR	11.0%	7.0%
8 Year Capacity Net Benefit	**$27.1m**	**$26.7m**

2. Theatre Utilisation

Initial 12/18- Identified both public hospitals undertake theatre cases out of hours and incur significant expense in overtime and award driven allowances for staff. It is expected that improved processes in creating more efficient theatre lists that run to scheduled theatre times in hours and ensuring theatres start on time will deliver improved capacity. Also, the additional funded capacity from LOS improvement will only result in 1 to 2 additional theatre cases per day from year 3 which should be manageable.

Refresh 08/19- Baseline data changed to completed 2018/19 year with no assumption changes. Key assumptions driving theatre utilisation and reducing theatre overruns are as follows:

Assumption	Initial 12/18	Refresh 08/19
Base Year Data	2017/18	2018/19
No of Theatres	8	8
Cases performed out of hours	22%	22%
Additional Salary Cost	$3.7m Overtime	$3.8m Overtime
Targeted Improvement	19%	19%
8 Year Salary Benefit	**$4.1m**	**$4.3m**

3. Reduced Clinical Documentation

Initial 12/18- Estimated cashable benefits are expected in functional areas/task for Clinical Forms and Printing, Medical Storage and Transport and Medical Transcription.

Refresh 08/19- Baseline data changed to completed 2018/19 year with major assumption change for medical storage costs reducing subject to destruction guidelines and statutory limitations noting no back scanning of old medical records. Medical transcription costs reduce 50% in first year of EMR reducing to 85% in remaining years. Key assumptions driving the reduced clinical documentation are as follows:

Assumption	Initial 12/18	Refresh 08/19
Base Year Data	2017/18	2018/19
Clinical Forms & Printing	$102k per year	$102k per year
Medical Storage over 7 years	$230k per year	$230k per year
Medical Transcription 85%	$394k per year	$394k per year
Scanning (SVHNS paper records)	n/a	n/a
8 Year Benefits	**$7.8m**	**$7.1m**

4. Reduced Diagnostic Pathology Tests

Initial 12/18- Estimated Pathology diagnostic savings based on Pathology request and test numbers for the first 6 months 2017/18 with aim to reduce the number of public testing and saving on variable reagent costs.

Refresh 08/19- Baseline data changed to completed 2018/19 year with major assumption change reducing the target reduction from 19% and 10% to 7.5% based on experience at

peer health services who have recently implemented EMR solutions and previous advice from Deloitte that targeted 10% with expectation of 7.5% reduction achievement.

Assumption	Initial 12/18	Refresh 08/19
Base Year Data	2017/18	2018/19
Public Requests	165,266	145,026
Public Tests	734,786	648,990
Tests per Request	4.45	4.48
Target Reduction	10%	7.5%
Ave Reagent Costs	$4.71	$4.70
8 Year Benefits	**$1.8m**	**$1.3m**

5. Reduced Imaging Orders

Initial 12/18- Estimated savings based on Imaging orders for examinations with a targeted reduction for non-invasive orders for x-ray, CTs and Ultrasounds. Costs exclude any prosthesis costs.

Refresh 08/19- Baseline data changed to completed 2018/19 year with major assumption change reducing the target reduction from 18% and 10% to 7.5% based on experience at peer health services who have recently implemented EMR solutions and previous advice from Deloitte that targeted 10% with expectation of 7.5% reduction achievement.

Assumption	Initial 12/18	Refresh 08/19
Base Year Data	2017/18	2018/19
Orders Examinations	69,026	71,317
G & S expenditure 2017/18	$1,867,653	$1,895,668
Ave Examination Costs	$27.06	$26.18
Target Reduction	10%	7.5%
8 Year Benefits	**$1.0m**	**$0.8m**

6. Increased Private Revenue

Initial 12/18 - Estimated increase in private patient revenue (Accommodation and Doctor Revenue) based on reduced leakage of patients with PHI being classified as public patients across the acute admitted and non-admitted setting due to timely and accurate data capture on presentation. SVHNS is recognised as the state leader in PPI conversion and single room utilisation with less scope for improvement.

Refresh 08/19 - Further investigation of SVHS to confirm the 29% PP achievement is required.

NOTE: It is highlighted that these estimates were established before the change to the PHI framework and any pending changes to CMBS reimbursements which will have an impact on the potential to generate revenue from these services.

Assumption	Initial 12/18	Refresh 08/19
Base Year Data	2017/18	2018/19
Baseline Private Revenue	$36.3m	$44.6m
Private Patients No.	15,615	15,856
Ave Private Patient Revenue	$2,322	$2,816
Current PP % (11.5% LY)	35.0%	35.0%
Target PP per P&FG	1.0%	1.0%
8 Year Benefits	**$11.1m**	**$12.5m**

7. System Retirement

It is acknowledged that there may be some additional cost saving benefits realised through the retirement of the systems currently in use that will be replaced by the EMR. The timing of the implementation is to be fully confirmed during the IPS, however an 8 year period is assumed for the potential savings to be reaslied.

The following table highlights the systems under review and the split of the FY19 budget:

Table 29: Potential Savings - System Retirement

Vendor	Product	SVHNS - SW	SVHNS - HW
DXC	EDIS	$648,336	
DXC	MedChart	$1,476,208	
SVHA	CorePas	$1,023,808	
DXC	iPM	$928,000	
Telstra	deLacy	$4,595,773	
PAS	Forms Printing	$214,381	
Smart Health Solutions	Clinic systems	$807,736	
Eric ICU	Eric	$2,240,000	
TOTAL		**$11,934,242**	

The following notes support the above potential savings:

- Timing of all savings subject to EMR roll-out and appropriate data migration being completed
- Savings for CorePAS will be dependent on the PAS/Billing strategy outcome, degree of consolidation and functional reduction
- May risk dropping Sybase support in 2019 ahead of EMR roll-out if no significant activity such as re-platforming for Cyber risk required.

Benefit Profile

The Benefit Profile included following will be used to document the supporting information to be referenced in the Benefits Realisation management process.

Table 30: Benefit Profile

Profile Section	Description
ID	Unique benefit number
Benefit Name	Short sentence summarising the benefit

Profile Section	Description
Description	A description of the benefit detailing what it is and what it will deliver.
Benefit Type	Financial or Non-financial Financial - benefits that can be quantified and valued in financial terms such as increased revenue or cost avoidance. Non-financial - benefits that are defined and measured in non- financial terms such as improved patient experience or improved staff satisfaction.
Benefit Classification	Cash releasing or Non-cash releasing Cash releasing benefits that result in "cash in the bank" such as "increased revenue" or "cost avoidance" Non-cash releasing benefits that have a monetary value but do not result in "cash in the bank" such as "improved productivity" that frees up staff time to perform other tasks.
Benefit Category	Benefit categories are based on the departments/hospital's strategic objectives/service delivery priorities.
Planned Outcome	The outcome expected to be realised by the benefit.
Rationale	The reasoning for the benefit.
Baseline	The benefit measure at the commencement of the project.
Benefit Measure	Metrics/indicators to be used to inform the estimation of each benefit.
Calculation	The calculation used to measure the benefit value.
Target	The expected reduction/improvement/saving as a result of the benefit.
Reference Literature	List of referenced documents/studies/papers.
Assumption	List of assumptions on which the benefit valuation was based.
Modules Required	Solution modules (e.g. EMR, PAS, etc.) that must be implemented to realise the benefit.
Risks	Any potential risk associated with the benefit.
Risk Mitigation	Actions required to mitigate the risk.

Problem Statement

Existing System Environment

The following table outlines the status of the existing hybrid disconnected system environment across SVHNS. The key challenges summarised highlight the immediate need and benefits of the proposed integrated EMR and PAS as outlined in this business case.

Table 31: SVHNS System Environment

Capability Area	Existing Capability	Key Challenges
Identify and Access Management	Bespoke developed KDS application for access to clinical apps. Azure Active Directory also available but most legacy platforms still authenticate with KDS.	No single sign on mechanism available. Heavy reliance on home grown platform widely known as 'KDS' that provides bulk of IDAM capability to clinical systems. The platform has a single person support dependency.
Shared Patient Information and Information Services	A bespoke results viewer, Mediweb, is used for viewing pathology and radiology results. Mediweb and CoreDocs are both home-grown systems that provide the bulk of scanning and record functionality, however, it is largely manual. CorePas supports all patient administration functions outside ED other than referrals. Access to Up-to-date best practice knowledge base which provides access to the latest medical findings, the best available evidence and recommendations for patient care.	Mediweb is old and in need of replacement due to limitations in functionality. There is no support available for CoreDocs and most internal IP has also been lost. Most documentation on inpatient wards is on paper. CorePAS is a home grown system with no support available and is approximately 15 years old. Allergies are recorded in the CorePAS then transcribed to paper due to the lack of access to the CorePAS at the point of care. Test ordering is paper based other than ICU. Medications prescribing and administration is paper based other than in ICU. No significant decision support capabilities identified. Access to other knowledge bases (such as MIMS) is not available. MedChart is used for medications management.
Specialty Clinical Information Services	EDIS is used for ED Registration triage and clinical documentation in Emergency. Specialty systems exist to support Cardiology (HealthTrack, Muse, Artis), Catheter Lab, Endoscopy (Provation), Mental Health and Diabetes management. Existing systems are in place to support Pathology, Pharmacy and Radiology.	No existing CIS capabilities for anaesthesia and medical oncology. Limited CIS capabilities for operating theatres, with TMS being used for scheduling, no advanced theatre management capability is available. Existing specialist systems are largely disconnected resulting in fragmented patient information that is both difficult to

Capability Area	Existing Capability	Key Challenges
	MAQS is used by sterilisation services to track medical instruments used to the patient. MOSAIQ is used for oncology scheduling and clinical documentation purposes. Theatre Management System (TMS) is used for theatre booking and management, preference cards, utilisation, instrument and resource tracking purposes. Patient Flow Portal provides the journey board functionality and in use in most wards. This platform is provided by NSW Health. iPharmacy (procurement, inventory management, dispensing, compounding and financial billing).	locate difficult to use in research and reporting. Existing Pathology, Pharmacy and Radiology are largely integrated with CorePAS via MirthConnect to receive ADT feeds. Karisma Radiology currently supported and upgraded product; will integrate with DCP (standard HL7 for admissions, order, reports, billing). Existing Pathology (TrakCare) and Pharmacy systems (iPharmacy) require upgrading or replacement. No CIS capabilities to support clinical photography. No CIS capabilities to support Allied Health, Blood Bank, Pastoral Care or Social services.
Shared Patient Administration Services	CorePAS supports several required patient administration capabilities including patient registration, waitlist management, admission, transfers, discharge, booking and scheduling, bed management and billing. Limited Bed Management functionality available within CorePAS.	Limited CIS support for patient flow with the journey board providing manual tracking of where the patient is, but no automated tracking of patient flow available. Nil capability to support electronic referrals. CorePAS is deeply integrated with deLacy as they both share the same database. It makes it very hard to make any amendments or carry out an upgrade due to the strong interdependencies.
Analytics and Reporting Capabilities	Most of the clinical reporting is provided using Jasper reports. QlikView in place as implemented through NSW Health, however, it largely provides finance and KPI reporting only. DeLacy integrates with HealtheNet (NSW Health platform), that operates as a broker to send info (Discharge Summaries) to NSW Health and My Health Record.	Patient information is fragmented across multiple solutions, making reporting from a single source of truth difficult. No self-service or ad-hoc reporting capabilities supported by the CIS environment.
Foundational Capabilities	Mirth Connect currently used for HL7 messaging, however this solution is old and in need of replacement with a more contemporary platform eCredentialing supports clinician credentialing. This is a different solution	Microsoft Teams now available to all staff, however, its use is very limited with respect to clinical communication.

Capability Area	Existing Capability	Key Challenges
	to all the other hospitals, who are using cGov 3M and IRIS is used for clinical coding, which is used by all hospitals.	
Philips	PACS (Picture Archiving Communication System)	There is an inflight upgrade looking to move this to latest version

Alignment with Government Strategy

This SVHNS EMR Program is strongly aligned with critical government and agency policies and priorities. The alignment between this project and the objectives of the NSW Government and the objectives of this business case is considered below.

NSW Premier's Priorities[22]

Adoption of the EMR across SVHNS will enable better support of the following priorities to improve the Health System outlined by the Premier of NSW:

- Improving service levels in hospitals
- Improving outpatient and community care
- Towards zero suicides.

The significant improvement that will be available through the EMR in creating longitudinal patient records of care, managing and monitoring care delivery and digitally engaging with other health and community care providers will result in SVHNS making an active contribution towards the achievement of these priorities.

As outlined in the aim to improve outpatient and community care, the SVHS EMR will provide the clinicians with the tools and insights to proactively manage patient care while also facilitating options for remote and virtual care.

NSW State Health Plan: Towards 2021[23]

In the NSW State Health Plan, the NSW Ministry for Health outlines two key areas relevant to this SVHNS EMR business case:

- Supporting and harnessing research and innovation

  As outlined in this document, the implementation of the EMR will provide extended opportunities for research through access to a comprehensive data set aligned with relevant terminologies and standards.

- Enabling eHealth

  NSW Health is using technology to support the healthcare system as it changes and evolves, embedding eHealth into everyday models of care that help link patients, service providers and communities in a connected, smarter healthcare system. Implementation of the EMR will enable greater participation of SVHS in the digital health ecosystem that is being established.

[22] Premier's Priorities, NSW Government

[23] NSW State Health Plan: Towards 2021, NSW Ministry of Health, 2014

NSW Rural Health Plan: Towards 2021[24]

As outlined in this Plan, NSW Health aims to provide world class care as close to home as possible for people in rural communities. The NSW Rural Health Plan will continue to build on the significant achievements made in recent years and aims to further develop capacity and opportunities in rural health services.

The capability available in the proposed SVHNS EMR will enable greater collaboration with rural clinicians and facilitate remote engagement with patients thereby providing the most appropriate care with a patient focus.

eHealth Strategy for NSW Health 2016 – 2026[25]

The premise of this strategy is "A digitally enabled and integrated health system delivering patient-centred health experiences and quality health outcomes". It has been developed to deliver world-class, eHealth-enabled healthcare services across NSW over the future decade.

It sets the framework for investment to meet the growing demand. The scope and objectives of the SVHNS EMR Program addresses the following focus areas outlined in the Strategy – Core Clinical Systems; Integrated Care Solutions; Data and Analytics; Access to Information; Infrastructure, Security and Intelligence; and Innovation.

Without investment in the EMR Program, SVHNS will have limited influence and participation in such eHealth advancements. Delay in this investment will make the transition more complex than the current situation.

Clinical Engagement and Patient Safety[26]

eHealth NSW's Clinical Engagement and Patient Safety team seeks to improve the usability, usefulness, safety and efficiency of our digital solutions for clinicians by seeking their input and providing analysis, advice and design support.

Clinical engagement and patient safety are two of the key pillars of the SVHNS EMR Program and areas where significant benefits are expected to be realised. Without the EMR, SVHNS would not be positioned to address either of these imperatives.

NSW Health Telehealth Framework and Implementation Strategy 2016-2021

Telehealth is particularly important in rural, remote and regional areas of NSW. Embedding sustainable telehealth services into the NSW Health system will support delivery of patient-centred care in the right place, at the right time. Telehealth, as the delivery of health care at a distance using tools ranging from web-based videoconferencing to wearable technologies, complements face-to-face consultation and offers significant benefits for patients, their carers, health care workers and the health system as a whole.

[24] NSW State Rural Health Plan: Towards 2021, NSW Ministry of Health, 2014

[25] eHealth Strategy for NSW Health 2016-2020, NSW Government Health, 2016

[26] Clinical Engagement and Patient Safety, eHealth NSW Government

As a specialist tertiary referral centre, both telehealth and virtual care for patients will be facilitated by the SVHNS EMR enabling Sydney-based clinicians to engage with and monitor care for patients across the state. This strategy aligns with the principles of the NSW Rural Health Plan.

NSW Health and Medical Research Strategic Plan

NSW Health is focused on providing researchers, clinicians, managers and policy makers with the tools they need to translate research into innovative policy and practice to create healthier communities and deliver better patient care.

The integration of health and medical research in the health system supports innovation, builds a strong culture of continuous improvement to ensure we deliver the best evidence-based health care for Australians and is crucial for ensuring the health system's efficiency and sustainability.

The St Vincent's Research Campus, including Garvan Institute of Medical Research, Victor Chang Cardiac Research Institute and the St Vincent's Centre for Applied Medical Science have pioneered insights into some of the most widespread diseases affecting our community today. Access to the comprehensive longitudinal data set that will be created as an outcome for the implementation of the SVHS EMR will provide broader benefits to the research community.

NSW Homelessness Strategy 2018-2023

One of the tenets of this Strategy is to establish an integrated person-centred service system. The aim is to put people at the centre of the system so they get the right help at the right time.

With support of the EMR, SVHNS will be able to more effectively continue their mission of helping the homeless by contributing to their wellbeing and providing continuous care in the context of their overall health status.

Strategic Framework for Suicide Prevention in NSW 2018-2023[27]

Establishment of the SVHNS EMR will enable better contribution to the key priority areas outlined in this Framework, specifically, "Supporting excellence in clinical services and care" and "Promoting a collaborative, co-ordinated and integrated approach".

Availability of a longitudinal record of care that can be shared with other services will allow care to be co-ordinated and managed more effectively. It will also facilitate engagement with primary care services and broader state wide initiatives to establish a more holistic approach.

Australia's Digital Health Strategy: Safe, Seamless and Secure

As outlined in this Strategy, digital information is the bedrock of high quality healthcare. The benefits for patients are significant and compelling: hospital admissions avoided, fewer adverse drug events, reduced duplication of tests, better co-ordination of care for people with chronic and complex conditions and better informed treatment decisions.

Implementation of the SVHNS EMR will allow the hospital to be an active participant in Australia's digital health advances. The current environment limits the contribution that can be made given lack of relevant tools and infrastructure to engage.

[27] Strategic Framework for Suicide Prevention in NSW 2018-2023, Mental Health Commission of NSW, 2018

National Innovation and Science Agenda[28]

Extraordinary technological change is transforming how we live, work, communicate and pursue good ideas. The National Innovation and Science Agenda aims to embrace new ideas in innovation and science, and harness new sources of growth to deliver the next age of economic prosperity in Australia.

Implementing a SVHNS EMR program is a key enabler for advanced research and innovation. The EMR will enable SVHNS to maintain and leverage its current strengths as a world-class centre for research.

[28] National Innovation and Science Agenda, Commonwealth of Australia, 2015

Discovery and Scope

Discovery Phase Findings

The St Vincent's EMR team scored MEDITECH responses and rescored Cerner's 2018 responses along with supporting information gained from the Discovery workshops. Side-by-side comparisons and scoring were undertaken with justifications documented. The same weightings from the original Epic to Cerner evaluation were used in the MEDITECH evaluation process.

Table 32: Discovery Phase Findings

Functionality
Functional EMR software requirements refer to the capabilities at the core of the system. Both Cerner and MEDITECH have a comprehensive suite of integrated clinical solutions with functionality that would enable St Vincent's to achieve HIMSS EMRAM level 6 or 7 and support care across the continuum. In the literature there are numerous recently published papers highlighting the inefficiencies of traditional EMRs and the lack of usability. A recent study concluded that "Physicians give EHR usability a Fail" and that "The poor usability has resulted in EHRs that are extremely hard to use compared to other common technologies. Poor EHR usability was also found to be highly correlated with physician burnout, according to the research"[29]. Selecting an EMR that is easy to use and navigate significantly improves user adoption and satisfaction, reduces the training required, increases clinician efficiency and ultimately delivers better patient care. This was a major factor in the evaluation and a significant difference was noted between the products for this component. MEDITECH has an enhanced user interface and in fact received the highest score in the evaluation for this feature. The MEDITECH Expanse platform released in 2018 was completely redesigned as a web-based platform with clinicians informing the interface design to deliver a better clinician experience. The clinician input into the design was evident. A summary view delivers a comprehensive clinical picture of the patient with minimal navigation to more detailed information and personalisation is simple and executable by the end user to tailor their view to clinical specialty and their preferences. Consistency is maintained throughout the interface; searching is simple with features and icons similar to those of other regularly used software (i.e. Microsoft Windows). Many of the clinical workflows are enhanced with key clinical information presented in context to assist in clinical decision making. Minimal clicks were observed to perform tasks, notably to transfer and admit patients, to perform handover and medication reconciliation / administration. In contrast Cerner can be difficult to navigate and to easily assimilate a clinical picture of the patient. There are many "clicks" to perform tasks, inconsistencies between screens (i.e. the save icon is in different positions throughout the solution) and constant refreshing of the system is required to update with the latest information. There are multiple ways to perform the same function, the screens are busy and add to the cognitive load. Personalisation options are minimal and key capabilities such as providing surgeons with the ability to draw or annotate their documentation, is not possible in the Cerner EMR. It should also be noted that in the 2018 RFT process, St Vincent's clinicians chose EPIC over Cerner in the clinical demonstrations. MEDITECH also scored more highly in mobility as their web based EMR is readily accessible inside and outside the hospital walls on any device type (device agnostic). Mobility comes with an enterprise licencing model compared to Cerner's per user licence. Clinical workflow is becoming more mobile with clinicians wanting to use one device for communication, clinical review and documentation and as such the web-based platform future proofs and supports multiple clinical workflows. Both Cerner and MEDITECH have implemented innovative features to their solution offering and have comprehensive three-year roadmaps. Both support FHIR based APIs and have an open app available in a development environment (app store). Cerner's platform is not currently web based and the timeline for

[29] Melnick, E,R, Dybye,L,N et al (2019, November 14), The Association Between Perceived Electronic Health Record Usability and Professional Burnout Among US Physicians, https://www.mayoclinicproceedings.org/article/S0025-6196(19)30836-5/fulltext

Functionality			
this is not available. MEDITECH are collaborating with Apple, Google, Microsoft and Amazon and see them as partners rather than competitors. Plans are underway to work with Google to further enhance chart searching and chart navigation. MEDITECH allocates 30% of operating expenses to product development and Cerner state 15% of historic revenue is used for innovation. MEDITECH scored more highly for innovation based on the recent major re-platforming to a web-based cloud hosted solution.			
Overall Scoring			
MEDITECH	4.1 / 5	Cerner	2.8 / 5

Price
The pricing between Cerner and the MEDITECH offerings have been assessed from a baseline of the original scope and BAFO with Cerner and Epic and with a consideration of some key inclusions and needs that St Vincent's that are now are better understood. Both views have been provided with a summary of key differentiators between the offerings by the vendors. There are a small number of key considerations and distinctions between the offerings put forward by each vendor: Comparison with Original Scope and Offering (initial comparison) • Billing licensing and implementation costs have been included in addition to the original costs and scope. This is a mandatory requirement for the organisation and provides significant benefits and cost savings for the organisation. • The original Cerner mobile offerings were for a very small number of users. This has been extended to reflect a full set of anticipated nursing, clinical and administrative staff across the organisation in consultation with Cerner. • The original quote from Cerner is also based on the number of beds in the organisation. An additional 100 beds are now provided by the organisation. The pricing from Cerner has been consequently amended. • Cerner have quoted for one instance (domain) of the software. A domain assessment has been conducted and indicates that two domains at a minimum are required. This has a significant cost differential which has been priced into the latest comparative costs. It is also noted that Cerner have not included disaster recovery in their current and revised pricing. • MEDITECH licensing is for all users across the organisation and does not scale in price for additional users in St Vincent's. Cerner licensing is strictly user based, as numbers increase costs will increase. • MEDITECH prices have been provided with an initial BAFO. This process is yet to be finalised with the vendor. • MEDITECH has priced to implement across four facilities. Cerner has priced to implement across two facilities. Cerner implementation costs have been increased to cater for implementation across four facilities. • MEDITECH do not provide Application Support Management services for the solution. Pricing has been requested for this service as this is a key principle for the organisation. This price has been projected and included in the cost comparison. • Implementation with MEDITECH has been confirmed to be less complex. The following organisational cost discounts have been factored into the price calculations: labour (5% reduction), Infrastructure (20%), Training (25%) and activation support (6%). This equates to an overall reduction to organisational costs of $8 million. The total cost of ownership (TCO) for MEDITECH and Cerner with these considerations and including organisational costs are MEDITECH $331 million and Cerner $330 million. Organisation costs for

Price
implementing with Cerner are $147 million and organisation costs for implementing with MEDITECH are $138 million. Amended Comparative Details (secondary comparison) In addition to the information above, the following considerations have been applied: • MEDITECH licensing is for all users across the organisation and does not scale in price for additional users in St Vincent's. Cerner licensing is strictly user based, as numbers increase costs will increase. • MEDITECH prices have been provided with an initial BAFO discussion with the vendor to date. This will have further negotiation in the near future. • MEDITECH will implement across four facilities, Cerner costs have been amended to cater for a four-facility implementation as this suits the change needs of St Vincent's. • MEDITECH provide normalised costs for image storage (ECGs, etc.). Cerner costs to date do not include cost for image storage and this information has been projected from the details originally provided by Cerner. Storage has a price differential. The price differential between MEDITECH and Cerner with these considerations as a TCO including organisational costs are MEDITECH $337 million and Cerner $372 million. Overall the price differential between Cerner and MEDITECH is approximately $32 million. There are several important factors with the pricing that make the MEDITECH offering even more competitive and with less risk. Meditech, however, offers licensing that does not scale with additional users or beds. Cerner software license costs scale with user numbers and bed numbers which has the potential to impact overall St Vincent's costs in the future.

Overall Scoring			
MEDITECH	3.2	Cerner	3.0

Technology
There are some distinct variances with the vendor technology offerings. Cerner does not include disaster recovery in the pricing and the solution must be hosted in the Queensland Cerner data centre. MEDITECH provides a vendor (cloud supplier) agnostic hosting offering and has partnered with a common cloud hosting vender as its preferred supplier, Macquarie hosting services. Macquarie is a private cloud provider (hosted in Australia). This meets the preferred government standards to ensure that data is segregated from other hosting clients and is truly classified as PROTECTED. The cloud hosting approach provided by MEDITECH is flexible, aligns with St Vincent's standards and will allow for change in the future if required. The MEDITECH software has been refreshed over the last two years and is fully web enabled, allowing for higher flexibility to align with St Vincent's standards, implementation options and does not require additional software such as Citrix (costly) to present the solution to users. Cerner requires additional licensing (Citrix) to present the application to users and is not fully web enabled. This has distinct disadvantages for a number of configuration items such as roaming and single sign in options. The MEDITECH software approach is more flexible, open and current and is a far more robust foundation that will align with organisational needs into the future. The Cerner software has specific limitations with newer technologies, has some vendor specific (Cerner) proprietary and embedded capability which is not open (e.g. CCL reporting). This introduces complexity and costs to the organisation to manage the product and resolve user access to the solution. Application management (ongoing configuration and environment setup) is an option offered by Cerner, however, MEDITECH do not provide this service as a standard option. MEDITECH is prepared to provide a pricing Application Management. Given this, an estimated cost for application management based on MEDITECH and other metrics has been included in the TCO figures. The application integration capability of both systems is robust and adheres to common standards. MEDITECH provides a device integration solution (third party) that provides greater flexibility to work with

Technology			
existing monitors. Cerner will work with a fixed set of certified devices. This approach has significant cost implications for the organisation should current devices (old and new) not be compliant with the Cerner EMR.			
Overall Score			
MEDITECH	3.4 / 5	Cerner	3.2 / 5

Implementation
Though a detailed IPS with the successful vendor is required to fully determine an accurate implementation strategy, the optimal St Vincent's EMR Project implementation approach is to have two EMR phases - Core (PAS and Billing) - EMR (noting that these phases may be as little as three months apart) Both MEDITECH and Cerner have proven implementation methodologies in Australia. The overall implementation approach and timelines are determined by the flexibility of the solution architecture. Cerner has recommended commencing with a single domain and if state differences cannot be accommodated to move to a multi-domain during the project. In the single domain scenario, the Cerner architecture is single tenanted, which means that it is limited to either building all sites at one time and then deploying them sequentially or building and deploying each site in sequence. The risk with building all sites at the one time is that the build is out of date for the facilities at the end of the implementation sequence. The estimated timeline for this approach is 18 months for project, design build, test, train and implement with the total project timeline including implementation for 16 hospitals of 60 months. The alternative approach to build each site as required and then deploy them would be a longer project timeline and prohibitive costs. Cerner has a proprietary project methodology named MethodM. Cerner has Australian resources with offices in QLD, NSW and Victoria and are supported with resources from the US as required. Cerner's approach is to build the applications for the project and then train staff to use the build tools at the end of the project. The MEDITECH architecture appears more flexible enabling sites to build and deploy with minimal dependencies and impacts upon each other, that is, limiting factors would be project resource availability resource. The estimated timelines for MEDITECH are 18 months for project design, build, test, train and implement with a total project timeline of 48 months. The reduction in the timeline is due to concurrent facility deployments. MEDITECH supports an agile approach to development with 6 – 8 weeks sprints of design and build with approval throughout the project governance to advance to the next sprint. MEDITECH's approach is to support and train St Vincent's resources to build the system during the project lifecycle so that knowledge and expertise are embedded, and a strong feeling of ownership is created. MEDITECH includes the clinical leadership preparedness program (CLPP) that focuses on clinician engagement during the implementation to ensure optimal buy-in. These sessions are run by clinicians and tailored specifically to clinicians' needs. Of note is MEDITECH's clinical quality improvement service where a team of experienced MEDITECH consultants work with the organisation to identify and operationalise clinically oriented improvement projects. They identify St Vincent's improvement projects, best practices and standards to ensure the EMR build (and workflows) are developed to deliver improvements in clinical outcomes, cost savings, patient experience and clinician experience. This process strongly supports the project's delivery of benefits. MEDITECH's head office is in Sydney and they have indicated plans to set up an office in Melbourne. Nevertheless, MEDITECH will need a significant uplift in resources and support from their international resources for a St Vincent's implementation.

Implementation
Developing the training programs, supporting material and "at the elbow support" is a major focus and costly part of the implementation. It is expected that that this component would be reduced in comparison with Cerner due to the more intuitive nature of the MEDITECH solution. Both vendors' methodologies include content which is a compilation of best practice to help guide the implementation, for example, optimal EMR workflows, training and change methodology. It should be noted that Cerner require the use of their proprietary tools and templates to complete workflow documentation and submissions for build.

Overall Score			
MEDITECH	3.1 / 5	Cerner	2.6 / 5

Scope
MEDITECH has proposed the complete EMR, PAS and Billing functional scope with maternity, oncology, critical care and supply chain management as optional. The PAS and Billing capabilities are fully integrated with the EMR, so it reduces complexity with interfacing to third-party vendors. The PAS and Billing system is in use and proven in 79 private hospitals in Australia and one public hospital in NSW. Case management and a specialist practice module that could be used by St Vincent's private specialists is included. In the original Cerner RFT, all modules were included, however, when the BAFO was negotiated restrictions were placed on the modules to be implemented as well as a reduction in Cerner implementation resources were applied. Cerner has offered EMR and PAS with the following modules as optional, maternity, mental health, bridge, instant access, infection control, antimicrobial stewardship, power trials, P2 Sentinel, ECG management, MPages development kit, oncology, surgical and endoscopy imaging. In negotiating the BAFO, the breadth of functionality was reduced. Cerner's Billing offering is with a third-party who has limited experience in private health billing but good experience in the public health sector. It appears that MEDITECH is offering a more comprehensive integrated scope / suite of solutions that are licensed in a clear transparent manner. The benefits of a fully integrated PAS, Billing and EMR system with one vendor with updates in any module being available in real time with no integration are significant.

Overall Score			
MEDITECH	3.6 / 5	Cerner	2.9 / 5

Data Analytics
The data analytics and research offerings from Cerner and MEDITECH have been assessed from a baseline of the original scope and BAFO with Cerner and Epic. Some key inclusions and needs of St Vincent's that are now are better understood were also considered. Data Analytics capability from the MEDITECH system is provided via an SQL server database which is a replication of the production database and designed for reporting. This provides a highly flexible and common platform for reporting and analytics. The Cerner reporting (data access) capability is via a proprietary language (CCL). This approach requires specialist resources to access the EMR data and limits wide access to information for research and other analytical purposes. Both vendors provide the tools with the system that provide physician alerts, clinician decision support, state-wide reporting, medications management, identify patients that meet trial criteria, track patients on trials and provide access to atomic data within the system. The overall data analytics and research capability in both products is reasonably comprehensive, however, the Cerner system has significant complexity and cost to access data from the system. Data is accessed from the main operation database and has a complex proprietary language that must be used to access information. In contrast, MEDITECH provide a separate reporting database that adheres to common

Data Analytics			
standards and is rationalised for reporting purposes. Overall, the MEDITECH data analytics research offering was seen to be superior to the Cerner offering.			
Overall Score			
MEDITECH	4.0 / 5	Cerner	3.0 / 5

Legal			
The 2018 RFT review of Cerner found them compliant for the legal and commercial component with detailed support and service level proposals included. In contracting, additional detail in the commercial, operational, technical and financial schedules would be required. MEDITECH International is comprised of MEDITECH USA and MEDITECH Holdings. St Vincent's would fall under MEDITECH Holdings. The software is developed in USA and then localised by MEDITECH Holdings. The relationship between the two arms appears strong with active collaboration and coordinated development activities. Contract development would need to ensure the USA support and backing is available as required. A sample St Vincent's project agreement has been shared with MEDITECH and they have confirmed that the EMR contract would fall under Australian jurisdiction. Financial statements have been reviewed internally with no issues identified and an external third party financial due diligence report is in train.			
Overall Score			
MEDITECH	3.0 / 5	Cerner	3.0 / 5

Fit
MEDITECH's mission is to "Enable Customers to provide higher quality care….to more people…at a lower cost" and apply discounts to third world countries and not for profit organisations for their software. They have invested significantly in re-platforming their software using clinicians to improve the usability of system for their users and for better patient outcomes. MEDITECH works closely with mission-based organisations internationally and believe in partnerships rather than a customer focus. They are an organisation that has had the same CEO for fifty years and a policy of promoting from within. Cerner's mission is to "contribute to the systemic improvement of healthcare delivery and the health of communities". They have invested a proportion of their revenue into research and development but have not re-platformed their software. It is based on older technology. Cerner also works with mission-based organisations and highlights partnership, but their approach is very sales oriented. MEDITECH did not originally have a Modern-Day Slavery plan but worked with St Vincent's and their own organisation to develop one that covers all aspects and is similar to St Vincent's. Cerner provided a statement that reflects commitment to Modern Day Slavery but did not develop a comprehensive document. MEDITECH provided a detailed Reconciliation Action Plan while Cerner stated that they would be prepared to develop one. Both vendors have Australian based customers and support staff. Cerner has a larger presence in Australia due to their larger footprint of clinical systems deployed in Australia at this stage. It has been observed that MEDITECH always behaves professionally engaging in what appears to be open and honest communication aimed at problem resolution and they do not shy away from stating where they are not able to achieve a particular outcome. This approach has engendered a sense of trust. They did not denigrate other vendors in any interaction, which was refreshing.

Fit
Cerner also at all times were professional, however, their approach was different. Cerner applies a sales approach with the answer to most questions being an unqualified "yes" when considering the previous Cerner experience of St Vincent's EMR advisors, this was not always the case. Without invitation, at times Cerner openly criticised other vendors. In summary, both companies could work with St Vincent's, however, the honesty and transparency of MEDITECH is a far better fit for St Vincent's as we embark upon a long partnership and undertake a complex project together.

Overall Score			
MEDITECH	3.6 / 5	Cerner	2.3 / 5

Total
The outcome of the evaluation was that MEDITECH is being recommended as the preferred EMR vendor for St Vincent's. The evaluation team considered that the relative value to St Vincent's for functionality and data analytics was higher than the other criteria, however, no weighting was applied to be consistent with the 2018 evaluation. Nevertheless, the criteria considered of higher value, that is, functionality and data analytics were the two areas where MEDITECH achieved "exceeds requirements" scores. The outcome of the evaluation process is summarised in the following graphic:

Selection Criteria	Meditech	Cerner	Key Comments
Functionality	4.1	2.8	**Meditech** - Enhanced clinician friendly user interface, minimal navigation, easy personalisation, one of only two vendors to see significant increase in market share growth in 2019 (KLAS) – new platform **Cerner** – User interface busy and difficult to navigate, inconsistent display between modules , too many clicks to assemble clinical picture and perform functions, no drawing ability for documentation
Price	3.2	3	**Meditech** – Licensing is for all users across the organisation and does not scale in price for additional users. BAFO process yet to be undertaken **Cerner** – User based so as numbers increase costs will increase e.g. mobility is per licensed user. Cerner's price does not include Disaster Recovery (DR)
Technology	3.4	3.2	**Meditech** – Fully web enabled, current technology with a mobile mind -set, device agnostic Private cloud, agnostic hosting in Australia which is flexible and allows for change in future **Cerner** – Not fully web enabled, Hosting controlled by Cerner in QLD data centre, Strong AMS
Implementation	3.1	2.6	**Meditech** – Iterative agile approach over a shorter timeframe with a strong benefits approach **Cerner** – Longer implementation timeframe with higher risk approach , more training required
Scope	3.6	2.9	**Meditech** – Fully integrated PAS & Billing proven in private, Integrated EMR **Cerner** – Unproven PAS and Billing for private, Billing third party solution
Data Analytics	4	3	**Meditech** – SQL server database (DB), replication of production DB which provides highly flexible reporting and analytics platform. Easy for clinicians to develop their own reports **Cerner** – Database access via proprietary language , specialist resources required for reporting
Legal	3	3	Both compliant - More detailed third party financial review in train for Meditech
Fit	3.6	2.3	**Meditech** – Organisational culture aligns more closely with SVHA's mission - Initiatives and sales across the world apply significant discounts for third world countries, considerate of the vulnerable **Cerner** – Sales oriented approach / culture
Total	3.5	2.9	

The following Legend is applicable:

- Score 1.0 – 1.9 = Does not meet requirements
- Score 2.0 – 2.9 = Requirements partially met
- Score 3.0 – 3.9 = Requirements fully met
- Score 4.0 – 5.0 = Requirements exceeded

In summary, it has been determined that the MEDITECH Expanse platform offers a comprehensive and streamlined EMR that is intuitive and easy to use to support clinicians to deliver quality patient care. The

Total			
following multi-perspective outcomes from the evaluation conducted during the Discovery Phase reinforce that decision: • The data analytics and research capability is broad with the ability for end users to easily develop their own reports and dashboards • The new web-based platform supports mobility, is device agnostic and cloud hosted • The architecture is more flexible which gives St Vincent's more options especially in determining the optimal implementation roll out strategy • The licensing model is transparent and enables St Vincent's to be more confident of costs as the organisation expands • The integrated PAS, billing and EMR reduces the integration costs and management of multiple vendors • MEDITECH's roadmap displays the commitment to ongoing research and development of the product and the company is closely aligned to St Vincent's in its mission, culture and service provision • The company has a high retention rate of existing customers (85%) and has seen a significant increase in market share in 2019 MEDITECH Expanse evaluates as a solution that will take St Vincent's confidently into the future.			
Overall Score			
MEDITECH	3.5 / 5	Cerner	2.9 / 5

Functional Scope

The EMR implementation will include the following functionality. This functionality will be deployed across all St Vincent's Hospitals, public and private.

EMR Core: This is the base level of functionality that will address common capability in all facilities across the enterprise. Implementation will vary from site to site, dependent on the environment.

Table 33: EMR Core Functional Scope

Application Function	Description
PAS	Patient Master Index (PMI), Admission Discharges and Transfers (ADT), Outpatient Scheduling, Waiting List, Coding, Bed and Capacity Management, Statutory Reporting, Billing – Private and Public (not including diagnostic billing), patient correspondence
Pastoral Care / Inclusive Health / Volunteers / Prisoners	Data entry and reporting. Basic clinical documentations
Emergency Department	Registration, Admissions, Bed Management, Statutory Reporting, Clinical Notes and Procedures, Summaries (complimentary with current processes) including Short Stay (SSU) and Vital signs spot monitoring for these areas.
Discharge Summaries	Generate and distribute Discharge Summaries to GPs / VMOs. At a minimum delivery existing capability in tandem with existing capability (MediWeb/Delacy)
Patient Journey Board	Manage criteria for revenue maximisation and patient clinical care regarding referrals, length of stay, patient flow, discharge processes and re-admission clinical criteria for patients across the organisation
Operating Theatres/Surgery	Waiting List, Emergency Theatre Bookings, Basic Clinical Notes, Procedures and Diagnosis, Statutory Reporting

Application Function	Description
EMR Functions	Radiology Results Viewing; Pathology Results Viewing and Trending; ECG Results Viewing
eReferrals - External	Referral Management: external to the organisation. This must include receiving (external) referral information to the National standard (CDA), receiving this to a triage queue, matching to existing patients with the clinical information in the eReferral displayed in the EMR.
National – My Health Record	Discharge Summaries to MHR, Viewing MHR
National – Identifier Service	IHI lookup
Patient Portal	Patient portal for preadmission details, bookings and viewing consolidated clinical details
Support for Telehealth	The EMR core will support telehealth workflows but will not provide direct capability for this functionality
Support for MDM's	The EMR core will support MDM workflows but will not provide direct capability for this functionality
Intensive Care	Intensive Care EMR core functionality. To ICU, Dependency (HDU) and Special Care Nursery (SCN) management.
Clinician Access	In addition to access from organisation infrastructure, access to the EMR solution will be provided via remote or mobile infrastructure

Full EMR Scope: This is the full complement of functionality that will be procured by the organisation. This provides the highest level of benefit for investment by the organisation. Some facilities may not implement all of functionality below, this will be dependent on the services provided by the organisation. Private organisations are only anticipated to implement the operating theatres functionality listed below.

Table 34: EMR Full Functional Scope

Application Function	Description	
Clinical Documentation	Inpatient and Outpatient	Tier 1
Clinical Documentation	Inpatient and Outpatient	Tier 1
Vital Sign Monitors	Mobile spot monitors integrated across the organisation.	Tier 1
Medications Management	EMM & complex medications, administration and reconciliation (not to unit dose level). Integrated with pharmacy dispensing software. Medication Orders	Tier 1
Specimen Collection	Pathology specimen collection management	Tier 1
Emergency Department	Full EMR functional adoption, medications, decision support, etc.	Tier 1
Blood Transfusion	Interoperability with Blood Bank, scanning and tracking, blood product tracking, scanning, mobile device utilisation	Tier 1
eReferrals – Internal	Internal to the organisation, specialties, diagnostic services, allied health etc.	Tier 1
Device Integration	Integration with existing and new devices, vital signs, pumps, ventilators, etc	Tier 1

Application Function	Description	
EMR Functionality	Medications Management (SNOMED-CT/AU, AMT) Clinical Decision Support (Drug to Drug and Drug to Alert-Allergy, Interaction checking), Sepsis Alerts, VTE etc. Discharge Summary: Including medications	Tier 1
Fluid balance chart	Full documentation of fluid intake and outputs	Tier 1
Growth & Weight Charts	Documentation of growth charts; Documentation of weight	Tier 1
Dialysis	Prescribing and clinical documentation	Tier 1
Operating Theatres / Surgery	Clinical Notes, Utilisation Tracking, Preference Cards and supply management, Bar coding - utilisation, Utilisation Report, Voice Dictation	Tier 2 (T1 core Private) *1
Mental Health – Inpatient	EMR functions for mental health patients, including a behavioural health module that complies with jurisdictional regulatory requirements	Tier 2
Intensive Care	Intensive Care, Orders, Medications Management and EMR functionality (as defined above). Across ICU, High Dependency (HDU) and Special Care Nursery (SCN)	Tier 2
Anaesthetics	Anaesthetics, Orders, Medications Management and EMR functionality (as defined above)	Tier 2

Note 1: Operating Theatre/Surgery is currently anticipated as the only major Tier 1 extension that would be implemented by private facilities.

Future EMR extensions: Costs for the following functions as they are desirable, however this capability is not part of the initial EMR implementation scope.

Table 35: EMR Future Functional Scope Extensions

Application Function	Description
Maternity / Gynaecology	Maternity and Gynaecology Module
Medical Oncology	Medical Oncology and Haematology

The EMR scope will support and work with the following initiatives but will not delivery capability that is directly related to this functionality.

- Prisoner management: Data is generally captured in independent systems such as JCARE, where prisoners are managed in government facility. This is anticipated to continue as per existing workflows. The workflows across the EMR and these independent systems will be assessed during the IPS. Prisoners as inpatients will be managed within the St Vincent's EMR as per current processes and is in scope for the initial implementation.
- Multidisciplinary Meetings.
- Telehealth.

The scope of delivery for the following areas requires further assessment:

- Inclusive Care / Pastoral Care / Volunteers: An assessment of current business processes, workflows and functionality is required to confirm scope.

- Mental Health: Approach to work with jurisdictional initiatives, current (preventative) and overall population health (mental health) care management, national drivers and anticipated scope of delivery for the EMR initiative.

It is assumed that replacement of the PAS will be progressed as a part of the EMR implementation. This includes Emergency Department, Billing and Outpatient scheduling capability.

Application Decommissioning

As noted in the Benefits overview, there are several applications that are likely to be decommissioned as an outcome of the EMR implementation. A detailed application consolidation strategy will be completed during the IPS along with the potential timing. A summary of those applications at SVHNS is provided following:

Table 36: St Vincent's Proposed System Retirement Options

Application	Description	Notes regarding Decommissioning
deLacy	Basic EMR	A scanning and clinical and care documentation application that has been tailored in-house. Further assessment is required to understand if it can be fully decommissioned. It is used to access scanned documentation (scan and view), manage referral access policies, pastoral point of care documentation, allied health notes and KPI reporting. It is configured to the needs of each facility and does not have a common build.
Butterfly	Surgeon Preference Cards	Proposed to be Decommissioned
EDIS	Emergency (DXC)	Proposed to be Decommissioned
IPM	PAS	Proposed to be Decommissioned
MediWeb and CoreDocs	Clinical Viewer and Forms	An in-house application that provides several functions. Further assessment is required to understand if this application can be fully decommissioned. It manages discharge summary consolidation and final formatting as well as managing other capability and is used to view ICU results.
CorePAS (In-house)	PMI, PAS, Scheduling	In-house PAS that cannot be supporting into the near future.
Patient Journey Board	SharePoint	Proposed to be Decommissioned
Episoft	Patient Portal – Preadmit	Utilised as a preadmission patient portal, further assessment is required to understand if the EMR software provide this capability. Intellidox / OLP is currently being decommissioned and replaced with the Episoft. This implementation will be completed before the EMR implementation is initiated.

Integration Considerations

A list of the current applications and interfaces that will likely be impacted by an EMR implementation are listed below. This is based on a high-level assessment at a point in time. A detailed application and interface list will be completed during the IPS. This list has been provided for the purposes of the discovery phase of EMR planning.

Table 37: Existing Interface Considerations

Application Category	Application	Current Interface	Sites	Future Interface
Food Services	CBORD	PMI/ADT from PAS	6	Replace existing interface
		Diet Type from EMR		Replace existing interface
	Chefmax	PMI/ADT from PAS	1	Replace existing interface
		Diet Type from EMR		New interface
	Delegate	PMI/ADT from PAS	1	Replace existing interface
		Diet Type from EMR		New interface
Pharmacy	iPharmacy	PMI/ADT from PAS	1 (+2)	Replace existing interface
		N/A		EMR to Pharmacy Dispense interface
	Merlin	PMI/ADT from PAS	1 (+2)	Replace existing interface
		N/A		EMR to Pharmacy Dispense interface
	Fred	PMI/ADT from PAS	1	Replace existing interface
		N/A		EMR to Pharmacy Dispense interface
Pathology	TCL (Trakcare) Intersystems	PMI/ADT from PAS	2	Replace existing interface
		Results to EMR/Viewer		Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
	Dorevitch	PMI/ADT from PAS	1	Replace existing interface
		Results to EMR/Viewer		Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
	Transmed	PMI/ADT from PAS	Not Listed	Replace existing interface
		Results to EMR/Viewer		Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
Imaging	ISite (Philips)	PMI/ADT from PAS	TBD	Replace existing interface
		Results to EMR/Viewer	TBD	Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
	Karisma	PMI/ADT from PAS	3	Replace existing interface
		Results to EMR/Viewer		Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
PACS/RIS	GE PACS/	PMI/ADT from PAS	2	Replace existing interface

Application Category	Application	Current Interface	Sites	Future Interface
	ZPF Synapse	Results to EMR/Viewer		Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
	MIA Direct	PMI/ADT from PAS	Not Listed	Replace existing interface
		Results to EMR/Viewer		Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
	Syngo (Siemens)	PMI/ADT from PAS	1	Replace existing interface
		Results to EMR/Viewer		Replace existing interface to new EMR
		Orders interfaces to EMR		New Interface
National	MHR	Discharge Summary to MHR		Replace Existing Interfaces
	Identifier IHI	IHI from national to PAS		New Interface – IHI lookup and store
	NHSD	GP details to PAS	2	Replace existing interface and interface to all PASs
Patient Monitoring	Phillips IBE	PMI/ADT from PAS		Replace Existing Interfaces
		Results to EMR		New interface
	Airstrip	PMI/ADT from PAS		Replace Existing Interfaces
		Results to EMR		New interface
Scanned Med Record	MRO Infomedix	PMI/ADT from PAS	1	Replace existing interface
		Integrate with EMR		New interface
Outpatient Queue	Qflow	SIU interfaces from PAS,	TBD	Currently being implemented
		booking status from Qflow	TBD	Currently being implemented
Outsourced Results	HealthLink	Results into viewers	3	Replace existing interface
Dispensing Cabinet	Omnicell	PMI/ADT from PAS		Replace existing interface
		Orders from EMR		New interface

Additional Interfaces from PAS to existing applications

The EMR implementation will also replace PAS capability across St Vincent's. The following applications will be impacted as a result of a PAS replacement. This list is based on a high-level assessment at this point in time. A detailed interface list will be completed during the IPS.

Table 38: Indicative New Interface Requirements

Application Category	Application	Current Interface	Sites / Interfaces
Cardiology	HealthTrak	PMI/ADT from PASs	-

Application Category	Application	Current Interface	Sites / Interfaces
	Muse	PMI/ADT from PASs	1
	Cardiobase	PMI/ADT from PASs	1
	McKesson Horizon	PMI/ADT from PASs	1
	GE Cardiolab	PMI/ADT from PASs	1
	Siemens Sensis	PMI/ADT from PASs	1
Endoscopy	Endobase	PMI/ADT from PASs	4
	Endosoft	PMI/ADT from PASs	1
	Provation	PMI/ADT from PASs	1
Coding/Grouping	3M Grouper	Direct Interface	TBD
	Turbo Code/Group	Direct Interface	TBD
Allied/HITH	Uniti	ADT/A19 with PASs	1
Community	Chime	PMI/ADT from PASs	1
MHR/Secure Messenger	CareTechOne	HL7 REF	
TBDB	TB Database	PMI/ADT from PASs	
ED Surveillance	RHEMS	ADT from ED (VIC)	
Dictation	Ozescribe	PMI/ADT from PASs	2
	Speech Magic	Interface (TBC)	Not Listed
	Syberscribe	PMI/ADT from PASs	1
Palliative Care	PalCare	PMI/ADT from PASs	1
Incident Management	Riskman	Interface (TBC)	Not Listed
Medical Oncology	Mosaiq	PMI/ADT from PASs	4
Provisioning	CGOV	xML to PASs	7
Infection Management	TIMs	PMI/ADT from PASs	6
Jurisdiction	HealtheNET (NSW)	PMI/ADT from PASs	1
Jurisdiction (VMO Pay)	VMoney (NSW)	PMI/ADT from PASs	1
Outpatient Billing	BlueChip (MD)	PMI/ADT from PASs	1
Reporting	IMDT (In-house)	PMI/ADT from PASs	1
Foetal Monitoring	Soncaide Centrale	PMI/ADT from PASs	1
Dialysis	TDMS (FMC)	PMI/ADT from PASs	1
Lung Function	Vmax	PMI/ADT from PASs	1

Program Costs

Cost Allocation

The overall costs for the program (vendor costs) have been reduced significantly (over $80 million from the TCO) since the organisation approached the market. In addition, the functional scope has increased substantially. The program will implement an integrated Patient Administration System (PAS) with the EMR which will include billing, a comprehensive mobile platform, a patient portal and remote clinician access. The organisation is assessing the implementation of a tier 1 EMR and PAS vendor via an Implementation Planning study over 2020/2021.

St Vincent's has 16 public and private facilities across the eastern seaboard. Given that enterprise scope, it was necessary to determine an appropriate method to allocate the associated costs. This was based on several factors, mainly activity based.

Table 39: St Vincent's Facilities

Sector	NEW SOUTH WALES	VICTORIA	QUEENSLAND
Public	St Vincent's Darlinghurst Sacred Heart Darlinghurst St Joseph's Auburn	St Vincent's Melbourne St George's Kew Caritas Christi Kew	-
Private	St Vincent's Sydney Mater North Sydney St Vincent's Griffith	St Vincent's Fitzroy St Vincent's East Melbourne St Vincent's Werribee St Vincent's Kew	St Vincent's Chermside St Vincent's Toowoomba St Vincent's Brisbane

Given the enterprise scope, it was necessary to determine an appropriate method to allocate the associated costs. There was potential to assess the breakdown of costs over a range of factors which could include actual usage, functional scope and comparative sizing.

Due to the economies of scale that would be realised through adoption of an enterprise approach, a decision was made that a proportional cost allocation would be used based on relevant activity factors. This was deemed the most appropriate model given the shared input and benefits that would be realised by all participating hospitals.

The following metrics were used to determine the distribution of costs between the public and private hospitals of St Vincent's. The key factors used to determine the cost allocation between public and private hospitals include the following criteria (other factors were considered with lower weighting):

- Activity - Inpatient
- Activity – Outpatient (higher weighting based on system usage)
- Activity – Emergency
- Beds (Inpatient and ICU)

Table 40: St Vincent's Summary Statistics

Facility	State	Private / Public	Beds	Inpatients	Outpatients	Emergency	ICU
Sydney (3)	NSW	Public	402	45,795	NA	52,602	20
Melbourne (3)	Victoria	Public	624	67,473	194,810	53,274	19
Sydney (3)	NSW	Private	598	65,221	0	0	24
Melbourne (4)	Victoria	Private	612	62,804	0	0	9
Queensland (3)	QLD	Private	659	60,874	0	25,586	21

Note: Reporting across NSW and Victoria for outpatient services varies due to reporting criteria. The outpatient numbers across the NSW and Victoria Public are very similar on a common activity basis.

The statistics used cover the year 01/03/2019 to 28/02/2020 as the most recent representative time period due to the skewed impact that the COVID-19 pandemic will have on throughput and service data.

A complexity ratio was determined to address that factor in determining the cost distribution. Factors considered included waiting lists, ICU, Theatre, Emergency Departments, Medications, Statutory Reporting, Patient Billing, Visiting Medical Officer access, Patient access, Staff access, Scanning, Change Management, Governance, Diagnostic Services, Pharmacy and the number of facilities impacted.

This analysis resulted in the following complexity ratio:

- Private: 2.11%
- Public: 2.42%

These statistics were then summed and the complexity applied to determine the proportional split between public and private entities.

Table 41: Cost Allocation Modelling

Hospital Type	IP Visits	Beds	Procedures	OP Visits	ED Visits	Complexity	ICU Beds	Day Patients
Private	1038.6	1869.0	713.3	1	25,586	2.11	54.0	99,412
Public	222.0	1026.0	39.9	889,074	105,876	2.42	39.0	18,554
Ratio: Private to Public	4.68	1.82	17.86	0.00	0.24	0.87	1.38	5.36
% Private	82%	65%	95%	0%	19%	47%	58%	84%
% Public	18%	35%	5%	100%	81%	53%	42%	16%
Weight	1	1	1	2.5	1	1	0.1	0.2
Private Cost (m)	$278	$218	$319	$0	$66	$157	$20	$57
Public Cost (m)	$59	$119	$18	$843	$271	$180	$14	$11

A similar approach has been used to determine the distribution across New South Wales (NSW) and Victorian Public Hospitals. That analysis resulted in the following ration of cost allocation:

- New South Wales Public Hospitals: 48%
- Victorian Public Hospitals: 52%

Table 42: Public Private Distribution Model

Criteria	Beds	Inpatients Visits	Outpatient Visits	Emergency Visits	ICU Beds	Distribution Overall
Public Hospitals	35%	18%	100%	81%	42%	**58%**
Private Hospitals	65%	82%	0%	19%	58%	**42%**

Cost Model

The base cost model is summarised in the table following:

Table 43: Ten Year Total Cost of Ownership – Base Costs

Cost Category	CapEx	OpEx	Total
Program Resources - St Vincent's	$59m	$0m	**$59m**
Device Integration & EMR Peripherals	$14m	$6m	**$20m**
Hosting and Application Management	$7m	$54m	**$61m**
Training and Activation Support	$19m	$0m	**$19m**

Cost Category	CapEx	OpEx	Total
Assurance, Advisory, Project Office Expenses	$28m	$0m	**$28m**
Vendor Implementation, Software and Support	$73m	$53m	**$126m**
TOTAL	**$201m**	**$0m**	**$314m**

In assessing the overall risk, the following contingency was applied to the CapEx:

Table 44: Contingency Allocation

Cost Category	Total
Contingency	**$23m**