ADHB Data & Analytics Strategy Executive Summary

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Document Information

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Contributors

Name & Role
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ADHB Directorates (various)

1.0 Strategy Context – ADHB have a comprehensive data & analytics strategy in response to our business needs with good progress across a number of areas

We have adopted the approach of proving value first using existing or trial technologies, and then after qualifying business demand implementing new solutions

Enterprise Data Warehouse

Existing (Legacy)

SQP Business Objects, SQL 2005

Real-time IOC Dashboards

Existing

PowerBI, Azure Analysis Services, SQL Server, HealthCare Logic (POV)

Self-Service Analytics

New Capability !!!

PowerBI, SQL Server

Data Science

Initial Implementation

R, Python on Data Science Server

Clinical Audit / Registries

MVP#1 Solution

Dendrite Clinical Systems

Clinical Research Management

Interim Production Solution

Redcap Database Solution

Clinical Trial Management

Hosted in Azure

Edge Clinical Trial Management & Research

Departmental Databases

Trial Capability (APEX)

Microsoft Access, SQL Server, Oracle APEX

This document describes how ADHB is leveraging data & analytics to deliver to our strategic priorities and in particular digital transformation

ADHB's priorities are aligned to recently announced Health system outcomes:

- **Equity for all New Zealanders** – so everyone can achieve the same outcomes, and have the same access to services and support, regardless of who they are or where they live.

- **Partnership** – through embedding the voice of Māori and other consumers of care into how the system plans and makes decisions, ensuring that Te Tiriti o Waitangi principles are meaningfully upheld.

- **Excellence** – ensuring consistent, high-quality care is available when people need it, and harnessing leadership, innovation and new technologies to the benefit of the whole population.

- **Sustainability** – focusing the health system on prevention and not just treating people when they are unwell – 'wellness not illness' – and ensuring that we use resources to achieve the best value for money.

- **Person and whānau-centred care** – by aiming to empower people to manage their own health and wellbeing and put them in control of the support they receive.

With an IT centric model, we simply cannot ever build the delivery capacity needed to meet total demand, or have the embedded knowledge needed to translate "intelligence into action"

Urgent,
High Variability
Many One-off Insights
Low to Zero cost

| Ad-hoc Data Analysis, experimentation, Research | Operational Analysis | Operational Reporting | Management / Performance Reporting | Strategic / Compliance Reporting | Operationalised Data Science |

Repeatable
Minimal Variability
Higher Cost

70-80% of total demand

20-30% of total demand

"The Analytics Spectrum"

Capacity

cannot meet

Qualified Demand (HIT Requests)

Total Demand

How do we address the gap ?

There are many reasons why an IT centric model cannot meet business needs. The key reasons include:-

1) **Most demand is urgent, requirements change continuously , decisions need to be made urgently** – it is impossible to organise and join data to cover every single scenario.

2) **Business context is required** – This is even harder in the clinical setting where it is impossible for a data team to understand all the nuances of very specific business and clinical processes.

3) **Need to deliver at low to zero cost** – The business never has the budget to scale to their intelligence needs.

4) **Trust** – Self-delivered insights always have a higher level of trust than those delivered by central teams

And most importantly ….

5) **Impossible to organise and join data to cover every single scenario** – we just cannot predict all the combinations and permutations of data need to be joined to meet business demand

Creating a connected patient centric view of data is critical to shifting to improving throughput, reducing wait times and more importantly moving to proactive models of care.

- The public health system is shifting, from a sometimes fragmented health and disability system with a siloed service models, to a more connected and whānau-centric approach (Health and Disablity System Review March 2020).

- Data and analytics are essential to making the community, patient and whānau experience transparent and to informing system redesign and that will also improve performance.
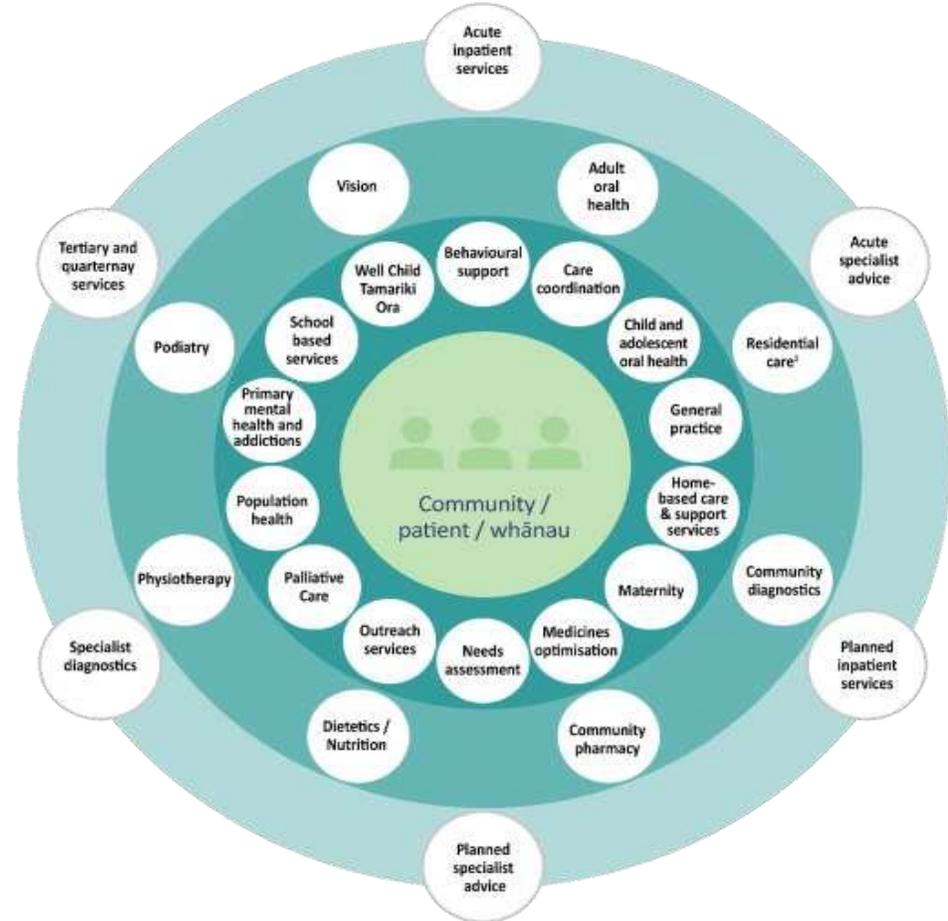
¹ Includes: Aged Residential Care and Disability Residential Care.

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1.4 Strategy Context – Finally, Cloud provides a range of new capabilities we can easily utilise to meet our needs without the need for significant upfront investment

As we transition more capabilities to the cloud, how do we increase the range and reach to deliver more value to our business ?
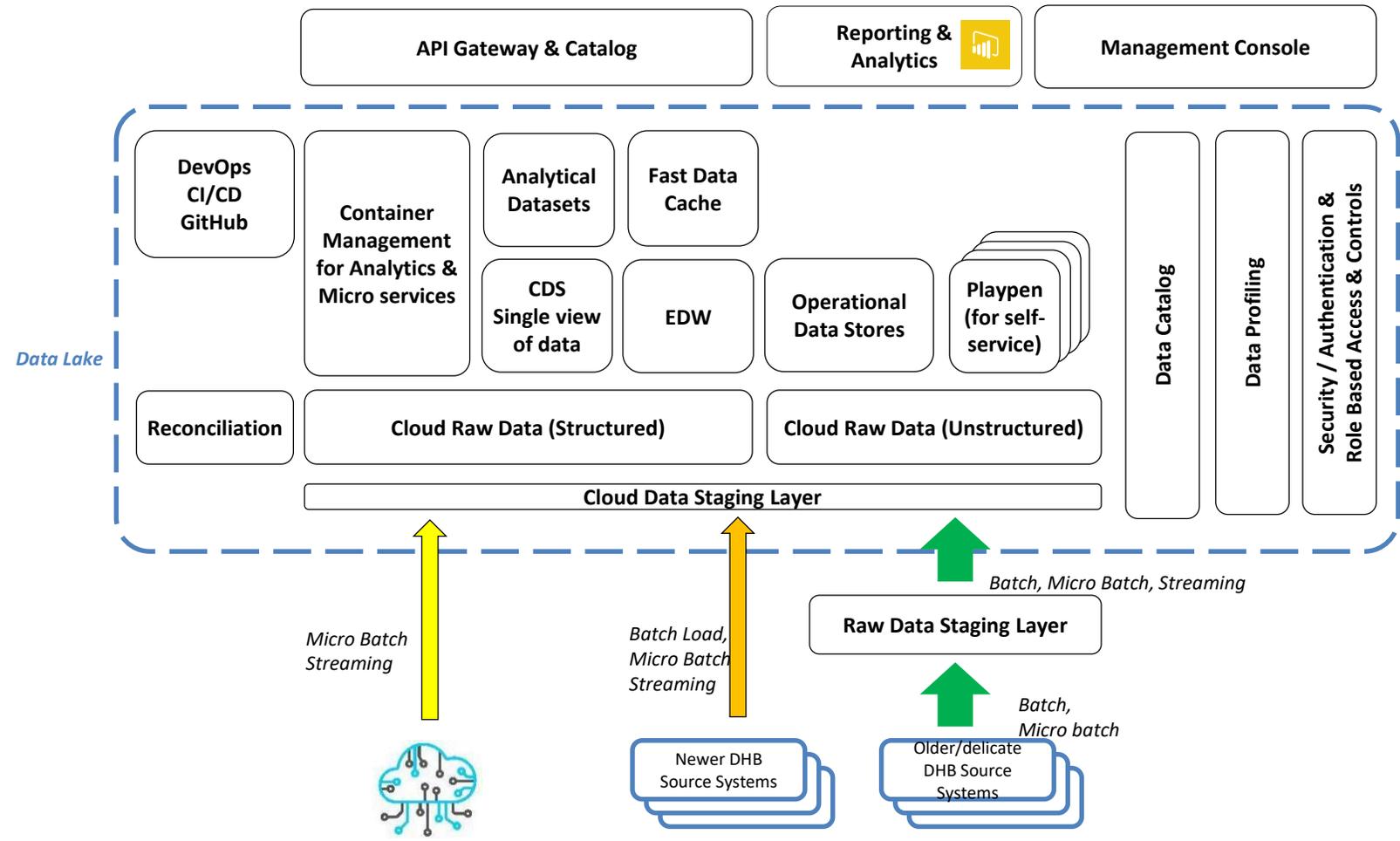
Unleashing our data

- Shift in operating model
- Focussing on value
- Changing our information architecture

2.0 Unleashing our data – "DataOps" is at the center of our new delivery model, with true self-service and automation being key enablers of business value delivery

This approach focuses on building data products, prototyped by (or in collaboration with) the business in safe modern self-service environments, powered by automation and data discovery

Traditional IT Centric BI Delivery Approach		Modern Approach – DataOps
Managing business intelligence projects		Developing data products
Analytics as a demand-driven support function		Analytics as a strategic business function
Proliferation of dashboards and reports		Focus on capabilities and support using a repeatable framework of tools
Hypothesis (questions) are pre-defined	**VS**	Questions are not pre-defined
Timeline is project-driven		Timeline is based on solving business needs
Limited or BI tool driven self-service		Full range of self-service capabilities including pro-typing, ad-hoc querying across multiple data sets
Most processes are overnight batch		Real-time or near real-time data for all data
Digital & analytics are separate		Integrated data delivery for BI, data & digital

Strategic shift from "Building Reports"
To
Delivering "Business Led Intelligence" through data products

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Our data strategy hinges on delivering to the 4 key pillars below through fit for purpose capabilities and accelerated delivery via people, process and technology changes

Data Discovery

- Search for data and reports existing across **ALL** ADHB systems

- Understand what the data means and how it is used

- Interact with regular users of this data to improve understanding

- Understand the quality of the data and its suitability for usage
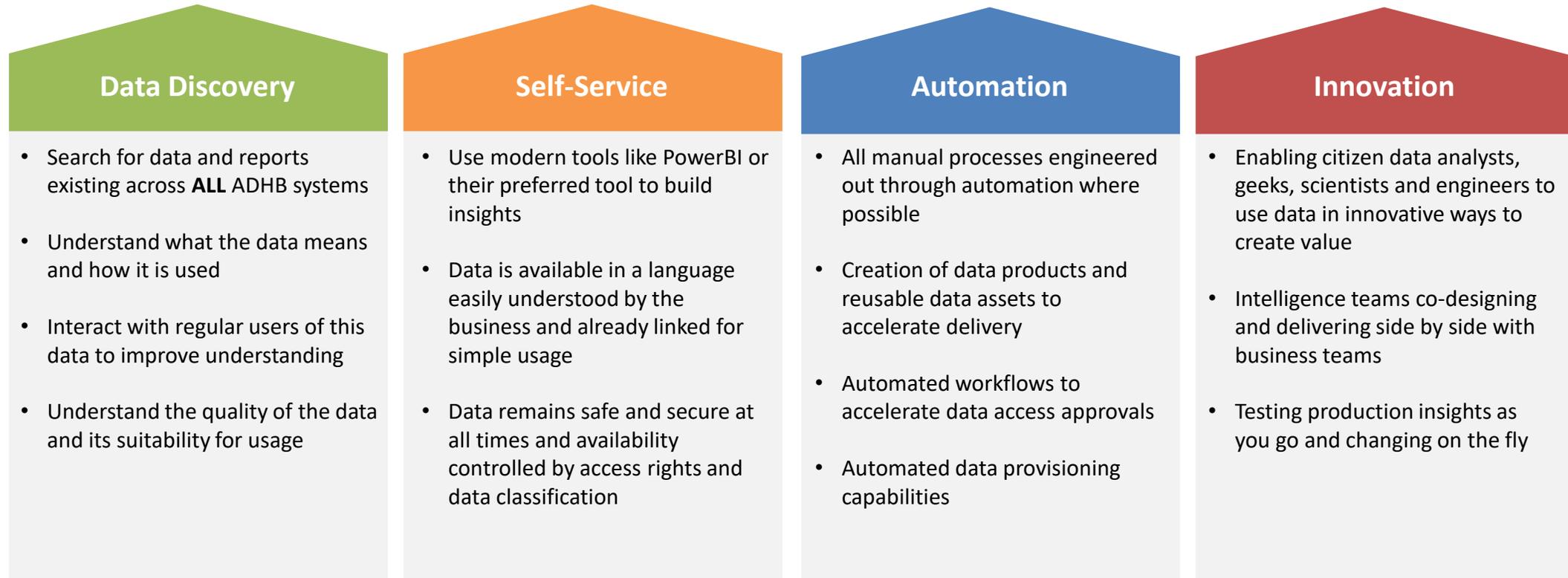
Discover data "within" and "outside" our data platforms

Self-Service

- Use modern tools like PowerBI or their preferred tool to build insights

- Data is available in a language easily understood by the business and already linked for simple usage

- Data remains safe and secure at all times and availability controlled by access rights and data classification

"Experiment and create new value" at low to zero cost

Automation

- All manual processes engineered out through automation where possible

- Creation of data products and reusable data assets to accelerate delivery

- Automated workflows to accelerate data access approvals

- Automated data provisioning capabilities

Reduce the friction and cost of delivering data (new and existing)

Innovation

- Enabling citizen data analysts, geeks, scientists and engineers to use data in innovative ways to create value

- Intelligence teams co-designing and delivering side by side with business teams

- Testing production insights as you go and changing on the fly

Enable our "untapped workforce of thousands" to build sharable, repeatable insights

2.2 Unleashing our data – We have adopted a sustainable product centric approach

We have started at the bottom of the pillar by enabling slices of base data and analytics to deliver immediate value, whilst tactically delivering higher value products as we build our data foundation

DIKW pyramid

Increasing complexity and "System Value"

Increasing velocity of delivery and "Operational Value"

L6 - Strategic Products

L5 - Predictive Products

Level 4 - Performance Products

Level 3 - Single View Products

Level 2 – Business Intelligence, Self-Service Analytics, Data API's

Level 1 - Base Data

Wisdom *driving outcomes through the application of knowledge, information and data e.g.*
- *Data driven clinical care*
- *Patient flow optimisation*

Knowledge understanding what might happen e.g.
- *Predictive Interventions*
- *Recommendation Engines*

Information value added products e.g.
- *Integrated Patient journey (pathways)*
- *Staff journey*
- *Patient record*
- *Integrated patient dashboard*
- *Operations Dashboards*
- *Key Performance Indicators*

Data consolidated source data e.g. Patient, clinician, facility, event, financials

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2.3 Unleashing our data – Our data & analytics strategy is built around understanding our customers and how to create a sustainable eco-system to deliver to their needs

Our customers are not just patients, but also include clinicians, healthcare providers, government as well as the general public
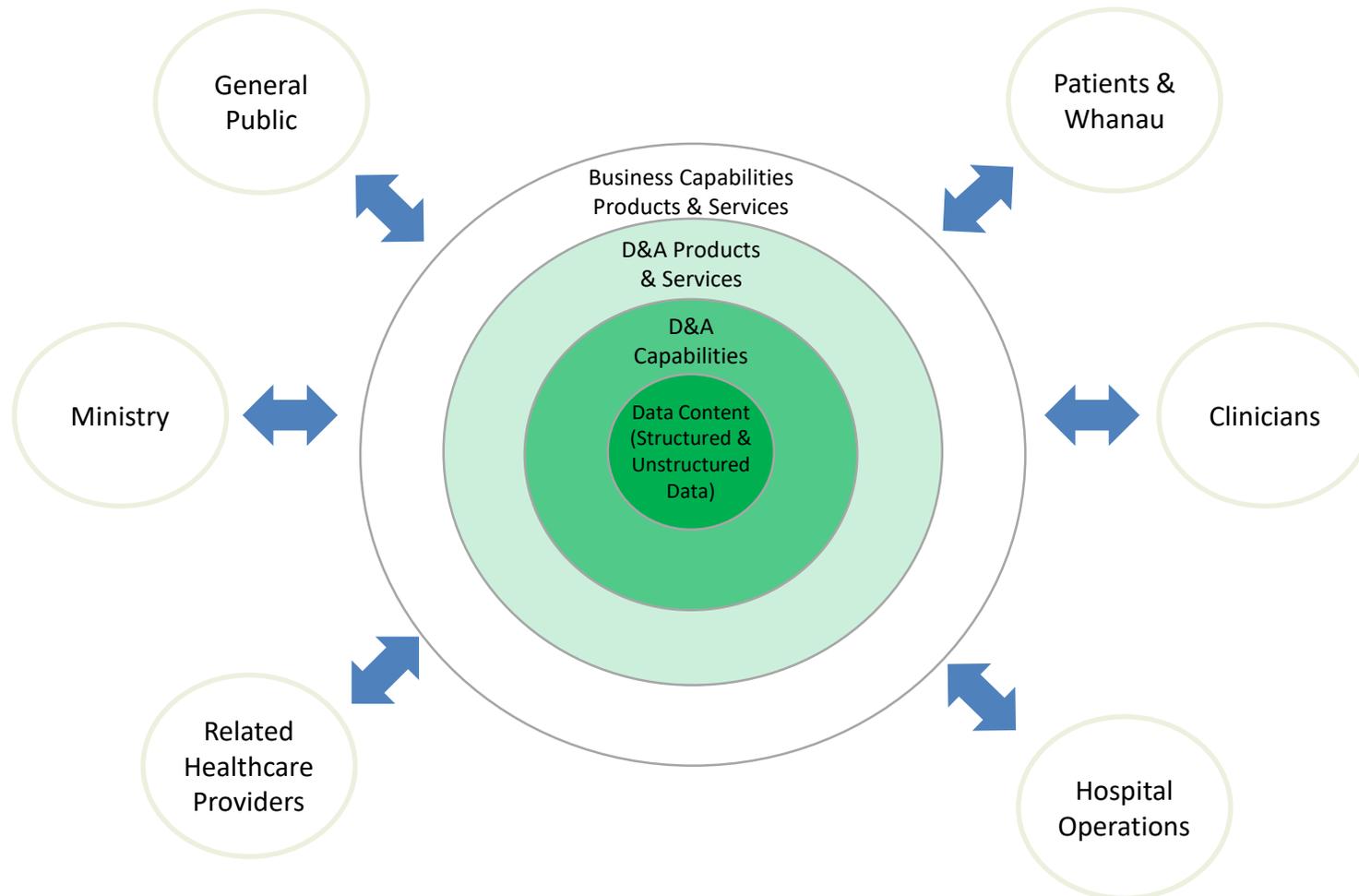
Patients & Whanau – A secure, single view of my health data

Clinicians – a current view of my patients, my activities, where are my patients in their care journey, understating my patients needs

Hospital Operations – how are we performing, what is due, where do we need to improve

Related Healthcare Providers – enabling a seamless patient care journey, frictionless handoffs as people move across care boundaries

Ministry – meeting our obligations, ensuring equity

General Public – trust in our healthcare system, maximising value from our investment

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2.4 Unleashing our data – We have used a value mapping framework to define hospital value

Through clarity about what the business need, we are able to link back to the data, identify missing data, and build a holistic and strategic views of hospital performance

Hospital Value

Finance | **People** | **Patient Experience** | **Productivity**

Value Drivers

| Assets / Liabilities | Revenue | Cost | Engagement / Wellness | Education | Staff Safety | Equity | Quality | Patient Safety | Effectiveness | Efficiency |

Improvement Levers

Assets / Liabilities
- Building values
- Car parks
- Equipment
- Fleet
- Stock on hand (Pharmacy, other supplies)
- Short Term Liabilities
- Accounts receivable (non resident)
- Long Term Liabilities

Revenue
- Non-Resident Revenue
- Cash generating outsourcing
- Clinical Training & Education Income (CTA)
- Contract
- Donations
- IDF
- MOH top ups
- Parking
- Programme Funding
- Rental
- Tertiary Revenue
- WIES

Cost
- Ambulance
- Cleaning
- Clinical supplies
- Contract vs Actual Volumes
- Equipment cost
- Excess Annual Leave in $
- Infrastructure maintenance (buildings)
- Laundry/Staff Uniform
- LOS
- Meals
- Non Clinical supplies
- Non Clinical support
- Offsite Rentals
- Outsourcing
- Overheads (Power, Phone, Gas, Fleet maintenance)
- Penalties
- Personnel allowance &cost
- PHO Cost
- Security
- Training / conferences
- Write offs - non funded patients

Engagement / Wellness
- Annual Leave
- No meal breaks
- Overtime
- Sick Leave
- Turnover

Education
- Annual Practising Certification
- Training/conferences

Staff Safety
- Accidents
- Incidents
- Mandatory Training
- OHS Measures

Equity
- CBU Outliers
- Mixed Gender Occupancy
- Single Room Occupancy
- Smoking Advice

Quality
- Accidents
- Incidents
- Mortality
- Patient experience
- Readmissions

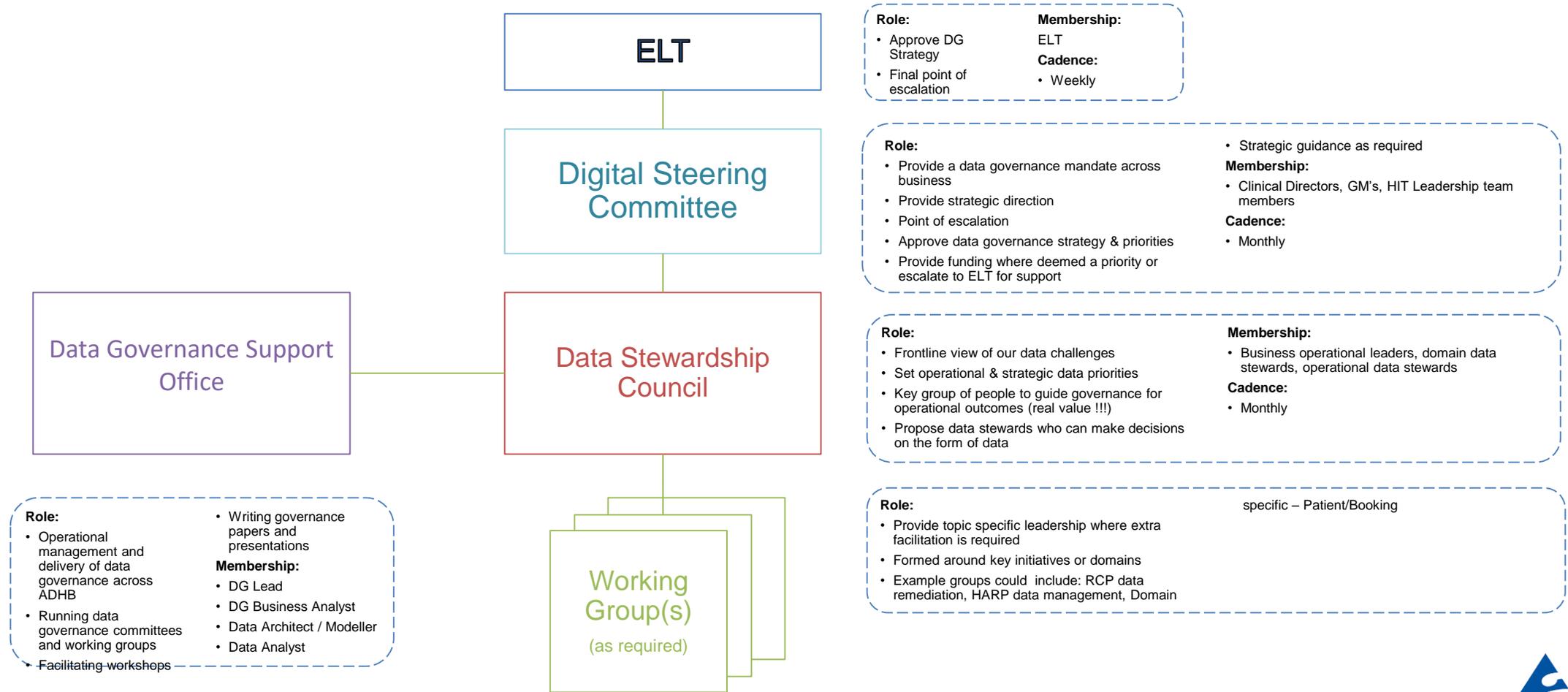**Patient Safety**
- Falls
- Hand Hygiene
- Infections
- Medication Errors
- Patient Safety Audit Compliance
- Pressure Injuries

Effectiveness
- Acute Volume
- DNA
- DOSA
- Elective Discharges
- IDF
- Long term illness measure
- LOS
- PAR
- Readmission

Efficiency
- Capacity
- Health Targets - ADHB
- Health Targets - Regional
- Occupancy
- Utilisation
- Waiting List

	Asking the right questions
1.1	Are we on target to achieve our safety targets e.g. hand hygiene, falls, mortality, infections, goals of care
2.1	How are we tracking against MoH targets
2.2	Increasing the number of additional patients booked e.g. lists, ITC (using our spaces right)
3.1	Benchmarking ourselves against others= hospitals e.g. via HRT, Telehealth, LOS, DOSA
3.2	Measuring the effectiveness of care navigation capability e.g. equity
3.3	Meeting or exceeding our planned care objectives to receive MoH allocated funding
3.4	Measuring the financial spend progress of programmes against planned capital expenditure
3.5	Effectively managing our cashflow to reduce borrowing costs
3.6	Improving Inpatients/Outpatients experiences.
4.1	Delivering against our price volume schedule e.g. Discharge targets, IDFs (Contract Volume)
4.2	Maximising our OR/OP usage & utilisation to improve throughput e.g. DNAs
4.3	Reducing our annual leave balances to agreed targets
4.4	Optimising the mix of staff between agency and DHB staff overtime to effectively and efficiently deliver services
4.5	Monitoring how we are tracking against our budgeted FTE
4.6	Measuring the intended planned savings to be delivered by improvement initiatives
4.7	Minimising the use of high cost or off catalogue items

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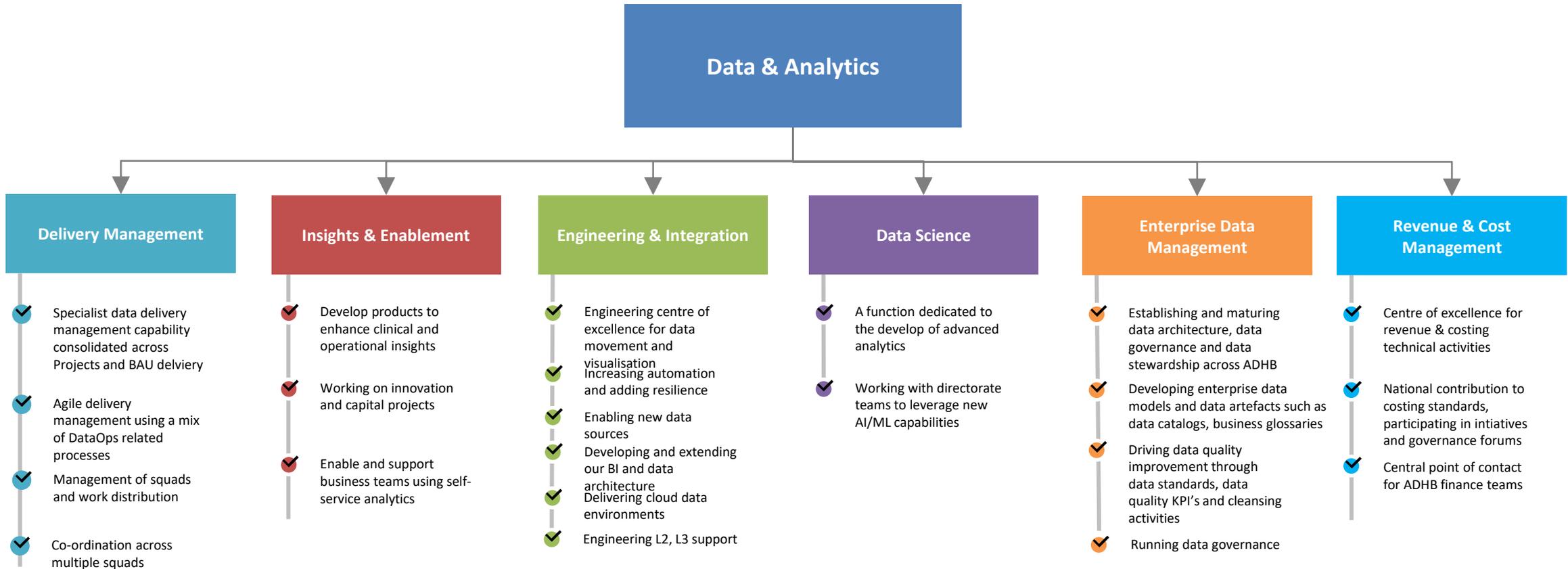DISTRICT HEALTH BOARD
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2.5 Unleashing our data – Governance provides the foundation for sound decisions

We have been running governance for over 24 months and have successfully completed a number of initiatives under its mandate

ELT

Role:
- Approve DG Strategy
- Final point of escalation

Membership:
ELT

Cadence:
- Weekly

Digital Steering Committee

Role:
- Provide a data governance mandate across business
- Provide strategic direction
- Point of escalation
- Approve data governance strategy & priorities
- Provide funding where deemed a priority or escalate to ELT for support

- Strategic guidance as required

Membership:
- Clinical Directors, GM's, HIT Leadership team members

Cadence:
- Monthly

Data Governance Support Office

Data Stewardship Council

Role:
- Frontline view of our data challenges
- Set operational & strategic data priorities
- Key group of people to guide governance for operational outcomes (real value !!!)
- Propose data stewards who can make decisions on the form of data

Membership:
- Business operational leaders, domain data stewards, operational data stewards

Cadence:
- Monthly

Working Group(s)

(as required)

Role:
- Operational management and delivery of data governance across ADHB
- Running data governance committees and working groups
- Facilitating workshops

- Writing governance papers and presentations

Membership:
- DG Lead
- DG Business Analyst
- Data Architect / Modeller
- Data Analyst

Role:
- Provide topic specific leadership where extra facilitation is required
- Formed around key initiatives or domains
- Example groups could include: RCP data remediation, HARP data management, Domain

specific – Patient/Booking

2.6 Unleashing our data – to enable our new operating mode, we are transitioning our internal team structures and capabilities
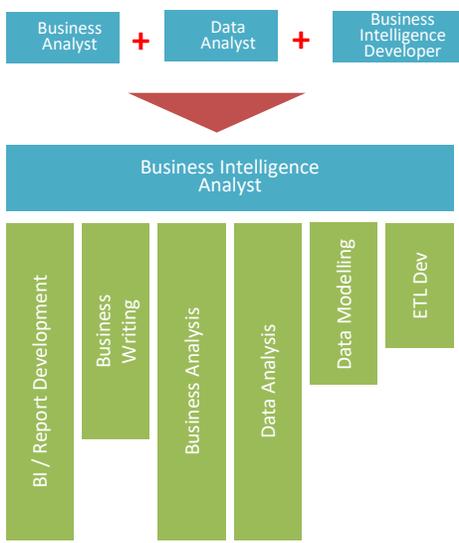
This has meant creating a new focus on engineering and bringing in new skills to deliver change at speed and within our financial boundaries

Data & Analytics

Delivery Management
- Specialist data delivery management capability consolidated across Projects and BAU delviery
- Agile delivery management using a mix of DataOps related processes
- Management of squads and work distribution
- Co-ordination across multiple squads

Insights & Enablement
- Develop products to enhance clinical and operational insights
- Working on innovation and capital projects
- Enable and support business teams using self-service analytics

Engineering & Integration
- Engineering centre of excellence for data movement and visualisation
- Increasing automation and adding resilience
- Enabling new data sources
- Developing and extending our BI and data architecture
- Delivering cloud data environments
- Engineering L2, L3 support

Data Science
- A function dedicated to the develop of advanced analytics
- Working with directorate teams to leverage new AI/ML capabilities

Enterprise Data Management
- Establishing and maturing data architecture, data governance and data stewardship across ADHB
- Developing enterprise data models and data artefacts such as data catalogs, business glossaries
- Driving data quality improvement through data standards, data quality KPI's and cleansing activities
- Running data governance

Revenue & Cost Management
- Centre of excellence for revenue & costing technical activities
- National contribution to costing standards, participating in intiatives and governance forums
- Central point of contact for ADHB finance teams

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2.7 Unleashing our data – With the focus on improving capabilities and the use of repeatable frameworks, changes are being introduced into the Data & Analytics function to lift productivity.

These changes are designed to lift capabilities within the team, reduce inefficiencies and support a modern approach to delivery of outcomes.

1 Transition to **T-shaped roles to bring a multi-dimensional approach** to problem solving

Business Analyst + Data Analyst + Business Intelligence Developer

Business Intelligence Analyst

- BI / Report Development
- Business Writing
- Business Analysis
- Data Analysis
- Data Modelling
- ETL Dev

In the example above, it is normal practice for business intelligence analysts to be cross-functional. Complex delivery can be supported or delivered by a specialist capabilities where needed.

2 Addition of advanced capabilities to **lift overall D&A capability , tackle complex delivery, evolve our frameworks and tools**, increase automation and **enable self-service**.

Role	Responsibilities
Engineering & Integration Manager	• Design & implement the evolution of ADHB's data warehouse capabilities • Support hybrid cloud implementation • Drive self-service architecture, data security
Senior Data Engineer / Senior Data Operation Engineer	• Implement ADHB's target state technical architecture • Increase automation & real-time capabilities • Deliver self-service including data security • On-board new capabilities e.g. cloud adoption, API's
Senior Visualisation Developer	• Owner for our visualisation toolsets and BI architecture • Lift existing technical BI capabilities • Implement embedded analytics • Trial and implement new capabilities
Data Architect & Modeler	• Own all aspects of data architecture across projects and BAU. • Define, design and implement data assets such as data models, data catalogue etc. • Lead data governance activities.
Senior Enterprise Data Analyst	• Lead data analysis and modelling activities on complex projects. • Own and deliver data assets as agreed with the data architect and data leadership.
Data Story Teller	• Lead the multi-functional capability within D&A. • Implement processes to drive quality and consistency of delivery. • Mentor and grow analyst capabilities.

3 Focus on defining and implementing **BI products to** meet business needs. The insights team also lead project delivery and bring in resources from other D&A teams.

Insights & Enablement Manager

Senior Business Intelligence Analyst

Business Intelligence

Data Story Teller

4 The creation of enduring assets, tools and frameworks to increase reuse, accelerate delivery and enable self-service.

Information Architecture Models

Reusable Data Models

Data assets including data catalogue, data dictionary, business glossary
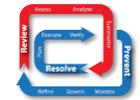
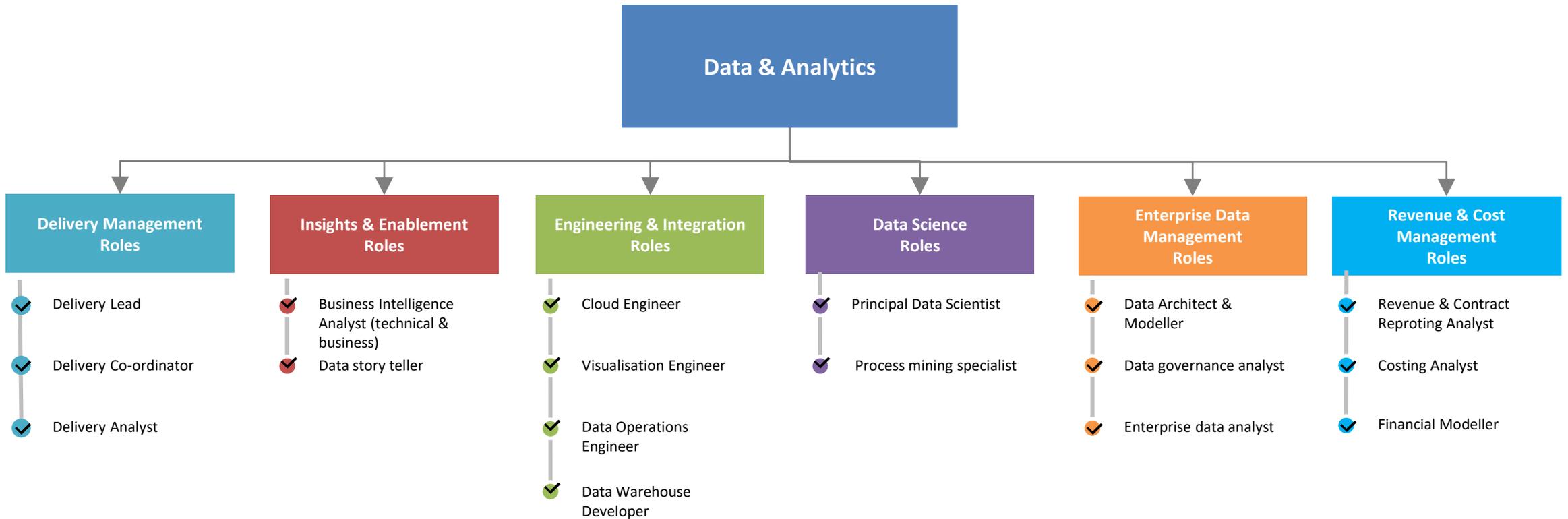Frameworks and tools to monitor data quality, data sharing etc

Automation of capabilities such as data provisioning, data sharing, approvals

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2.8 Unleashing our data – we are progressively becoming a true centre of excellence

The new roles allow us to have a new focus on engineering as an enabler, and new skills/focus in others areas to deliver new value at speed within our financial boundaries

Data & Analytics

Delivery Management Roles	Insights & Enablement Roles	Engineering & Integration Roles	Data Science Roles	Enterprise Data Management Roles	Revenue & Cost Management Roles
Delivery Lead	Business Intelligence Analyst (technical & business)	Cloud Engineer	Principal Data Scientist	Data Architect & Modeller	Revenue & Contract Reproting Analyst
Delivery Co-ordinator	Data story teller	Visualisation Engineer	Process mining specialist	Data governance analyst	Costing Analyst
Delivery Analyst		Data Operations Engineer		Enterprise data analyst	Financial Modeller
		Data Warehouse Developer			

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Capability verticals enables our team develop high levels of competence in their area of expertise. The focus on outcomes is provided through delivery squads which we recalibrate on a regular basis. Bringing this together is an agile operating and governance model.
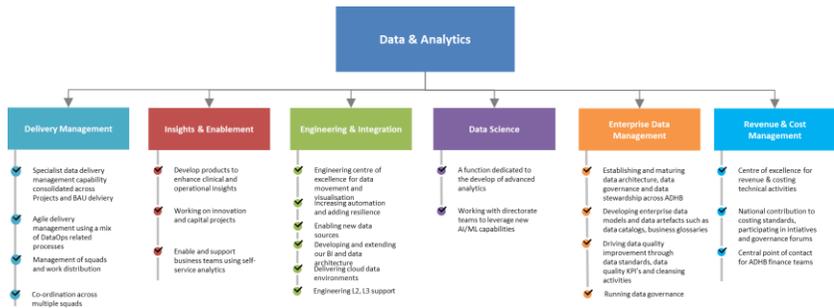
Focus on lifting core capabilities to increase capability and productivity
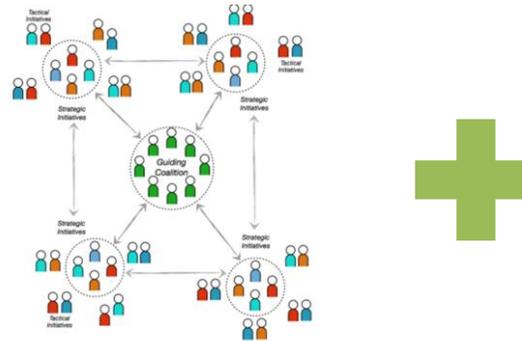
Organised into outcome focussed squads with a focus a clear set of objectives and outcomes (Porter's model)
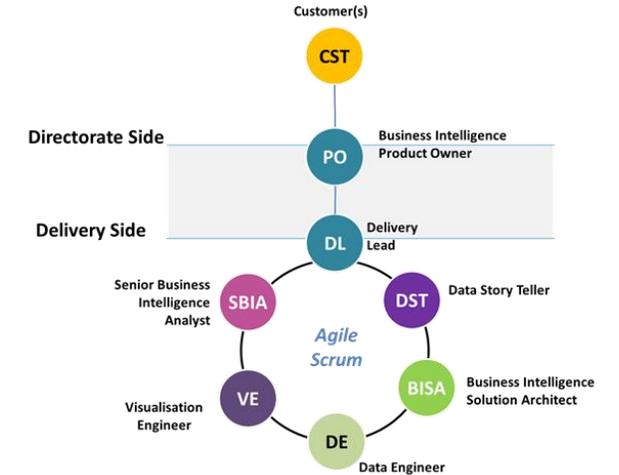
Agile delivery model powered by tools such as Jira & Confluence

Delivery Squads

Self-Service

Platform Management

EDW Automation

Clinical Databases

Data Management

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2.10 Unleashing our data – using low cost cloud services, we have been able to build business products such as self-service analytics and real-time integrated operational dashboards

As we add further no/low cost cloud capabilities, we will create a rich suite of D&A products to deliver personalise insights and real-time
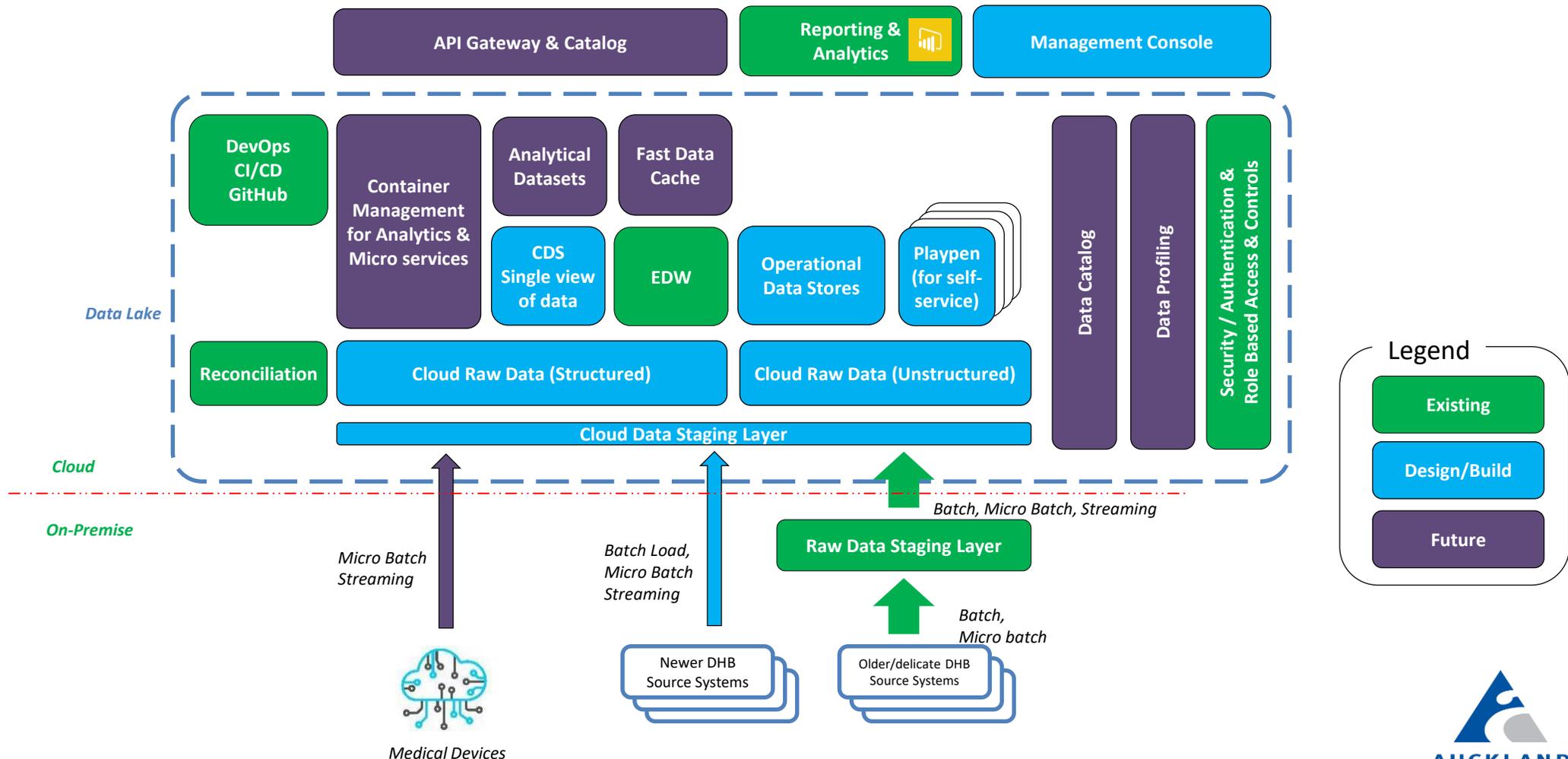
By taking a lightly modelled approach, we are able to surface real-time data to the presentation layer whilst enabling an enterprise perspective
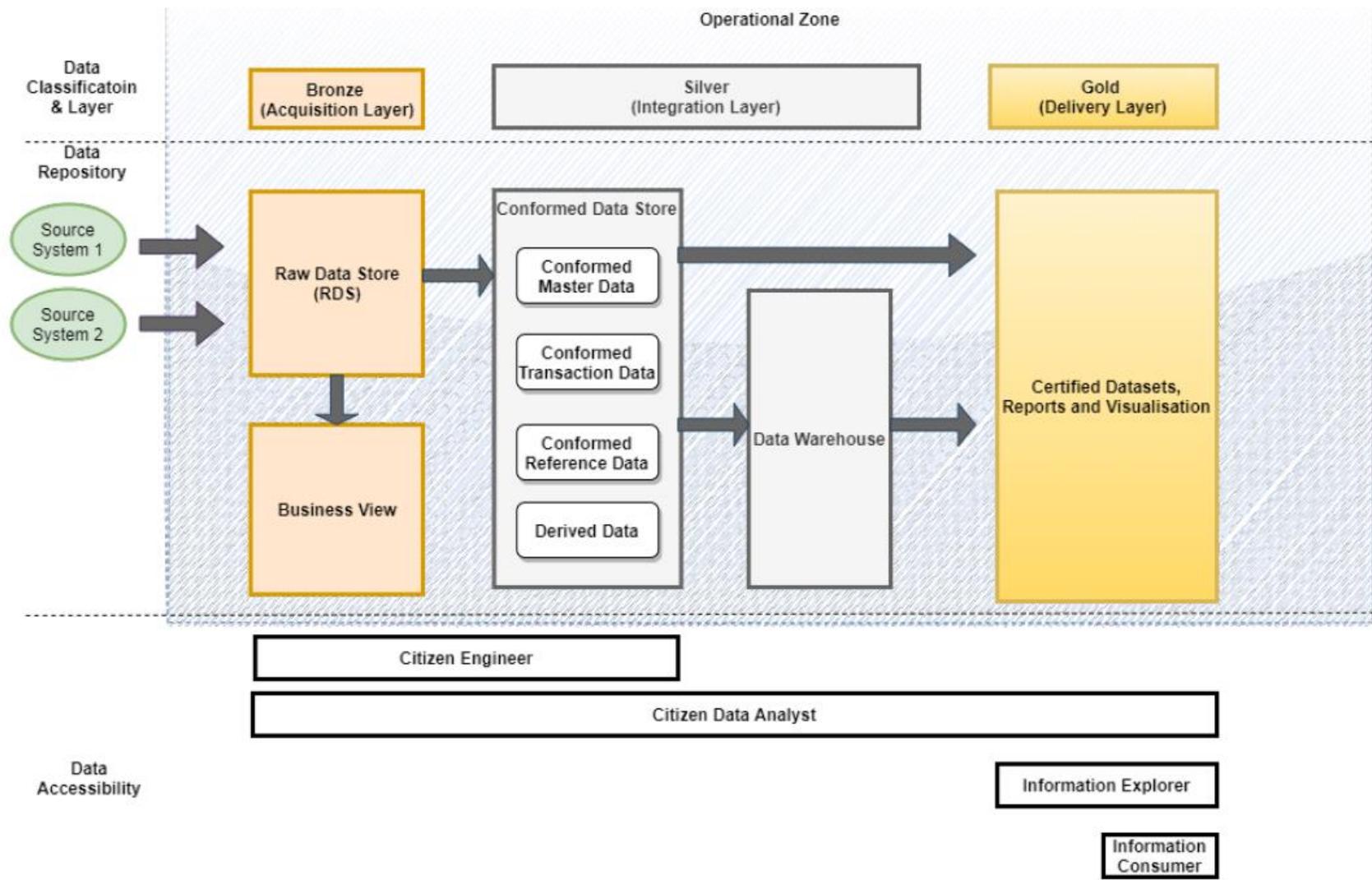
Key design features include:-

1) A conformed layer in the middle enabling enterprise insights

2) A lightly curated RDS layer allowing citizen analysts to innovate with new data

3) A data presentation layer, prior to entering the BI tool, to allow portability

4) Ability to bridge enterprise metrics to any data in our platform at the right grain

5) Independent resilient data layers that allow for systems to be added or replaced but still maintain an enterprise view

2.12 Unleashing our data – We have also defined key capabilities and gaps

We are also working with our IT partner healthAlliance and the northern region to identify missing capabilities we can all share e.g. CDC/Replication, data catalog, data quality management

Tools needed to enable future state platform

Data Visualisation ADHB Tools: PowerBI, Business Objects, Excel
ADHB have PowerBI, which is a leading data visualisation and analysis tool. Additionally, existing toolsets like SAP Business Objects, SAP Lumira and Excel offer a range of options for end users.

Workflow Management ADHB Tools: Service Now, MS Flow, Orion Care Pathways
With the acquisition of ServiceNow, Microsoft Office 365 and Azure, we have all the tools we need to implement workflow management.

Data Movement & Transformation ADHB Tools: LogicApps, Wherescape RED, Data Factory
ETL tools are normally used to extract, transform and load data. Our investment in WhereScape RED will need to be reviewed overtime given the recent vendor acquisition and unmet demand for a higher capability toolset to support data access from/to cloud based applications.

CDC / Data Replication ADHB Tools: SQL Replication
The ability to replicate all or part of any database within our eco-system is badly missing at ADHB and required immediately to decrease the cost and time taken to provision new data to end-users. This capability will also minimize time and effort needed to integrate data from cloud based systems.

Data Virtualisation ADHB Tools: Database views
Data virtualization enables all data to come together without having to use complex and expensive ETL procedures to physically move the data into one place. In other words, the data stays in its original location, but you can query it just as if it was local. Some of this capability exists within newer versions of existing tools.

Data Catalog ADHB Tools: Visual Paradigm
The ability to find data located in any system regardless of where it sits. This is a big gap within our eco-system and needs to be addressed urgently.

Data Quality Management ADHB Tools: None
As the quality of data is better understood through the use of a data catalog, tools to monitor and fix data quality can be purchased. The HARP transformation program would benefit significant from a data quality and profiling tool.

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2.13 Unleashing our data – We are lifting our capabilities through Azure components (and azure hosted apps) on our dedicated tenancy

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We are currently working with healthAlliance to implement scalable Self-Service, ODS and data lake
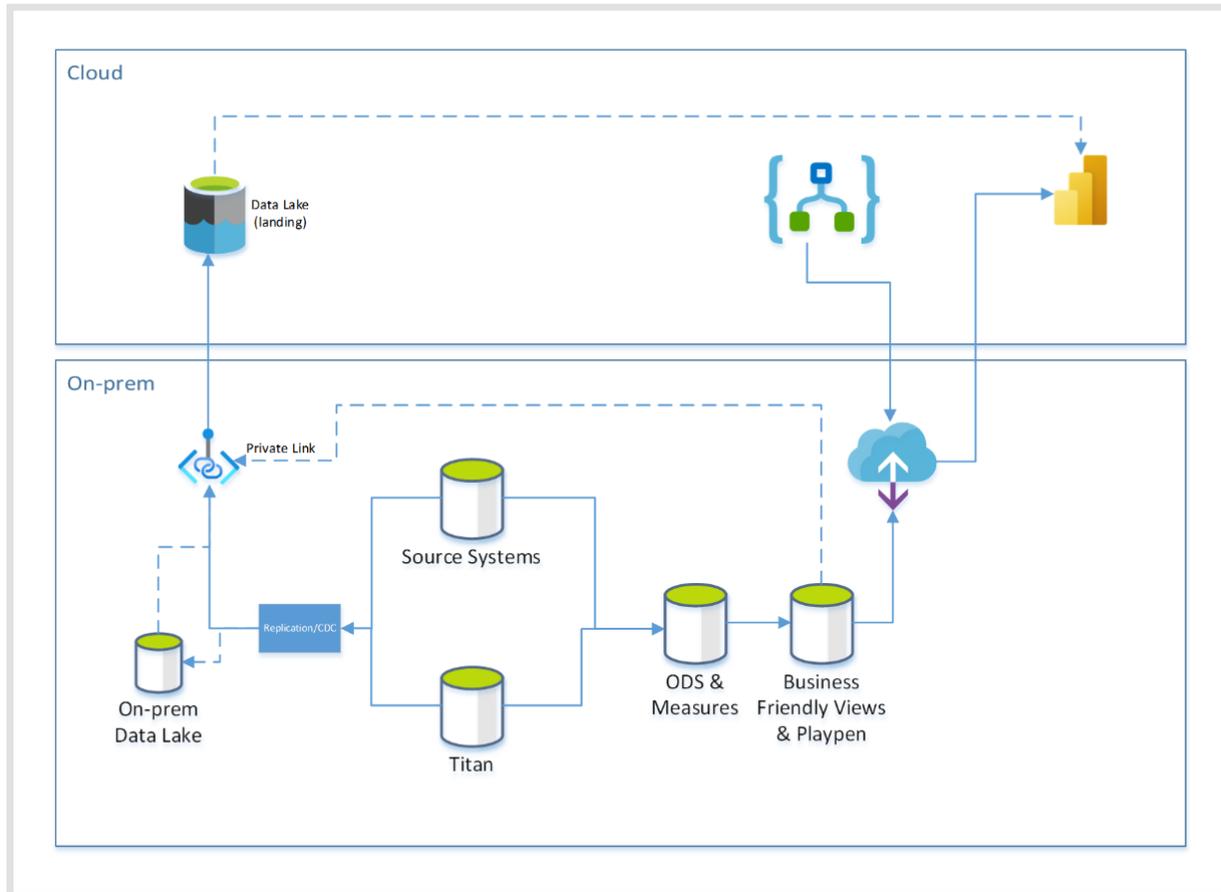
Key Design Features:

- Data Lake
  - With everything kept the same as Stage 1, introduce a data lake
  - Replication/CDC is done for batches and micro-batches from the source systems
  - Data from the source systems are staged in the landing area of the lake
  - On-premise data lake can be introduced in order for ADHB to be cloud technology agnostic
- Replication into Data Lake
  - Not all tables from Titan/source systems need to be transferred into the lake
  - Must be selective on replicating CMS/PIMS tables into the lake as CMS &PIMS will be retired
- Security
  - Data must be transported into the lake via a secure channel - Azure Private Link
  - Data in the lake is not accessible by anyone other than using the service principal
- Monitoring & Auditing
  - Reconciliation done to assure that the data in the lake is in sync with the source systems

Key Technology Components:

- Azure Data Lake Storage Gen2
- Private Link
- Azure Data Factory

Design Decisions:

- Introducing data lake early with a reconciliation process - it will create a good foundation for the future cloud platform
- On-premise data lake can be designed to meet the technology agnostic/portability strategy
- Unless there is a specific near real time requirements from the business, CMS does not have to replicated into the lake. All CMS data and measures required for reporting should already be in Titan
- Once the lake is set up, transfer the Business Friendly Views into the lake to be imported into Power BI within the cloud - no user impact

2.14 Unleashing our data – We are adopting fit for purpose cloud capabilities to maximise value

Replacing monolithic on-premise capabilities with monolithic cloud capabilities is not the answer and will likely result in unsustainable cost profiles and mismatched capabilities. We are continually assessing cloud technologies to deliver cost-effective outcomes

	Info Consumer	Info Explorer	Analysts	Citizen Data Scientist	Citizen Developer
Visualisation					
PowerBI Web	N	Y	Y	Y	Y
PowerBI Desktop (Pro)	N	N	Y	Y	Y
Custom Visualisation Tool (HIT managed)	N	N	N	Y	Y
Data Management					
Query Data (light & advacned) Synapse, Snowflake Studio, DataBricks	Y	Y	Y	Y	Y
Data Transformation Light PowerBI Flow,	N	N	Y	N	N
Data Transformation Advanced (Synapse, Snowflake Studio, DataBricks, Snowflake DBT)	N	N	Y	Y	Y
Data Import / Export (light) – PowerBI Data Flow	N	Y	Y	N	N
Data Import / Export (advanced) – PowerBI Data Flow	N	N	Y	Y	Y
Data Storage					
Fast Read Access (analytical)	Synapse, Databricks, PowerBI (cached reports), Snowflake				
Fast Read Access (OLTP)	Cosmos, Azure Gen2 Data Lake				
Bulk Load	Azure Gen2 Data Lake				
Fast UPSERT	Azure Gen2 Data Lake, Azure SQL				
Archive	Azure Gen2 Data Lake				

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Self-service and data innovation

- Why does intelligence fail ?

- Enabling data innovation

- True self-service analytics

Clinical & Operational Intelligence	Self-Service & Innovation	Integrated Real-time Analytics

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"No one has made the traditional business intelligence model work "
- Big Mountain Analytics

Common issues include:-

- Cannot traditional BI scale to the level required to meet business needs
- The Business typically finds BI slow and ineffective
- By the time IT delivers a solution, the problem that generated the request is no longer a problem
- The traditional model only addresses known data and questions. It doesn't address unknown or future question

3.1 Self-service and data innovation - Where do we focus to deliver the required shift ?

We are enabling a new set of users in the business we can extend our intelligence capabilities through virtual teams.

True Self-serve Analytics & Data Innovation

Traditional Business Intelligence

| Ad-hoc Data Analysis, Experimentation, Research | Operational Analysis | Operational Reporting | Management / Performance Reporting | Strategic / Compliance Reporting | Operational Data Science |

Growth Opportunity

Information Explorers

Citizen Analysts

Citizen Data Scientists

Geeks / Unicorns

Modern Analytics Paradigm

Business Data Stewards

Citizen Data Engineers

Traditional Users

Information Consumers

Occasional Analysts

Traditional Business Intelligence

BI Analysts

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We have designed this capability with security, governance and privacy at the centre, whilst enabling our business teams to use their data when they need it

Self-Service Framework

Self-Service Personas
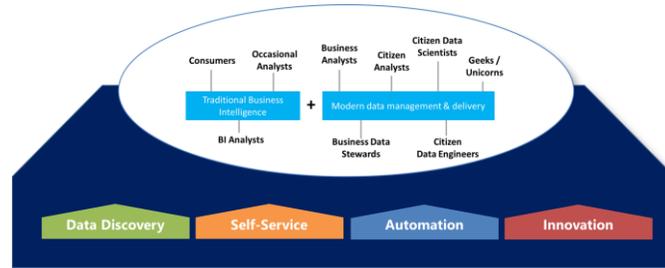

Detailed Access Controls & Usage Auditing
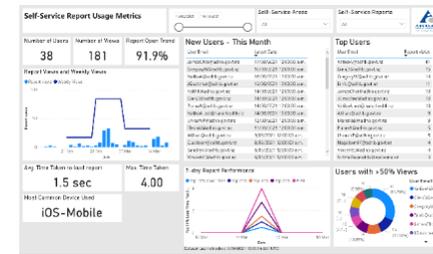
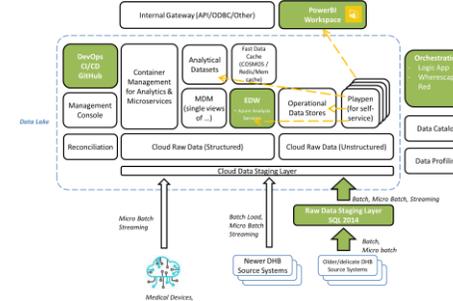**Outcome focused squads incl Self-Service Enablement**
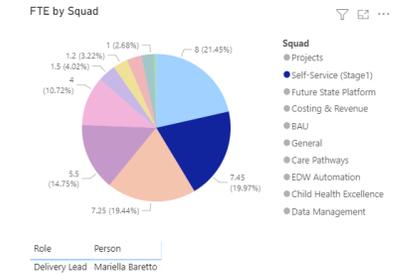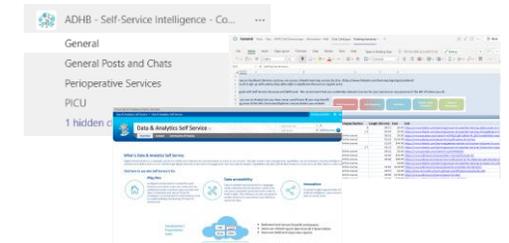

A realigned D&A capability model

'DataOps' Delivery Model

Information Architecture

Community of practice (chat, teams channel), Wiki, Web Portal, Data Catalog (excel)

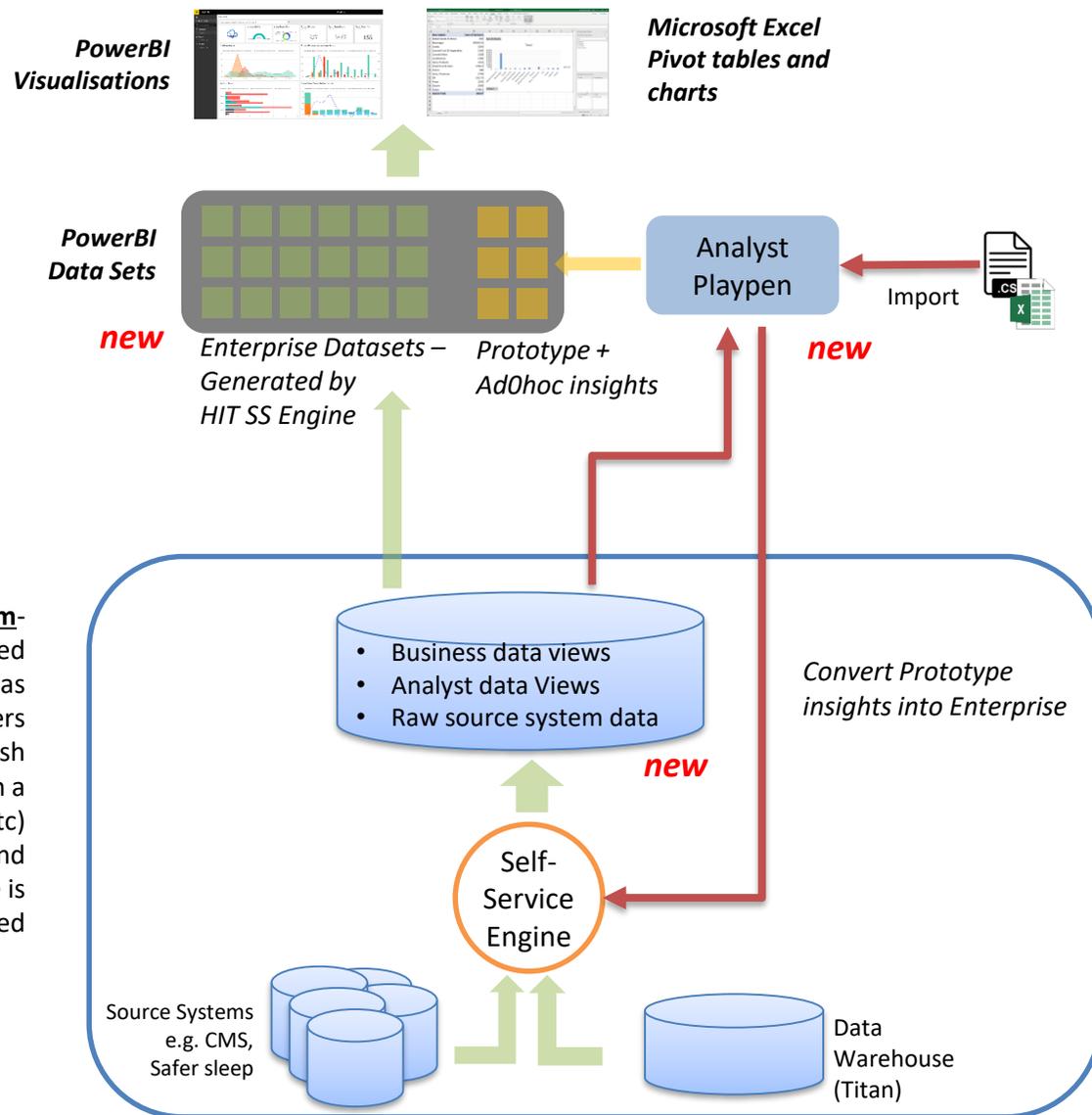# 3.3 Self-service and data innovation - Our self-service capability revolves around 5 business user personas

We are working with business teams to enable key roles with the required skills to align to the requirements of each of these personas

	Decision Maker / Information Consumer	Information Explorer	Citizen Analyst	Citizen Data Developer	Citizen Data Scientist
Key Activities	• View prebuilt reports	• View prebuilt reports • Slice and dice intelligence reports • Create and run excel pivot tables to explore data	• Build new SQL queries to interrogate data • Build PowerBI Reports from datasets • Publish new reports	• Write complex code to transform data • Develop deterministic models • Prototype new intelligence outputs	• Build analytical models using statistical and programmatic approaches
Technical Skills Required	• None	• Excel pivot tables and pivot charts	• PowerBI Development • SQL Code	• PowerBI development • SQL Scripting & procedures • Lightweight programming (e.g. HTML, JavaScript)	• R / Python • Advanced SQL coding • Lightweight programming (e.g. HTML, JavaScript)
Tools Used	• Web browser	• Excel • PowerBI Web (optional)	• PowerBI Desktop • PowerBI Web • SQL Management Studio (or similar)	• PowerBI Desktop • SQL Management Studio (or similar)	• R Studio • PowerBI Desktop or similar • SQL Management Studio (or similar)

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Analysts in directorate teams can prototype new datasets to build deeper insights. If required, these can be optimised by HIT and released into production.

PowerBI Visualisations

Microsoft Excel Pivot tables and charts

Directorate Staff

Use playpen to build new insights using :-
- Additional data from Titan and source systems
- Import custom data from spreadsheets & external sources
- Write SQL to build new views

PowerBI Data Sets

new

Enterprise Datasets – Generated by HIT SS Engine

Prototype + Ad0hoc insights

Analyst Playpen

new

Import

How does it work?

1) HIT uses our new Self-Service data generation engine to create business and analyst data views (simple excel like views). These views remove all complexities of joining data from different systems

2) The business data views are published as PowerBI data sets

3) PowerBI reports and dashboards are generated using 1 or more PowerBI data sets

4) Business Intelligence analysts (or similar) in the business can generate new insights by :-

    a) Creating new reports using PowerBI Datasets

    b) Adding data to existing business data views and publish new PowerBI datasets (manual)

    c) Create brand new business data views using analyst data views, business data views and/or raw source system data views

HIT Data & Analytics team-
- Creates new libraries of simplified views joining data from systems as directed by customers
- Implements processes to publish data to PowerBI data sets on a regular basis (daily, hourly etc)
- Implement security and monitoring to ensure data usage is governed

- Business data views
- Analyst data Views
- Raw source system data

new

Convert Prototype insights into Enterprise

Self-Service Engine

Source Systems e.g. CMS, Safer sleep

Data Warehouse (Titan)

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All of insights below have been prototyped and delivered with analysts in the business, building prototypes and continuously iterating until they can land on insights that deliver value

Deliberately fuzzy

Enabling the digital ecosystem

- Establishing a reliable data core

- Connected via data API's

- Delivered to multiple data consumers
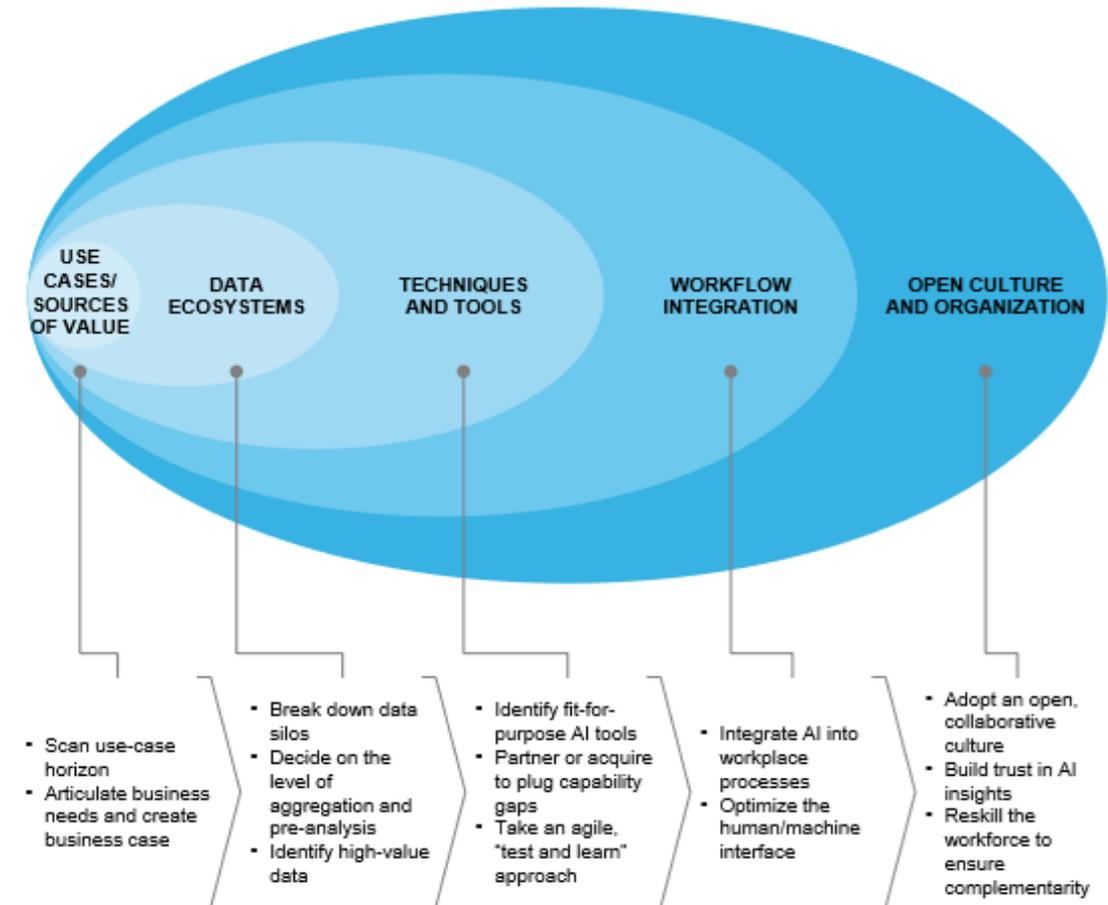
Clinical Decision Support Systems

Digital Applications

Electronic Health Record

4.0 Enabling the digital ecosystem – Integrated data & analytics is also key to driving digital transformation

Integrated data & analytical insights delivered into our eco-system creates the opportunity to supply data and rich content for delivery via modern digital platforms and multiple channels

- Successful AI and analytics transformations require elements similar to those found in successful digital transformations

- Need to focus on business outcomes and specific business use cases

- Data silos need to be broken down with integrated quality data available for consumption and integration

- The right platforms needs to be selected to make data available for consumption to operational and analytical use cases

USE CASES/ SOURCES OF VALUE
- Scan use-case horizon
- Articulate business needs and create business case

DATA ECOSYSTEMS
- Break down data silos
- Decide on the level of aggregation and pre-analysis
- Identify high-value data

TECHNIQUES AND TOOLS
- Identify fit-for-purpose AI tools
- Partner or acquire to plug capability gaps
- Take an agile, "test and learn" approach

WORKFLOW INTEGRATION
- Integrate AI into workplace processes
- Optimize the human/machine interface

OPEN CULTURE AND ORGANIZATION
- Adopt an open, collaborative culture
- Build trust in AI insights
- Reskill the workforce to ensure complementarity

SOURCE: The age of analytics: Competing in a data-driven world, McKinsey Global Institute, December 2016; McKinsey Global Institute analysis

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4.1 Enabling our digital ecosystem – Our digital applications need data from our disparate legacy systems

Integrated EMR and PAS systems take many years, sometimes decades to implement fully, EHR's require costly data integration, which is even costlier in a changing eco-system

Clinical Decision Support Systems

- Dendrite - Audit / Registry solutions requiring patient context data (operational, clinical etc) to enrich clinical outcomes data and build rich data registries

- Edge - Clinical trial management solution requiring operational and clinical data to provide contextual information

- REDCap – Clinical research database solution to provide relevant clinical data to support clinical research activities

- Other approved internal and external ancillary systems needing data supply

Digital Workflow Applications

- Clinical pathway applications to incorporate patient, operational and clinical data from ADHB and regional systems e.g. Orion care pathways, SMT

- ADHB workflow and automationn solutions required integrated data from ADHB systems e.g. single view of employee, single view of patient etc. Examples of these solutions include care navigation, OIA automation, telehealth etc.

- AI/ML driven patient flow optimisation solutions such as Signals for Noise, System View

Electronic Health Record Data Supply

- Using the CDS Master Data model, an integrated view of patient and hospital data can be surfaced via data API's to populate a regional Health Information Platform.

- This can include a variety of information including patient history, clinical information

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4.2 Enabling our digital ecosystem – Challenges with heavy integration solutions

The Northern Region has invested in shared Mulesoft capability, however the cost of integration is prohibitively expensive and limits our ability to build a complete view of our patients

There are several issues limiting the use of traditional integration solutions such as Mulesoft including:-

1) Most of our systems are old and lack the resilience required to support the workloads created by direct integrations

2) Given the absence of an integrated EMR and integrated PAS solution, our data is disparate and business API's require data across multiple systems

3) The cost of integration is prohibitively expensive a single development pipeline acting as a choke point

4) As we transform our application eco-system, the cost of maintaining integrations will likely become prohibitively expensive

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4.3 Enabling our digital ecosystem – Our data foundation will be extended to meet our digital needs through light weight cloud data API's

These data API's can be wrapped into integration and business orchestration layers as needed, or used by our digital eco-system directly through a private gateway
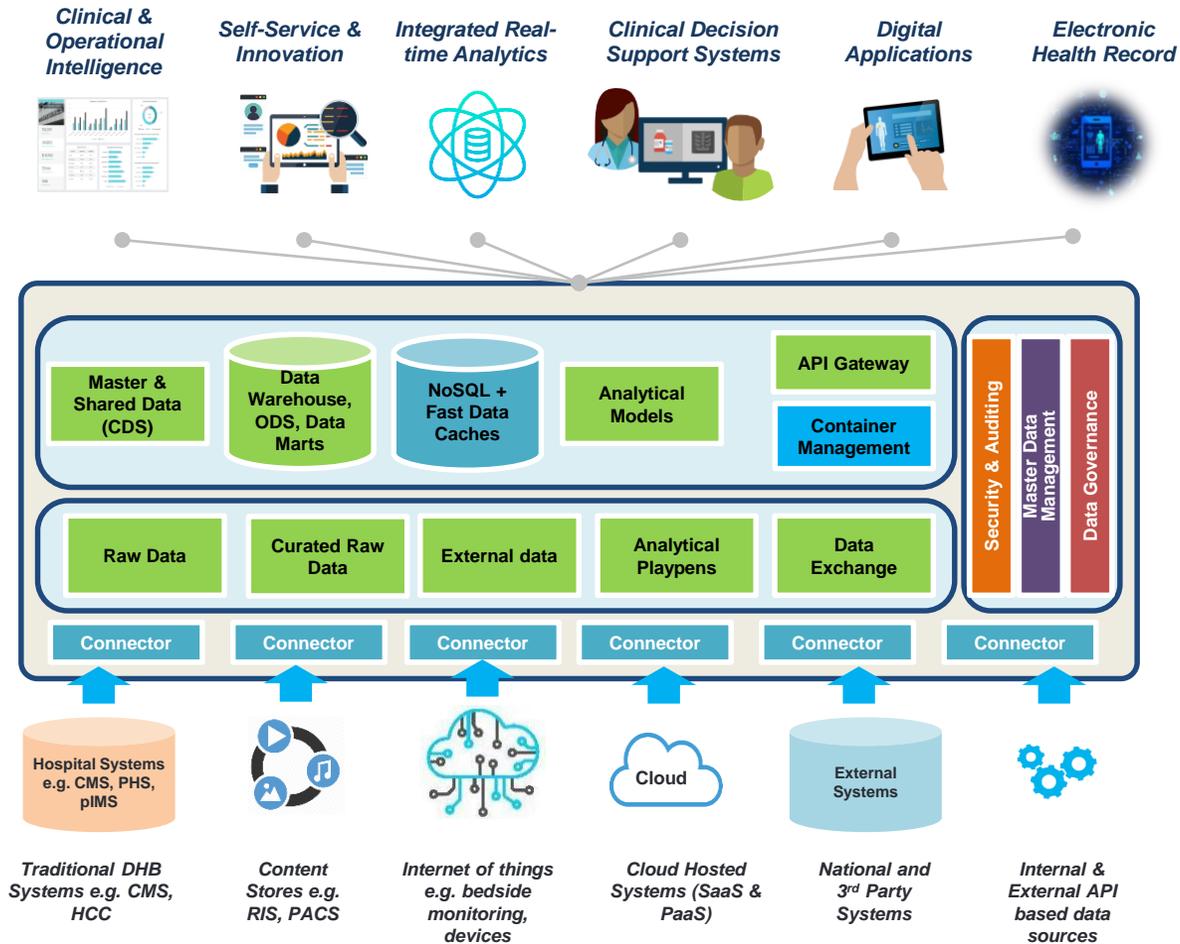
A secure data foundation
- real-time data where possible (fast micro-batch data supply for legacy systems)
- Treated as an operational system 99.99% uptime
- Data encrypted at rest and in motion
- Secure gateway connecting Azure cloud to ADHB systems
- Avoids the cost of building multiple data foundations and integrated data sets
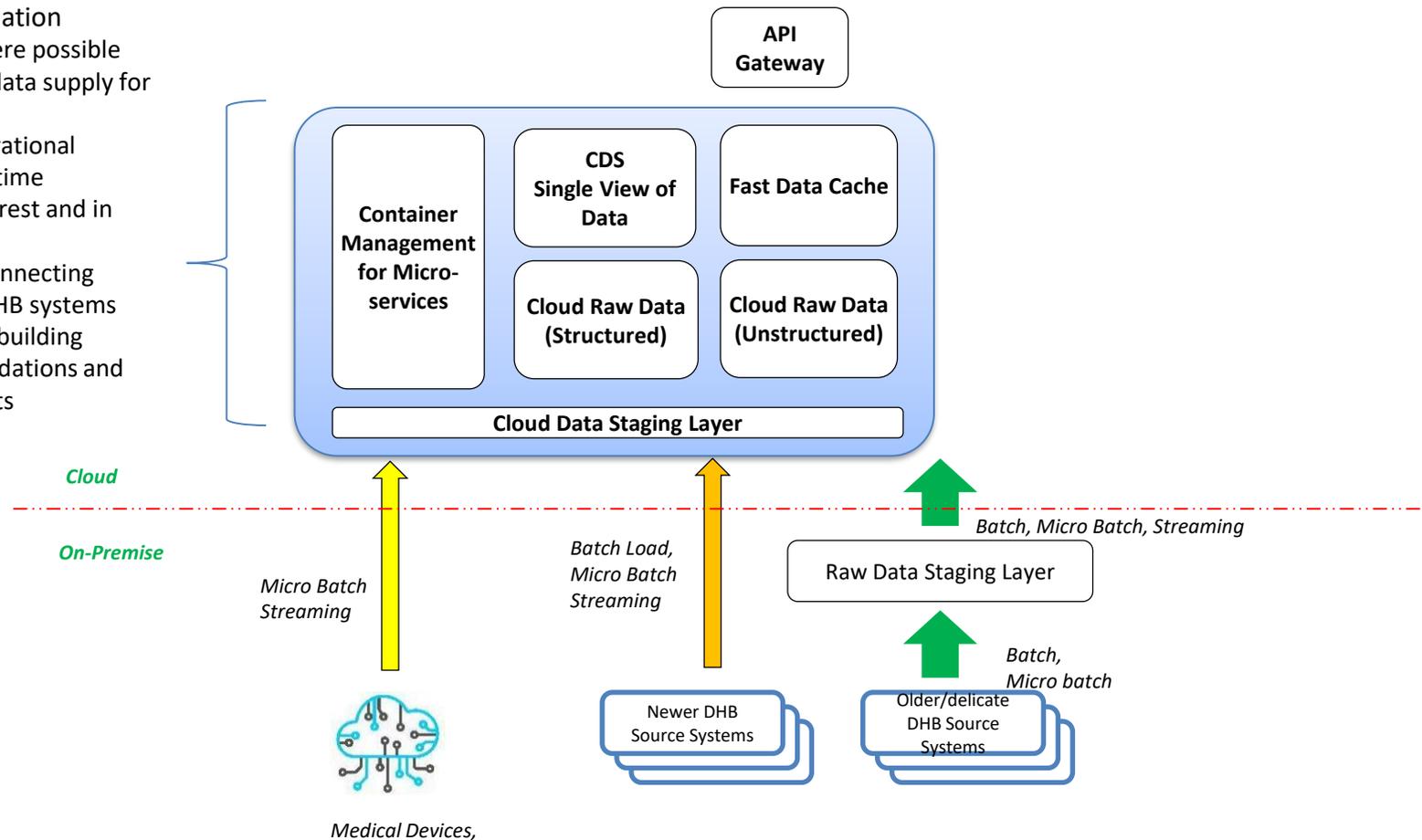
4.4 Enabling our digital ecosystem – The business opportunity for the use of integrated data & analytics is vast but challenged by large disparate application blueprint

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An integrated view of data is needed now to

Clinical & Operational Intelligence

Self-Service & Innovation

Integrated Real-time Analytics

Clinical Decision Support Systems

Digital Applications

Electronic Health Record

Master & Shared Data (CDS)	Data Warehouse, ODS, Data Marts	NoSQL + Fast Data Caches	Analytical Models	API Gateway	Security & Auditing	Master Data Management	Data Governance
				Container Management			

Raw Data	Curated Raw Data	External data	Analytical Playpens	Data Exchange

Connector	Connector	Connector	Connector	Connector	Connector

Hospital Systems e.g. CMS, PHS, pIMS

Cloud

External Systems

Traditional DHB Systems e.g. CMS, HCC

Content Stores e.g. RIS, PACS

Internet of things e.g. bedside monitoring, devices

Cloud Hosted Systems (SaaS & PaaS)

National and 3rd Party Systems

Internal & External API based data sources

Through our new modern delivery model and new capabilities, we will shift our capability models to support a wide variety of business scenarios, operating across a hybrid eco-system of new and legacy capabilities.

These extend well beyond the traditional passive intelligence use cases into:

1) True Self-serve analytics & data innovation

2) Integrated / Prescriptive data science

3) Data driven clinical decisioning

4) Connected patient support through IOT and distributed networks

All delivered through digital systems of engagement in context of the care setting.

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Thank you