



Health

NSW Health Analytics Framework

Transformed health through data and insights

A five year vision for Analytics in NSW Health

January 2016

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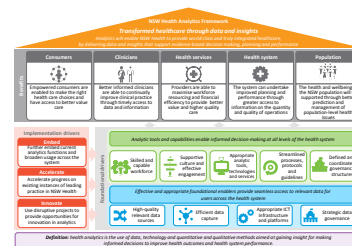
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Glossary

Term	Description
ABF	Activity Based Funding
ABM	Activity Based Management Portal
ACI	Agency for Clinical Innovation
aIM	Acute Inpatient Modelling tool
CaSPA	Clinical Services Planning Analytics Portal
CHeReL	Centre for Health Record Linkage
CEC	Clinical Excellence Commission
CEE	Centre for Epidemiology and Evidence (MOH)
DAC	NSW Government Data Analytics Centre
DPC	NSW Department of Premier and Cabinet
EDWARD	Enterprise Data Warehouse for Analysis Reporting and Decisions
EIR	Enterprise Imaging Repository
eMR	Electronic Medical Record
HIE	Health Information Exchange
HSIPR	Health System Information and Performance Reporting (MOH)
HSPI	Health System Planning and Investment (MOH)
IMF	NSW Government Information Management Framework
LHD	Local Health District
MHDAO	Mental Health and Drug and Alcohol Office (MOH)
MOH	NSW Ministry of Health
NSW	New South Wales
NHS	National Health Service
OHMR	Office of Health and Medical Research
PACS	Picture Archiving Communication System
PCeHR	Personally Controlled electronic Health Record
RIS	Radiology Information System
SAPHaRI	Secure Analytics for Population Health Research and Intelligence
SiAM	Subacute Inpatient Modelling tool
SHN	Specialty Health Network

Executive Summary

The NSW Health Analytics Framework (the Framework) outlines the vision for analytics in NSW Health over the next five years. It provides an actionable plan to drive broader and more sophisticated analytics use to better support decision making and analysis across the NSW health system. The Framework clearly articulates to NSW Health stakeholders, including consumers and clinicians, the benefits, direction and approach to analytics for the NSW health system and coordinates and aligns effort to deliver on the vision.

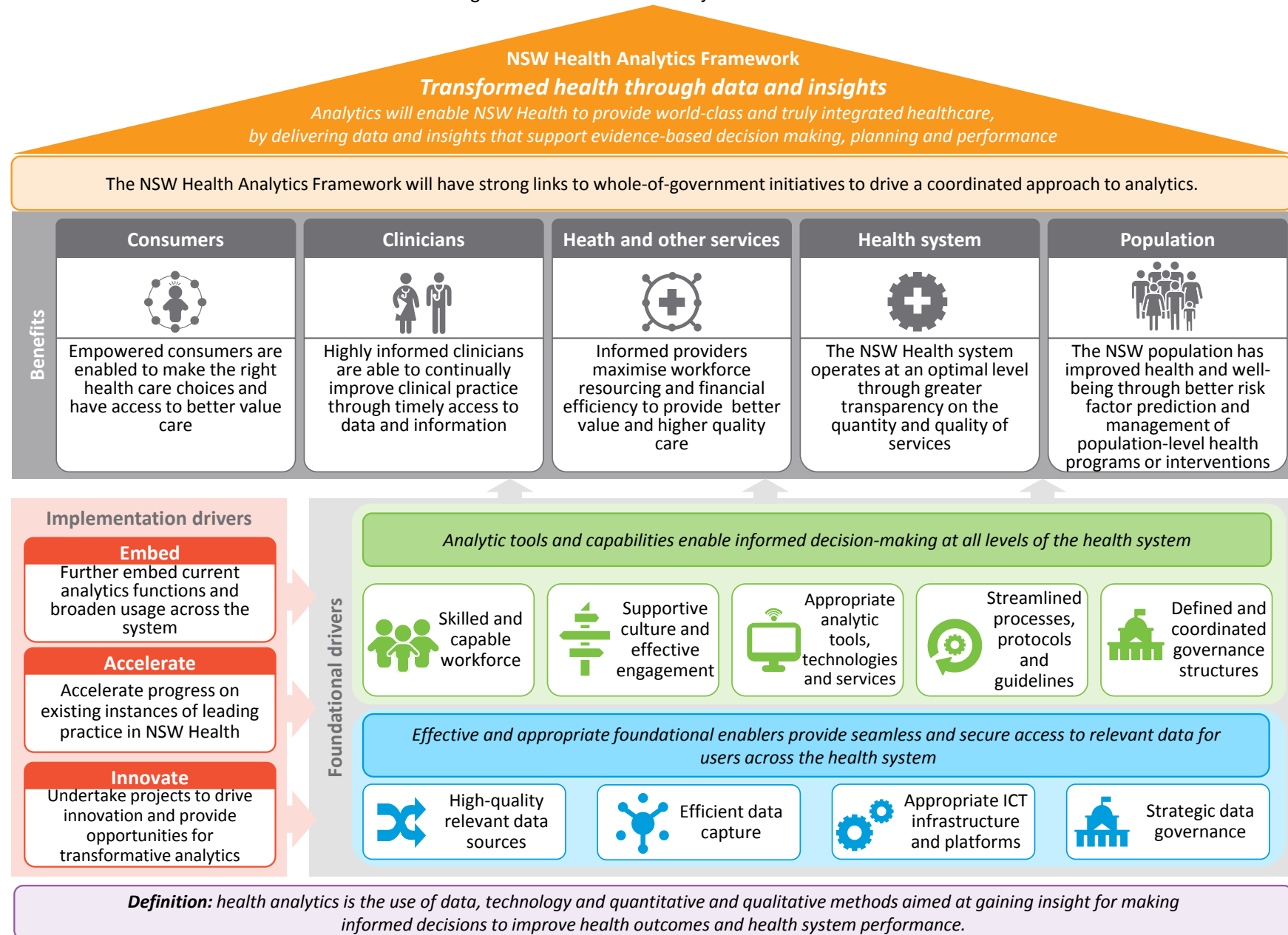


The Framework diagram is provided in Figure 1 overleaf. The components are:

- **Vision** – ‘transformed health through data and insights’. Analytics will enable NSW Health to provide world-class and truly integrated healthcare by delivering data and insights that support evidence-based decision making, planning and performance. This will in turn support NSW Health to achieve the directions outlined in the NSW State Health Plan.
- **Benefits** – effective implementation of the Framework and greater, coordinated use of analytics for decision making will deliver a range of benefits to consumers, clinicians, health and other service providers, the broader health system and the NSW population.
- **Implementation drivers** – three categories of projects and initiatives will drive implementation of the Framework and further development of the analytics capabilities and enablers: those that embed current analytics initiatives and system; those that accelerate areas of leading practice; and those that drive innovation in analytics delivery and use.
- **Foundational drivers** – the necessary components that underpin successful implementation and the delivery of analytics, comprising:
 - **Five capabilities** – the key capabilities the NSW health system requires to effectively access, interpret, analyse, report on and utilise the increasing volume and complexity of health data for decision making. These are: a skilled and capable workforce; a supportive culture and effective engagement across the health system; appropriate analytical tools and technologies; streamlined processes, protocols and guidelines; and defined and coordinated governance structures.
 - **Four enablers** – the foundations that underpin the capabilities that are required for the successful delivery of analytics. While not analytics-specific, they must be fit-for-purpose to support analytics delivery. These are: high quality and relevant data sources, efficient data capture, appropriate ICT infrastructure and platforms, and strategic data governance.

Implementation of the Framework will be led by the NSW Health Analytics Steering Committee, which has overall governance and coordination responsibility for the development and delivery of analytics in NSW Health. The Steering Committee will oversee the execution of a number of priority actions that will drive implementation and further develop the required analytics capabilities. These actions, along with the responsibilities and timeframes, have been identified in the Framework. A number of these actions will commence within 12 months, whereas others will be implemented within the next five years. The Steering Committee will also review and update the Framework annually to ensure its direction remains relevant to the needs of NSW Health.

Figure 1: NSW Health Analytics Framework



Definition: health analytics is the use of data, technology and quantitative and qualitative methods aimed at gaining insight for making informed decisions to improve health outcomes and health system performance.

1 Background

1.1 Health analytics refers to the use of analytical techniques to improve clinical and health system outcomes

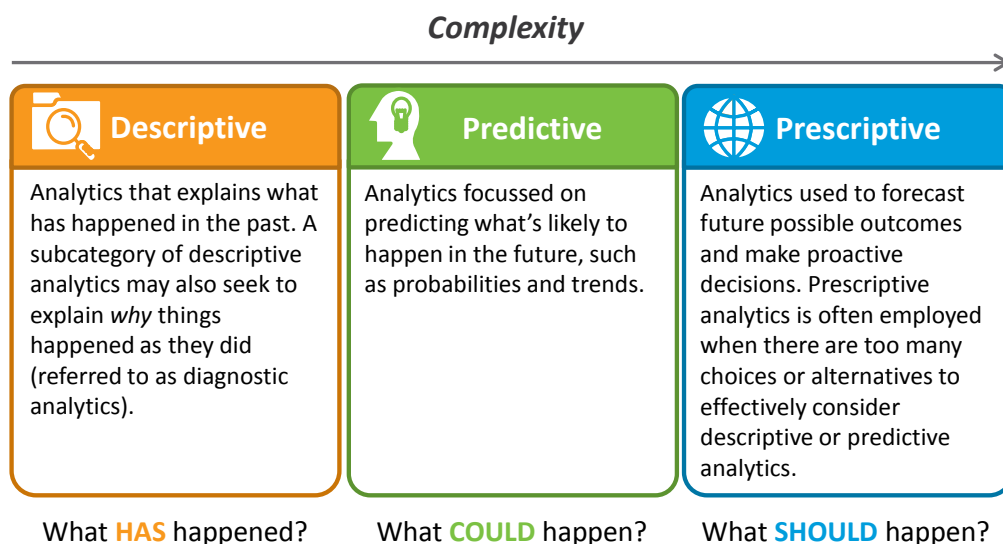
The rapid proliferation of data over the past decade and the equally rapid development of tools and techniques to capture, manage and analyse data has resulted in many differing views on the definition of ‘analytics’. The application of analytics to health also has many broad interpretations, from the type and sophistication of the analytical technique, to the nature of its use.

A common and agreed definition of health analytics is therefore critical to the development of the vision for analytics in NSW Health, including the NSW Health Analytics Framework. The following definition has been tested and agreed with stakeholders across the NSW health system, and is adapted from leading international practice¹:

‘Health analytics is the use of data, technology and quantitative and qualitative methods aimed at gaining insight for making informed decisions to improve health outcomes and health system performance.’

The Framework considers three key types of analytics within the health system, as illustrated in Figure 2. It is acknowledged that these types of analytics functions do not operate in isolation and there is considerable overlap in practice. However, defining these three different types of analytics is useful to broadly understand the different capability and levels of sophistication of analytical techniques.

Figure 2: Types of analytics functions



¹Adapted from definitions in Raghupathi, W. and Raghupathi, V. (2013), ‘An Overview of Health Analytics’, Fordham University.

1.2 Analytics sits alongside broader eHealth and government initiatives in NSW

Analytics is a core component of the eHealth Strategy for NSW Health, which underpins analytics delivery

The eHealth Strategy for NSW Health² outlines the strategy to continue the development of eHealth in line with the NSW State Health Plan. The plan has been developed around three goals that represent the value to be achieved in the health system through eHealth for consumers, providers and organisations. These goals are:

1. Patients are well informed and supported by eHealth in achieving their health objectives
2. Our people are assisted by eHealth to make effective decisions, access education and training, and deliver integrated models of care
3. Organisational and health system performance is optimised and informed by eHealth.

While recognising the eHealth Strategy has other components that do not relate directly to analytics, analytics forms a core component of each of these goals: providing consumers, providers and the system more broadly with the right data and analysis that will inform, support decision making and optimise system performance.

As such, the eHealth Strategy for NSW Health is closely linked to the Analytics Framework. The eHealth Strategy and its implementation by eHealth NSW underpins delivery of the Analytics Framework – eHealth initiatives will provide the ‘backbone’ in terms of infrastructure, technology, processes and governance on which the Framework builds. The eHealth-delivered components are captured in the ‘foundational enablers’ of the Analytics Framework. Further detail on how eHealth NSW initiatives and actions support delivery of this Framework is provided in Section 4.2.

Analytics use in NSW Health will support and align with broader government initiatives, including the NSW Government ICT Strategy and Information Management Framework

Almost all areas of government service delivery, planning and performance are being impacted by the influx of data and the power of analytics. A number of whole-of-government initiatives and strategies have been developed in NSW around data and analytics use, which guide the use of analytics in NSW Health. The Analytics Framework has been developed to align with broader whole-of-government frameworks, including the NSW Government ICT Strategy *Digital+ 2016*, and the NSW Government Information Management Framework (IMF).

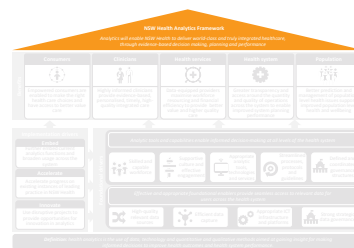
The vision, capabilities and enablers, as well as actions identified in the Analytics Framework reflect the principles and guidelines outlined by the NSW Government in these documents. Further detailed work will be performed in the implementation of the Framework to ensure adherence to whole-of-government standards and policies, such as protocol around data access and sharing as it relates to NSW health system data.

In August 2015, the NSW Government announced the Data Analytics Centre (DAC) as part of the *Digital+ 2016* ICT Strategy. The DAC aims to develop solutions to long-term challenges through facilitating effective whole-of-government data sharing. NSW Health will work with the DAC as it develops, and continue to seek opportunities for cross-agency collaboration³.

² The eHealth Strategy for NSW Health is still in draft form at the time of publication of this report.

³ Minister for Innovation and Better Regulation. (2015). *NSW Government leading in data analytics*. Date accessed: 10/08/2015.

2 The future of analytics in NSW Health

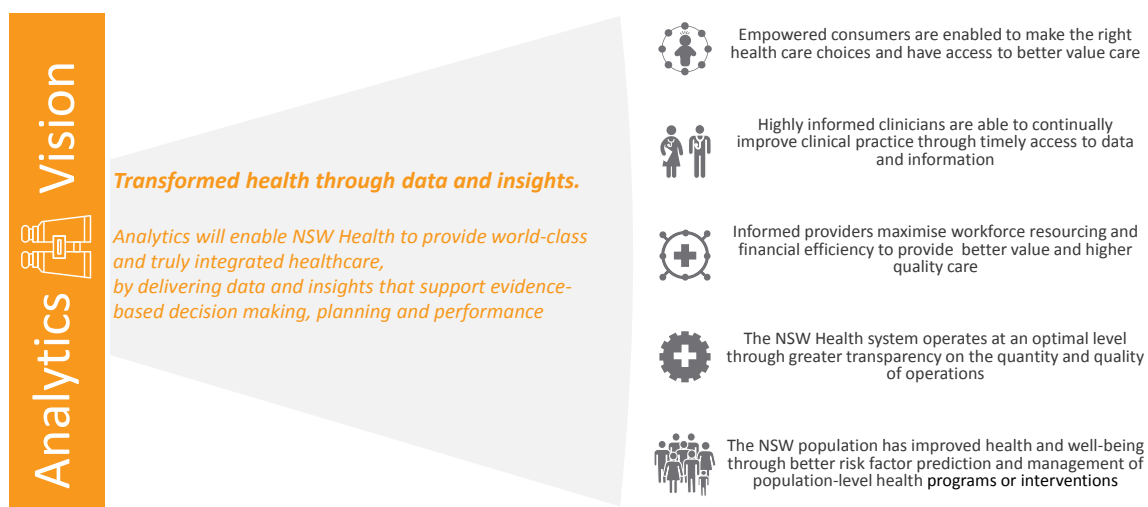


2.1 There is a clear vision for analytics in NSW Health

The NSW Health Analytics Framework is grounded in the overall vision of the NSW State Health Plan, which aims to keep people healthy and out of hospital and provide timely, quality care when and where it is needed. The vision for analytics use in NSW Health is intended to help drive increased analytics use across the system by illustrating how analytics can help NSW Health better deliver on the overall purpose and direction of the health system. A clearly articulated vision ensures stakeholders across the NSW health system understand the target future state for analytics use and are working collectively to achieve it. It positions NSW Health to excel in analytics.

The vision for analytics use in NSW Health over the next five years is illustrated in Figure 3 and described below.

Figure 3: Vision for analytics in NSW Health over the next five years



Successful delivery of the vision will provide benefits to a range of stakeholders, as outlined below:

- **Empowered consumers are enabled to make the right healthcare choices and have access to better value care.** Consumers will be empowered to make informed decisions about healthcare providers and treatment and care options. The broader NSW community will be proactively engaged in the health and wellbeing of themselves and their communities, which will reduce the demand on the health system.
- **Highly informed clinicians are able to continually improve clinical practice through timely access to data and information.** Clinicians and other health care professionals across NSW Health will have ready access to user-friendly analytics tools and technologies required to make informed clinical decisions.

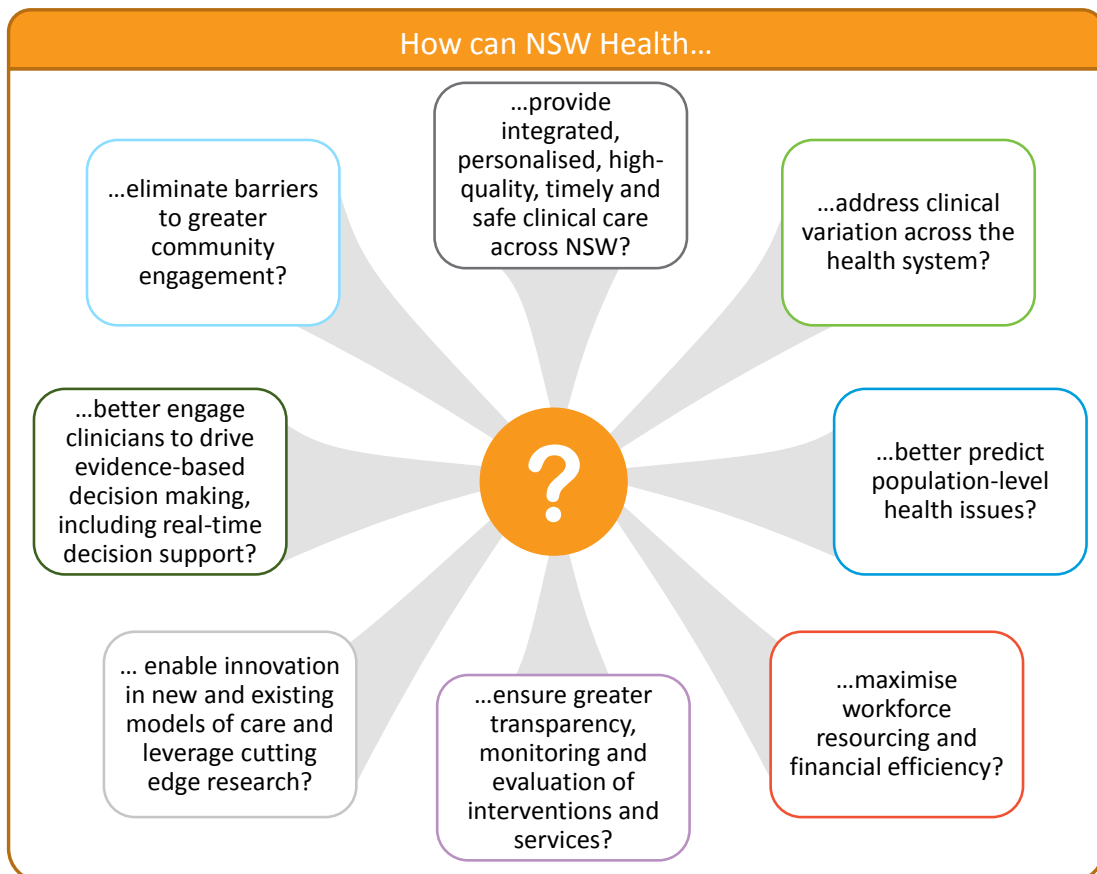
- **Informed providers maximise workforce resourcing and financial efficiency to provide better value and higher quality care.** Service providers in NSW will be supported by effective and appropriate analytics tools, technologies and services to make informed decisions about workforce resources and finances. Their staff will be encouraged and supported to adopt enhanced analytics to improve their clinical, operational and administrative work practices.
- **The NSW health system operates at an optimal level through greater transparency on the quantity and quality of operations.** Transparency in system and organisation performance will increase accountability and drive continuous improvements in service delivery. The NSW Health workforce will have a high performance culture that supports continuous improvement in system and organisational performance.
- **The NSW population has improved health and wellbeing through better risk factor prediction and management of population-level programs and interventions.** Population-level health issues and interventions that affect the NSW population will be better managed, monitored and evaluated through better prediction tools and better access to timely and relevant population-level data and information.

2.2 Delivering the vision will help NSW Health answer critical questions

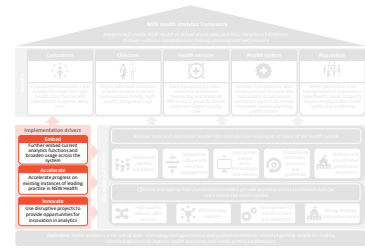
Other jurisdictions have shown that analytics is most successful when driven by specific and clearly defined questions. Realisation of the vision will support NSW Health to better address issues and questions across a number of areas. Wide consultation across the NSW health system identified eight critical questions that analytics could help NSW Health better address. These are summarised in Figure 4.

However, these are not the only questions that analytics can be used to answer and address. These have been identified as those of the highest priority and potential value by stakeholders.

Figure 4: Critical questions that analytics can help address for NSW Health



3 Implementation drivers for analytics in NSW Health



3.1 Three implementation drivers will enhance analytics uptake and use across the health system

Three implementation drivers will provide direction to ensure efforts to enhance analytics use are focussed and coordinated. A collection of specific projects, initiatives and activities sit under each implementation driver, which are intended to drive development, continuous improvement and innovation in the capabilities required for successful analytics use. The priority actions required for NSW Health to implement the projects, initiatives and activities are outlined in Section 4. Section 4 also articulates which implementation driver underpins each priority action.

The implementation drivers are focussed on three broad streams of work: embedding and broadening the use of current analytics functions, accelerating existing instances of leading practice and harnessing the power of innovative and transformative technologies (as described in Figure 5).

Figure 5: Implementation drivers for enhanced analytics in NSW Health



3.2 NSW Health will ‘embed’ current analytics initiatives and systems

NSW Health will build on existing initiatives to embed current analytics functions, broaden their use and better coordinate analytics delivery across the state. This implementation driver builds on the foundation of analytics capability that exists by identifying current analytics functions and initiatives that can be strengthened or embedded more broadly across NSW Health. Additionally, it is intended to address the sometimes disconnected and isolated approach to planning and system development, particularly between system developers and users. It will ensure a more coordinated approach to analytics delivery (e.g. through facilitating greater data linkage across relevant systems).

NSW Health will achieve this through leveraging existing systems that are working well. Once identified, use of these existing systems will be extended across the state to facilitate a broad, but coordinated, approach. This may involve integration of some existing systems to ensure consistency. NSW Health will leverage lessons learned from early adopter sites to inform the successful roll-out of state-wide analytics initiatives and solutions. NSW Health will also consider divestment of assets and programs which are determined to be outdated, redundant (legacy) or of limited value.

Potential existing projects NSW Health could consider under this implementation driver include:

- *Data visualisation platforms*: explore opportunities to better use *data visualisation platforms* to support decision making for service and facility planning, and performance improvement.
- *International Consortium for Health Outcomes Measurement (ICHOM)*: explore ways to build on the existing strategic partnership between ACI and ICHOM. This would enable NSW Health to continue to learn from ICHOM's approach to value-based health, and engage clinicians in the measurement system (e.g. patient reported outcomes).
- *HealthStats*: explore opportunities to expand the indicators to better meet LHD and SHN needs, and consider enhanced data visualisation tools.
- *eMR*: utilise eMR data to develop decision support rules, care plans, and predictive and prescriptive algorithms.
- *EDWARD*: continue to roll out EDWARD as the new enterprise data warehouse to provide a single source of truth, enabling the provision of high quality information to the wide range of analytics tools used system wide, and the development of new analytics applications.
- *CaSPA (Clinical Services Planning Analytics portal)*: continue to develop best practice data visualisation and analytics tools, to support service and capital planning decision making, and respond to user requirements.

3.3 NSW Health will 'accelerate' areas of leading practice

NSW Health will identify existing leading uses of analytics that are currently working well and delivering high value, with the aim of accelerating their development. NSW Health will introduce new and extended capabilities in these existing pockets of excellence in phases and realise benefits incrementally. This type of approach will ensure a continuous feedback loop and improvement cycle to ensure analytics delivery remains successful and efficient. Projects that have demonstrated early and positive results from analytics use will be explored to facilitate knowledge sharing and relevant lessons learned with broader stakeholder groups.

Existing leading instances of analytics use that NSW Health could consider for acceleration under this implementation driver include:

- *STARS (SLHD)*: explore opportunities to tailor STARS for use in other LHDs/SHNs and/or for additional management and reporting activities. This includes accelerating development of additional applications that focus on clinical performance rather than solely activity reporting.
- *SAPHaRI*: extend the Secure Analytics for Population Health Intelligence and Research (SAPHaRI) data access and analysis environment to enable broader controlled use of sensitive data for innovative and collaborative data analysis projects while minimising privacy risks.
- *CHeReL*: identify opportunities for high-impact and innovative data linkage (e.g. increase the number of data sets in the linkage key, support integrated care through novel linkage of data from general practice and the Commonwealth, link new datasets such as bio-banks, enable cross NSW agency linkage and collaboration with the NSW Data Analytics Centre).
- *ABM Portal*: explore methods for supporting facilities, services and LHDs/SHNs to better understand the potential of the ABM Portal and its use for decision support.

- *OPERA*: extend operational reports and performance benchmarking already being deployed for Elective Surgery and Emergency Department into other acute settings, non-admitted activity and primary care (where possible) in an integrated care context.
- *Patient Flow Portal*: explore opportunities to expand the use of the Patient Flow Portal to appropriate facilities or organisations not currently maximising its use and benefits.

3.4 NSW Health will ‘innovate’ in analytics delivery and use

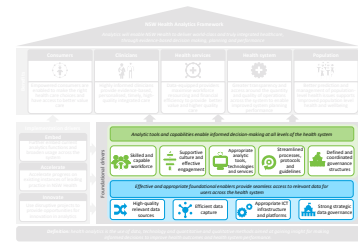
NSW Health will stimulate projects that utilise *innovative* analytics tools, technologies and services. This implementation driver is intended to further encourage innovation across the health system and place NSW at the forefront of analytics use. The implementation of innovative projects will leverage cutting-edge analytics tools and technologies that have demonstrated success and clinical value in other jurisdictions and/or health settings to drive change and high performance in NSW Health.

Potential innovative projects NSW Health could consider investigating and/or implementing under this implementation driver include:

- *Consumer engagement*: discrete projects aimed at better understanding the future expectations and priorities of consumers and the broader NSW community in relation to how they use their health data.
- *Specific clinical specialties*: projects that pilot innovative uses of analytics for enhanced decision making in specific clinical specialties (e.g. for palliative care, mental health).
- *Clinical variation*: projects that use analytics tools, technologies and/or services to reduce clinical variation across the health system.
- *LHD level triangulation of data*: capability development projects aimed at improving the ability of LHDs to triangulate local level data (e.g. being able to cross-correlate workforce and human resources data with clinical and/or financial data).
- *Analytics support for integrated models of care*: projects that develop and implement analytics tools and/or technologies to better support integrated care. For example, current systems do not adequately support the patient journey data capture required to provide analytics support across integrated models of care.
- *Innovative partnerships*: projects that support NSW Health organisations to partner with third parties to develop innovative analytics tools, data visualisation, technologies and services tailored to the NSW Health context to maximise impact and benefits (e.g. Cerner ‘Lights On Network’ monitoring of EMR use, partnering with universities, research institutes or technology companies).
- *Workforce management and planning*: projects that enable NSW Health to more efficiently manage its current workforce, including resource allocation and recruitment, and to better plan for future workforce requirements.

A mechanism for identifying, funding and implementing innovative projects is described further in Section 4 and detailed in Appendix A.

4 Foundational drivers for analytics in NSW Health



4.1 Five capabilities drive analytics use and implementation

Five broad capability areas have been identified which set the foundation for the use of analytics in the NSW health system and will drive implementation of the framework. This section is structured according to each specific area of analytics capability. It provides a description of the desired future state of each capability area and priority actions to achieve the future state. The implementation driver underpinning each priority action is identified, as well as the stakeholder with responsibility for implementing it and the suggested timeframe for implementation. The suggested timeframes for implementation are either:

- short term: urgent implementation beginning within 12 months.
- medium term: progressive implementation beginning in 12 months to two years.
- long term: implementation beginning in two to three years.

Further detail on the roles and responsibilities of organisations within NSW Health are provided in the analytics operating model (see Appendix B).

4.1.1 Defined and coordinated governance structures

Future state


<p style="text-align: center;">Governance structures</p>	<p>A strategic, coordinated approach to analytics governance across the NSW health system including:</p> <ul style="list-style-type: none"> • A mechanism for driving enhanced use of analytics at a state-wide level and to address key system-wide issues (e.g. data sharing, interoperability of tools and technologies). The central mechanism provides the tools and technologies for NSW Health organisations and LHDs/SHNs, but does not mandate how they are implemented at a local level. • Clearly defined and communicated governance structures which support coordination, optimisation and collaboration of existing data, data streams and analytics functions. • Enterprise information management that respects individual privacy and security requirements, and promotes ethical consent and data retention policies.
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
<p>G.1. Establish a NSW Health Analytics Steering Committee and associated working groups with responsibility for analytics governance. The Steering Committee should have responsibility for analytics governance at a strategic, state-wide level, drive implementation of the Framework and identify current and emerging policy areas that analytics could help address.</p> <p>Specific working groups should have responsibility for supporting implementation of the Framework through addressing specific issues. Each working group should have a clearly defined purpose, work plan and timeframe. Suggested working groups include:</p> <ul style="list-style-type: none"> • Senior data managers (and custodians) working group • Data access and use working group • MOH analytics working group. 	Embed	MOH	Short term (immediate)
<p>G.2. Develop local level strategies to translate the Framework into implementable, locally relevant actions that enable analytics in LHDs and SHNs. These may be at a single LHD level or across multiple LHDs.</p>	Accelerate	LHDs/SHNs	Short term
<p>G.3. Develop a framework that outlines a standard approach for developing partnerships between NSW Health, NSW government clusters, other jurisdictions, the Commonwealth and researchers to support the ethics approval process. The Framework should articulate streamlined ethics approval processes and procedures.</p>	Innovate	OHMR	Medium term

4.1.2 Skilled and capable workforce

Future state


<p>Workforce</p> 	<ul style="list-style-type: none"> • Relevant NSW Health clinical and non-clinical staff have a foundation level of data literacy: <ul style="list-style-type: none"> • They can carry out basic interpretation of data (e.g. assess its strengths and weaknesses of data assets, in the context of service delivery). • They have a minimum capability level to generate and interpret the specific reports that are required to make evidence-based decisions (e.g. policy, planning or clinical decisions). • Information is available on where NSW Health staff can access specialist analytics support (both internal and external to the NSW health system). • The NSW health system has targeted internal specialist capabilities in data analysis and analytics, biostatistics and epidemiology (e.g. to undertake agile benchmarking and modelling). This includes specialist expertise within policy areas of relevant organisations/agencies. There are clearly defined pathways for staff to access these specialist capabilities. • Specialist staff members across the NSW health system have the technical expertise to interpret data and use analytics, but also a strong understanding of the clinical, operational, or community context (i.e. the ability to analyse data streams, interpret it within the relevant clinical context, produce meaningful reports, and effectively communicate insights to clinicians to enable them to make decisions about their clinical practice).
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
W.1. Develop a partnership to support development and delivery of foundational-level analytics training to the NSW Health workforce.	Embed	HETI, Analytics Steering Committee	Short term
W.2. Showcase contemporary data visualisation products and tools, and highlight where particular types of analytics expertise exist across the state, and how NSW Health staff can access this expertise.	Embed	MOH, Centre for Epidemiology and Evidence	Short term
W.3. Explore emerging workforce needs and identify new capabilities required to support implementation of the Framework centrally and at the LHD/SHN level, including expanding any existing training programs (e.g. biostatistics).	Accelerate	HETI, Workforce Planning and Development	Short term
W.4. Identify and support individual staff members with analytics expertise and embed them within and across each LHD/SHN to drive the uptake of analytics.	Innovate	LHD/SHNs	Short term
W.5. Build stronger, strategic partnerships and networks to meet priority epidemiology and bio-statistics training and workforce needs.	Embed	MOH, Centre for Epidemiology and Evidence	Short term
W.6. Design and implement an innovative workforce project for beginning to think about new workforce models, in areas such as allied health.	Innovate	Workforce Planning and Development	Medium term
W.7. Work with the relevant stakeholders in the health professional education and training sector (tertiary sector and postgraduate) and accreditation authorities to strengthen relevant units on data literacy and health informatics in the curriculum.	Accelerate	MOH, Workforce Planning and Development, Office of Nursing & Midwifery	Long term

4.1.3 Supportive culture and effective engagement

Future state


<p>Culture and engagement</p> 	<ul style="list-style-type: none"> • NSW Health staff, including clinicians, are engaged with data, understand the context of relevant data sets and recognise the benefits of using decision support analytics to think critically about their practice. This includes using fit-for-purpose reports to make evidence-based decisions. • Management and Executive-level staff across NSW Health encourage a culture of openness, data sharing and collaboration that respects principles of data privacy and security. • Change management strategies at all levels of the system are in place to support staff to adopt new data systems, tools and technologies to make evidence-based decisions. • Defined mechanisms are in place for sharing success stories or examples of leading practice in analytics use across the NSW health system (e.g. to demonstrate benefits, share innovative ideas).
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
E.1. Publicise the Framework and the new analytics governance arrangements broadly within NSW Health and with relevant external stakeholders to build a shared understanding of the purpose, goals and specific initiatives. This should include development of a public website that provides information on the Framework, including analytics governance, data governance and other relevant news, events and key contacts.	Accelerate	Analytics Steering Committee	Short term
E.2. Continue to engage with external stakeholders, including universities and other research bodies to leverage their specific skill sets and capabilities to enhance the use of analytics in NSW Health and build capability within the system (e.g. engaging with data scientists and clinician researchers that can perform cleaning and analysis of health data).	Embed	MOH, OHMR	Short term
E.3. Build a change management approach into local-level analytics strategies to engage NSW Health clinicians, managers/directors, other health professionals and other administrative staff. The change management approach should include identification of clinical champions who will help drive the use of analytics to support better informed decision-making within their organisation and across the health system.	Embed	LHDs/SHNs Pillars CEC	Medium term
E.4. Better engage with primary health practitioners, other state government departments and Commonwealth government departments to a) communicate relevant initiatives across organisations and sectors and b) support a coordinated approach to the collection and use of relevant health or other data (e.g. social services data).	Accelerate	MOH, Strategy and Resources	Medium term
E.5. Build a culture of enquiry by encouraging early to mid-career academic and clinician researchers to better use NSW Health data in their research. This includes connecting researchers, clinician researchers and clinicians working across different research areas to support collaboration and knowledge sharing.	Innovate	MOH, OHMR	Medium term
E.6. Establish 'Transform Analytics', an initiative that enables NSW Health staff to pitch innovative ideas on opportunities to improve the use of analytics within the health system. It should have a number of defined streams (e.g. consumer and community engagement, population health, service planning and workforce planning). Appendix A provides detailed information on the suggested purpose and operating model.	Innovate	Analytics Steering Committee	Medium term

4.1.4 Appropriate analytics tools, technologies and services

Future state


<p style="margin: 0;">Analytics tools and technologies</p> 	<ul style="list-style-type: none"> ◦ Appropriate NSW Health staff are equipped with user friendly, fit-for-purpose analytics tools to be able to exploit large, complex data streams to improve patient and population outcomes. They are able to be used by relatively non-skilled users. ◦ Analytics tools and technology platforms are implemented systematically at a system-wide, LHD/SHN, organisation, agency or health care facility level. ◦ Analytics tools and technologies have the capability to leverage new data and analytics developments such as big data, data mining and machine learning. ◦ Analytics tools and technologies support integrated care: <ul style="list-style-type: none"> ◦ Technology platforms are interoperable across health services, jurisdictions, sectors and levels of government (particularly given the move towards integrated care and open data). ◦ Analytics tools utilise robust, linked data streams that link data from across the health system (e.g. acute, primary and secondary care data, quantitative and qualitative data) with relevant Commonwealth data streams, and other NSW initiatives. ◦ Analytics tools and technology platforms make use of timely data (including real-time data where possible or appropriate).
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
T.1. Develop a more strategic approach to procuring analytics infrastructure, tools and technologies to ensure coordination and consistency (where appropriate) across the health system.	Embed	Analytics Steering Committee	Short term
T.2. Develop a mechanism for identifying emerging analytics tools and technologies and/or innovative uses of them to better address NSW Health strategic priority areas and inform service planning.	Innovate	eHealth NSW	Short term
T.3. Investigate scalability of analytics projects in NSW Health that currently demonstrate high-value, to assess their applicability across other LHDs/SHNs, organisations or facilities, including their alignment to the NSW Health Enterprise Architecture.	Accelerate	eHealth NSW LHDs/SHNs	Short term
T.4. Provide flexible analytics, epidemiology and high-level bio-statistical support.	Accelerate	MOH, Centre for Epidemiology and Evidence	Short term
T.5. Further develop tools that have the functionality for LHDs/SHNs to compare their health services and outcomes against state-wide data and/or relevant leading practice systems, services and programs.	Accelerate	MOH, HSIPR, HSPI LHDs/SHNs	Medium term
T.6. Further develop a data brokerage and analytics service model for priority projects using data linkage.	Accelerate	Analytics Steering Committee	Medium term

4.1.5 Streamlined processes, protocols and guidelines

Future state

<p>Processes, protocols and guidelines</p> 	<ul style="list-style-type: none"> Processes, protocols and guidelines for accessing and sharing data are streamlined and standardised (i.e. for accessing and sharing data within and between NSW Health organisations/agencies, LHDs/SHNs, and other sectors and jurisdictions). There is clarity on legal, ethical and privacy issues for NSW Health stakeholders. Data standards and definitions are consistent across NSW Health to allow comparability across data streams and jurisdictions and reduce siloed approaches. Processes are in place to categorise data according to its potential risk, which in turn defines the level of access restriction (i.e. 'low risk' data is broadly available across the system, 'high risk' data has more restrictions and is accessed through data custodians) to maintain privacy and security.
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Priority actions


Priority action	Implementation driver	Lead responsibility	Timeframe
P.1. Develop protocols and guidelines for data sharing, access and use, for the purposes of policy, planning, health service management and evaluation, internally and externally.	Embed	Data access and use working group	Short term
P.2. Establish streamlined processes to facilitate more timely and simplified access to linked data sets in NSW Health.	Embed	Data access and use working group	Short term
P.3. Develop standard requirements for ethics approval and a streamlined approach for obtaining ethics approval. The requirements should clearly articulate the circumstances in which ethics approval is required. The requirements and approach should be widely communicated across NSW Health and to relevant external stakeholders (e.g. researchers, other government departments).	Embed	MOH, OHMR	Medium term

4.2 Foundational enablers underpin analytics delivery

Four foundational enablers support the successful delivery and use of analytics across the NSW health system. While not the focus of the Framework, these elements underpin its successful implementation and support eHealth initiatives more broadly. The priority actions for these foundational enablers in relation to analytics are identified and outlined in this section. Many of these are expected to be addressed in the implementation of the eHealth Strategy for NSW Health.

4.2.1 High quality, relevant data sources

Future state


<p>Data sources</p> 	<ul style="list-style-type: none"> Staff across the health system are aware of data that is available and how to access data securely. Data created outside the health system is relevant to and useful for the health system. It can be used to provide benefits within the health system (e.g. data created in the social services sector could provide benefits when combined with data in the health sector). This could include point of entry data quality validations and smart logic to reduce burden on clinicians when entering information.
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
S.1. Develop consistent data and metadata standards and definitions for use across NSW Health. The standards should be developed through a consultative process to ensure they are relevant and applicable to all NSW Health stakeholders and, where necessary, align with external parties (e.g. DAC, other state and federal government agencies, private sector). The data and metadata definitions and standards should be widely communicated across the system.	Embed	MOH, HSIPR Senior Data Managers working group	Medium term
S.2. Identify and drive improvement in the use of data quality tools at source to prevent data errors.	Embed	eHealth NSW	Short term
S.3. Replace the Health Information Resources Directory (HIRD) to improve the functionality of the system and the accessibility of data standardisation information and key performance indicator definitions.	Embed	MOH, HSIPR eHealth NSW	Medium term

4.2.2 Efficient data capture

Future state


<p>Data capture</p> 	<ul style="list-style-type: none"> Data collection processes are efficient (e.g. data and/or information is collected once (where appropriate) by a single system, but can be used for multiple purposes). Data assets include the raw data and relevant contextual information such as metadata and update frequency Data capture mechanisms are able to capture and aggregate data created in varying formats/different types of data (e.g. unstructured and structured data). Data capture, storage and management capabilities are adequate and support the increasing amounts of data being generated.
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
C.1. Accelerate the transition to EDWARD and decommissioning of HIE to drive improvements in data quality and standardisation; provide flexibility to expand data collections and the ability to capture new data formats; develop patient journey analysis (including utilisation of the EUID to link patient records across care settings), and realise operational efficiencies.	Accelerate	MOH, HSIPR eHealth NSW	Short term
C.2. Streamline access to data through implementation of automated workflows/approvals and enabling appropriate delegations based on the decisions of each Data Custodian.	Embed	MOH, HSIPR eHealth NSW	Long term

4.2.3 Appropriate ICT infrastructure and platforms

Future state

ICT infrastructure and platforms 	<ul style="list-style-type: none"> NSW Health has a coordinated and strategic approach to investment in information technology architecture. Data assets are up-to-date and reliable. There is a coordinated approach to the replacement of aging data assets and scheduled upgrade of current data assets (particularly key NSW Health data repositories, such as Health Information Exchange (HIE) and SAPHaRI). Health ICT infrastructure is linked and interoperable across jurisdictions, organisations and facilities. Additional technology capabilities and data tools (and/or upgrading of existing ones) are provided where necessary to support consistency across NSW Health. Health ICT infrastructure provides the ability to track the ‘patient journey’ across the system and patient outcome measures. A unique patient identifier links data across sources (e.g. across primary and secondary sources, across jurisdictions, across services). Clinical, operational and population-level data are linked (particularly at the local level).
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
I.1. Develop and implement the eHealth Strategy for NSW Health and NSW eHealth Enterprise Architecture framework, in alignment with the NSW Government Enterprise Architecture Framework	Embed	eHealth NSW	Short term
I.2. Identify current and upcoming projects and programs that are used to support analytics delivery and either complete implementation or state-wide roll-out or explore opportunities to broaden their usage.	Embed	eHealth NSW	Short term
I.3. Develop a NSW Health Information Management Strategy, in alignment with the NSW Health Data Governance Framework and the NSW Government Information Management Strategy	Embed	eHealth NSW	Short term

Priority action	Implementation driver	Lead responsibility	Timeframe
I.4. Develop appropriate mechanisms that enable the MOH to maintain a current view of what infrastructure, tools and technologies are in use across the health system (e.g. systems or integration map).	Accelerate	MOH, HSPI eHealth NSW	Medium term

4.2.4 Strategic data governance

Future state

	<ul style="list-style-type: none"> • Roles, responsibilities and accountabilities for data governance across NSW Health are clearly defined and communicated. • Data governance structures support coordination, optimisation and collaboration around data assets. • Data sponsors and data custodians manage data across NSW Health, and monitor and communicate where different data streams are stored, what data is available and how to access data. • Data is mapped to a common information model, with the mapping process clearly defined for each data domain.
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Priority actions

Priority action	Implementation driver	Lead responsibility	Timeframe
D.1. Develop a Data Governance Framework for NSW Health, in alignment with the NSW Health Information Management Strategy, NSW Government Information Management Strategy and the NSW Government Open Data Policy.	Embed	MOH, HSIPR	Short term
<p>D.2. Identify appropriate data custodians at various levels across NSW Health who will have overall responsibility for managing specific data sets. The data custodians should have responsibility for:</p> <ul style="list-style-type: none"> ◦ working with relevant decision-makers to assign the level of risk associated with the data ◦ establishing and maintaining an agreed level of protection for the data ◦ managing access to the data sets within their mandate and ensuring access and release of data is appropriate ◦ ensuring data use aligns with the reasons for which it was collected ◦ ensuring collected data remains relevant to system and business needs ◦ monitoring data quality and ensuring completeness of data. <p>The role and mechanisms for interacting with data custodians should be widely communicated across NSW Health.</p>	Embed	Senior data managers (and custodians) working group	Short term

5 Monitoring and evaluation of implementation

The NSW Health Analytics Steering Committee will coordinate the monitoring of implementation and the achievement of the outcomes that are outlined in the NSW Health Analytics Framework, supported by the Ministry of Health. It will have responsibility for monitoring and reporting progress against priority actions and releasing a short, annual 'State of Analytics in NSW Health' report on overall progress against the NSW Health Analytics Framework.

An independent summative evaluation against overall progress and outcomes against the vision and actions outlined in Framework will be conducted in 2020, reporting to the Steering Committee and made available to stakeholders across the system.

It is recognised that the needs of the health system and the analytics requirements and capabilities of the future are based on the issues that are facing (or expected to face) NSW and health services today. There will always be unknowns that will potentially impact on these needs as well as new technologies, applications and analytical techniques that will emerge over time. The NSW Health Analytics Framework is not intended to be a static document. As time goes on and as strategies are implemented and more information and research is undertaken, the strategies may shift and change. The Framework will be reviewed annually and updated by the NSW Health Analytics Steering Committee to ensure that the direction is remains appropriate and that the strategies and actions remain relevant and necessary.

Appendix A *Transform Analytics*: generating innovative projects in NSW Health

The following details the purpose and suggested operating model for *Transform Analytics*. *Transform Analytics* is the suggested mechanism for NSW Health to encourage and support the development and implementation of innovative analytics projects. Designing and implementing *Transform Analytics* is a priority action under the culture and engagement capability area (Section 4).

Purpose

The purpose of *Transform Analytics* is to encourage NSW Health staff to incorporate innovative uses of analytics tools, technologies and services to enhance clinical and operational decision making processes.

Suggested operating model

Transform Analytics is a suggested initiative which provides a mechanism through which NSW Health staff (and possibly external stakeholders) can pitch innovative ideas for using analytics to improve current NSW Health decision making processes and service delivery. They will be encouraged to explore how innovative analytics tools, technologies and services could be used to enhance the quality of clinical care, decision-making, service delivery, system efficiency and health outcomes.

Each round of *Transform Analytics* should call for projects that have a common focus on defined priority areas. Focussing on and funding projects with similar objectives will accelerate NSW Health's efforts to enhance analytics in defined priority areas. Suggested priority areas for *Transform Analytics* include:

- Consumer and community engagement
- Linked data (both across health data sets and with relevant external data sets)
- Integrated care
- Quality and safety
- Health specialties (e.g. palliative care, mental health)
- Service planning
- Indigenous health
- Disease prevention
- Service access and patient flow
- Workforce management and planning.

The proposed process of submission and selection is:

1. NSW Health staff submit their projects that aim to enhance analytics use and update related to priority area for that round
2. The panel of judges (convened by the governing body) shortlists a small selection of projects
3. NSW Health staff pitch their shortlisted projects at the bi-annual meetings/conferences to a panel of judges

4. The selection panel selects one or more 'winning' projects based on an assessment against defined criteria
5. The 'winning' projects receive a set amount of funding, as well as ongoing support and mentoring.

Transform Analytics should run bi-annually, with two rounds in each calendar or financial year.

Governance

Transform Analytics should be governed and coordinated as directed by the NSW Health Analytics Steering Committee. This leading body will have responsibility for:

- sourcing a reliable and ongoing funding mechanism
- establishing the internal foundational policies and processes, such as confirming the governance and funding arrangements, the level of funding allocated to each round, the eligibility criteria for submitted projects, the criteria used to assess projects, etc.
- developing and disseminating guidelines to NSW Health staff that outline how *Transform Analytics* operates, including eligibility for submitting projects, how staff can submit their projects, the priority areas of focus for each round, selection criteria and timing of each round.
- establishing a website that provides basic information on *Transform Analytics*, detailed information on the application process and an online portal for staff to submit their ideas.
- establishing a feedback mechanism to ensure continual refinement of and improvement in how *Transform Analytics* operates
- widely publishing *Transform Analytics* across the NSW Health system
- encouraging NSW Health staff to submit their ideas for innovative uses of analytics
- coordinating and facilitating the bi-annual *Transform Analytics* meetings/conferences where shortlisted projects are pitched and winning projects are selected by the selection panel.
- convening the selection panel that shortlists projects and selects the winning projects based on an agreed set of criteria.

Transform Analytics should also be closely linked with the ACI Innovation Exchange and 'the Pitch' in Sydney LHD, as well as other mechanisms that foster and share innovation in analytics in the NSW health system.

Appendix B Analytics operating model (roles and responsibilities)

The operating model is a networked arrangement for analytics delivery, representing the complex and inter-connected nature of the NSW health system

The NSW health system (and therefore NSW Health) is a complex and highly inter-connected network of organisations, systems, processes and people, across a large geographical footprint. This has an impact on the roles and responsibilities in health service delivery, including analytics delivery. Additionally, governance arrangements enable service delivery to be locally-led, enabling consistency across the system but local innovation and implementation.

These factors mean the operating model for analytics, which mirrors the operating model for broader health and support services, has shared responsibilities in many areas. Many roles and responsibilities are shared between stakeholders, or require input and collaboration across multiple parts of the system. It represents a 'networked arrangement' in the delivery and use of analytics.

A number of principles underpin the operating model for the delivery of health analytics

The operating model outlines the roles and responsibilities of different stakeholders across the health system play in the delivery of analytics. The model is designed to deliver on the foundational drivers in the Framework. In particular, the operating model:

- Allows for devolved responsibility and locally-led analytics delivery. This means roles and responsibilities have components that are delivered centrally and other components that are delivered locally. For example, the definition of core, foundational technology systems is performed centrally, but is flexible enough to adapt what is used and implemented at a local level.
- Utilises existing structures (where available) in place to support the delivery of analytics. The model mirrors and leverages current governance arrangements, organisational roles and other elements for consistency between analytics and other service delivery.
- Builds upon existing strengths and capabilities in parts of the system. NSW Health has already made significant investment in technology, eHealth and analytics development, and has developed foundational capability in basic analytics as well as pockets of expertise in certain areas. The operating model expands on these strengths.

The operating model defines the roles and responsibilities of key stakeholders across the NSW health system

The operating model outlines the key roles and responsibilities of different stakeholder groups in the health system to deliver on the Analytics Framework. It provides a high level overview of the operating model, with the key roles and responsibilities for different stakeholder groups in both the delivery (i.e. to allow analytics to happen within the organisation or across the system) and use (in making organisational decisions) of analytics.

Figure 6 below outlines the main roles and responsibilities in analytics delivery and use of key stakeholders within the NSW health system.

Figure 6: Detailed NSW Health Analytics Operating model

Stakeholder	Branch/Organisation (if relevant)	Roles and responsibilities	
		In the delivery of analytics	In the use of analytics
Consumers	-	<ul style="list-style-type: none"> Provide consent for personal data to be housed securely in health data warehouses and systems, and to be interrogated at the appropriate level 	<ul style="list-style-type: none"> Access and interrogate select personal and public datasets, where available for release
NSW Ministry of Health	Population and Public Health Division - Centre for Epidemiology & Evidence	<ul style="list-style-type: none"> Develop and support population health information infrastructure and data management of SAPHaRI Facilitate access and data linkage for internal and external stakeholders seeking linkage of external data with NSW Health data sources for research and policy (CHeReL) Facilitate the translation of research evidence and information into policy and practice Provide specialist professional training programs in epidemiology and applied biostatistics Provide shared core analytics capability and support to smaller LHDs/SHNs where they do not have this capability 	<ul style="list-style-type: none"> Monitor and report on the health of the population via Health Statistics NSW, the NSW Population Health Survey, and syndromic surveillance of Emergency Departments Undertake complex, statistical analysis and modelling in the field of prevention Evaluate the effectiveness of population health interventions Develop the epidemiology and bio-statistical workforce (move from the 'delivery' column) Deliver and enhance the population health data warehouse to support analytics across NSW Health
	Governance, Workforce and Corporate - Workforce Planning and Development	<ul style="list-style-type: none"> Identify analytics capabilities required now and into the future for the health workforce Expand the provision of specialist analytics training and other capability development to support the health workforce in the understanding and use of analytics 	<ul style="list-style-type: none"> Undertake workforce analytic functions for NSW Health workforce Evaluate the effectiveness of workforce strategies
	Governance, Workforce and Corporate – Legal and Regulatory Services	<ul style="list-style-type: none"> Provide guidance on ethics, legal and privacy principles in the delivery and use of analytics across the system Provide legal input on information management governance policies, specifically around appropriate data ownership and use 	<ul style="list-style-type: none"> Utilise analytics for reporting and performance measurement
	Strategy and Resources Division – Government Relations	<ul style="list-style-type: none"> Manage relationships with government (state and federal) and engage and collaborate with other jurisdictions on analytics and data linkages 	<ul style="list-style-type: none"> Analyse evidence (from relevant parts of the system) to provide quality advice to government

Stakeholder	Branch/Organisation (if relevant)	Roles and responsibilities	
	ABF Taskforce	<ul style="list-style-type: none"> • Maintain and collate essential data elements required to enable the successful implementation of ABF in NSW. Maintain a central role of casemix expertise • Maintain the Activity Based Management Portal (ABM) – analytical casemix database bringing costs and activity data together 	<ul style="list-style-type: none"> • Identify efficiencies and volumes of core health service activity that underpins funding models
	Strategy and Resources Division - Health System Planning and Investment	<ul style="list-style-type: none"> • Manage Planning tools including Flow info, Acute Inpatient Modelling tool (aIM), Subacute Inpatient Modelling tool (SiAM) • Drive consumer engagement and feedback in the access, use and benefits of health analytics in collaboration with LHDs/SHNs 	<ul style="list-style-type: none"> • Undertake analytics to inform service, strategic and capital planning
	System Purchasing and Performance Division - System Relationships	<ul style="list-style-type: none"> • Coordinate communication and collaboration between pockets of excellence, innovation and expertise across the system, in collaboration with ACI and CEC 	<ul style="list-style-type: none"> • Utilise analytics for reporting and performance measurement

Stakeholder	Branch/Organisation (if relevant)	Roles and responsibilities	
	<p>System Purchasing and Performance Division - Health System Information and Performance Reporting</p>	<ul style="list-style-type: none"> • Provide consistent data definitions, standards, policies and procedures across the system, in consultation with LHDs, SHNs and Pillars • Manage key system-wide data warehouses - the Health Information Exchange (HIE) and the Enterprise Data Warehouse (EDWARD) as well as supporting data repositories such as database of organisational entities (HERO) • Facilitate and coordinate system wide Data Governance processes, including a range of LHD data coordinator forums • Provide a specialised Metadata management function for the system, including the maintenance of state-wide metadata repository (HIRD) and a KPI Dictionary • Manage the state-wide data quality framework, including a program of routine external data quality audits • Develop and maintain the activity purchasing model for NSW Health and provide analytical support for LHD Service Agreement development and negotiations • Manage business implementation of the Enterprise Data Warehouse for Analysis Reporting and Decision-making (EDWARD) • Represent NSW Health in the national data governance structures and processes 	<ul style="list-style-type: none"> • Provide standard quarterly, six monthly and annual data submissions to relevant national agencies to ensure NSW Health's compliance with the National Health Information Agreement and other relevant national data frameworks. • Produce weekly, monthly and annual performance reports at State, LHD and facility levels to support optimal functioning of NSW Health's Performance Framework. • Produce benchmarking reports and comparative analytics on the performance of NSW public hospitals and LHDs. • Provide customised analytical support for projects and initiatives led by other Branches and Pillars as required. • Provide a wide range of ad hoc analytical services and special reports in support of the Minister's Office, Parliamentary process, media enquiries and other external users of data.

Stakeholder	Branch/Organisation (if relevant)	Roles and responsibilities	
eHealth NSW	-	<ul style="list-style-type: none"> • Manage and provide secretariat support to the NSW Health Analytics Steering Committee, with ownership of the Analytics Framework • Provide high-level oversight and strategic planning for system-wide investment in analytics, including reporting against and refining the Analytics Framework • Delivery and maintenance of analytics foundational enablers (data sources, data capture, ICT infrastructure and platforms and data governance) • Identify new and innovative tools and technology platforms in analytics delivery and consider which to adopt in consultation with LHDs/SHNs, Pillars and other parts of the system • Provide technical support and maintenance for Health Information Exchange (HIE) and Enterprise Data Warehouse (EDWARD) and enabling tools and technology for analytics functionality (e.g. Business Intelligence tools, SAPHaRI, CHeReL) • Facilitate systems integration and data linkages across the health system 	<ul style="list-style-type: none"> • Utilise analytics to evaluate the efficiency and effectiveness of eHealth services and drive performance and quality improvement

Stakeholder	Branch/Organisation (if relevant)	Roles and responsibilities	
LHDs / SHNs	-	<ul style="list-style-type: none"> • Manage and monitor the routine capture and collection of clinical data (patient level transactions and clinical observation), administrative data (financial, workforce and facilities data) and appropriate population-level data (demographic and socio-economic data) within respective LHDs/SHNs • Provide input to the Ministry on data definitions, standards, policies and procedures for use across the system • Expand the provision of specialist analytics training to conduct and support in-depth analysis of local priorities • Utilise new and existing communities of practice to share leading analytics practice • Provide on-the-ground data analytics support for clinicians to enable analytics use for health decision making and performance reporting • Encourage and enable consumer engagement and feedback in the access, use and benefits of health analytics • Develop local partnerships with the research community and industry partners 	<ul style="list-style-type: none"> • Undertake analysis of local-level data and information to support reporting and informs operational and strategic decision making to improve the quality, efficiency and effectiveness of health services • Provide regular operational and administrative reports for local-level stakeholders (e.g. for clinicians, specific facilities, Boards) and broader NSW Health stakeholders (e.g. MOH, BHI). This includes reporting on key indicators, such as Key Performance Indicators (which are informed by input indicators, process indicators, output indicators, quality indicators, and outcome indicators).





Stakeholder	Branch/Organisation (if relevant)	Roles and responsibilities	
Pillars	Agency for Clinical Innovation	<ul style="list-style-type: none"> • Provide input to the Ministry on data definitions, standards, policies and procedures for use across the system • Coordinate communication and collaboration between pockets of excellence, innovation and expertise across the system • Utilise new and existing communities of practice to share leading analytics practice 	<ul style="list-style-type: none"> • Review clinical variation data and support clinical networks in clinical guideline/pathway development with encouragement toward standardised clinical approaches based on best evidence. • Economic analysis and evaluation to inform the decision making process associated with developing options for models of care, assists in deciding whether a project should be implemented, improves resource allocation, and supports the prioritisation of projects within the ACI • Conduct data and statistical analysis using a wide range of clinical, epidemiological, costing, and other relevant data to support Model of Care development, implementation, resourcing and evaluation. • Undertake analysis of local-level data and information to support reporting and informs operational and strategic decision making to improve the quality, efficiency and effectiveness of health services
	Clinical Excellence Commission	<ul style="list-style-type: none"> • Provide input to the Ministry on data definitions, standards, policies and procedures for use across the system • Coordinate communication and collaboration between pockets of excellence, innovation and expertise across the system • Utilise new and existing communities of practice to share leading analytics practice 	<ul style="list-style-type: none"> • Undertake analytics and reporting for quality and safety improvement in health service e.g. to reduce adverse events in public hospitals and support improvements in transparency and review of these events in the health system • Undertake analysis of state-wide data and information to support reporting and inform operational and strategic decision making to improve the quality, efficiency and effectiveness of health services
	Cancer Institute NSW	<ul style="list-style-type: none"> • Provide input to the Ministry on data definitions, standards, policies and procedures for use across the system • Maintain custody of specialist data related to cancer in NSW and manage access for other users of this data 	<ul style="list-style-type: none"> • Undertake analysis of state-wide data and information to support reporting and inform operational and strategic decision making to improve the quality, efficiency and effectiveness of health (cancer) services
	Health Education and Training Institute (HETI)	<ul style="list-style-type: none"> • Identify analytics training needs for the health workforce • Deliver general and specialist analytics training for NSW Health staff 	<ul style="list-style-type: none"> • Utilise analytics for evaluation, performance management and continuous improvement of business activities

Stakeholder	Branch/Organisation (if relevant)	Roles and responsibilities	
	Bureau of Health Information	<ul style="list-style-type: none"> Establish and maintain a website providing information and analysis on the performance of the NSW public health system; including tools for data analysis Provide input to Ministry on data definitions, standards, policies and procedures for use across the system 	<ul style="list-style-type: none"> Prepare and publish regular reports on the performance of the NSW public health system, including the appropriateness, accessibility, effectiveness, efficiency, equity and sustainability of the system Provide an annual report to the Minister and Parliament on the performance of the NSW public health system and benchmarking the performance of NSW with comparable systems Develop reports and tools to enable analysis of the performance of health services, clinical units and clinical teams across the NSW public health system Report quarterly on the performance of NSW public hospitals
	Office of Kids and Families	<ul style="list-style-type: none"> Provide input to Ministry on data definitions, standards, policies and procedures for use across the system Maintain custody of specialist data related to kids and facilities' in NSW and manage access for other users of this data 	<ul style="list-style-type: none"> Undertake analysis of local-level data and information to support reporting and inform operational and strategic decision making to improve the quality, efficiency and effectiveness of health services
HealthShare	-	<ul style="list-style-type: none"> Develop system-wide technology platforms and database solutions (such as EDWARD and EMM) to feed data into analytical applications 	<ul style="list-style-type: none"> Utilise analytics to evaluate the efficiency and effectiveness of services and drive performance and quality improvement
Mental Health and Drug and Alcohol Office (MHDAO)	-	<ul style="list-style-type: none"> Maintain custody of specialist data related to mental health in NSW and manage access for other users of this data 	<ul style="list-style-type: none"> Perform advanced analytical and reporting functions focussed on Mental Health Drug and Alcohol services
NSW Health Pathology		<ul style="list-style-type: none"> Maintain custody of specialist pathology datasets in NSW and manage access for other users of this data 	<ul style="list-style-type: none"> Utilise analytics to build an evidence base around pathology and related issues

Appendix C Development of the Analytics Framework

The Framework has been co-developed through a multi-stage consultative process with stakeholders from across the NSW health system. The data collection activities and stakeholders that provided input into the Framework are summarised in Figure 7 below.

Figure 7: Data collection activities and consultation undertaken in development of the Framework

	 Desktop research	 Key stakeholder consultations	 Discussion Paper and Framework Workshop	 Framework focus groups
Purpose	<ul style="list-style-type: none"> To develop a foundational understanding of how analytics is currently used across NSW Health To identify and leverage lessons from good practice uses of analytics in other jurisdictions 	<ul style="list-style-type: none"> To explore how analytics could be used to better help NSW Health organisations and agencies achieve their objectives To draw out examples of analytics good practice in NSW Health 	<ul style="list-style-type: none"> To provide key findings and insights from initial data collection activities (Discussion Paper) To develop the vision and drivers to deliver enhanced analytics use for NSW Health (Framework Workshop) 	<ul style="list-style-type: none"> To test and refine components of the Framework To further detail governance and innovation mechanisms for analytics To identify current and future disruptive projects for NSW Health
Participants/sources	<ul style="list-style-type: none"> Key NSW Health documentation (provided by NSW MOH) Literature scan on good practice use of analytics in other Australian jurisdictions, Scotland, the United Kingdom and the United States. Interviews/presentations with selected key stakeholders from other jurisdictions (e.g. the Farr Institute, Scotland and Barwon Health, Victoria) 	<ul style="list-style-type: none"> NSW MOH ACI Cancer Institute Clinical Excellence Commission Department of Health (Cwlth) eHealth NSW Targeted medical research institutes HealthShare LHDs DPC NSW Health Pathology NSW Health Senior Data Managers NSW Office of Finance and Services NSW Treasury Population Health Network 	<p>Clinicians, managers, senior executives, academics and researchers from across NSW Health (including MOH, Pillars and LHDs and SHNS) and external organisations including:</p> <ul style="list-style-type: none"> Barwon Health Capital Markets Cooperative Research Centre Dream Collaboration Kinghorn Centre for Clinical Genomics Sax Institute University of NSW University of Sydney 	<p>Six focus groups with representatives from each of the following:</p> <ol style="list-style-type: none"> Clinicians NSW Health Pillars Academics and researchers Primary care practitioners Workforce and training NSW MOH