Clinical and Business Intelligence (CBI)

Adopting cloud to
accelerate innovation,
modernise service delivery &
drive better outcomes for citizens

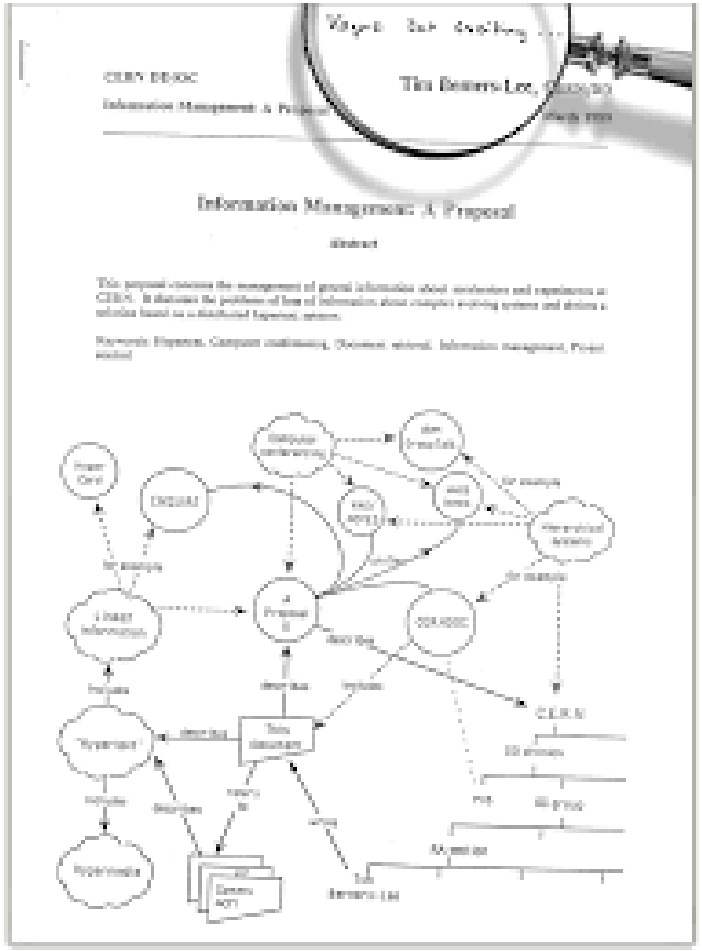
V1.0

+ The path to…


Here
in 1897 at the old
Cavendish Laboratory
J·J·THOMSON
discovered the electron
subsequently recognised as
the first fundamental
particle of physics and
the basis of
chemical bonding
electronics and
computing

Information Management: a proposal

- www…
- *“In those days, there was different information on different computers, but you had to log on to different computers to get at it.*
- *Also, sometimes you had to learn a different program on each computer.*
- *Often it was just easier to go and ask people when they were having coffee…”,*



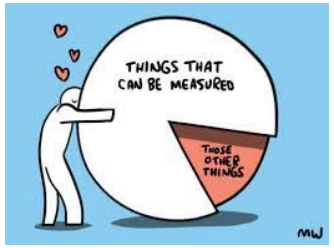
From Data to Decisions…

…analytics

Prescriptive

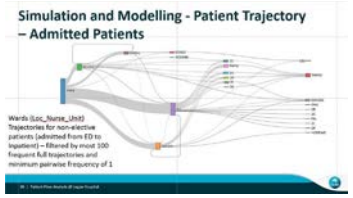
Tell us what to do before it happens!

Decision



Predictive

Tells us what's going to happen



Data

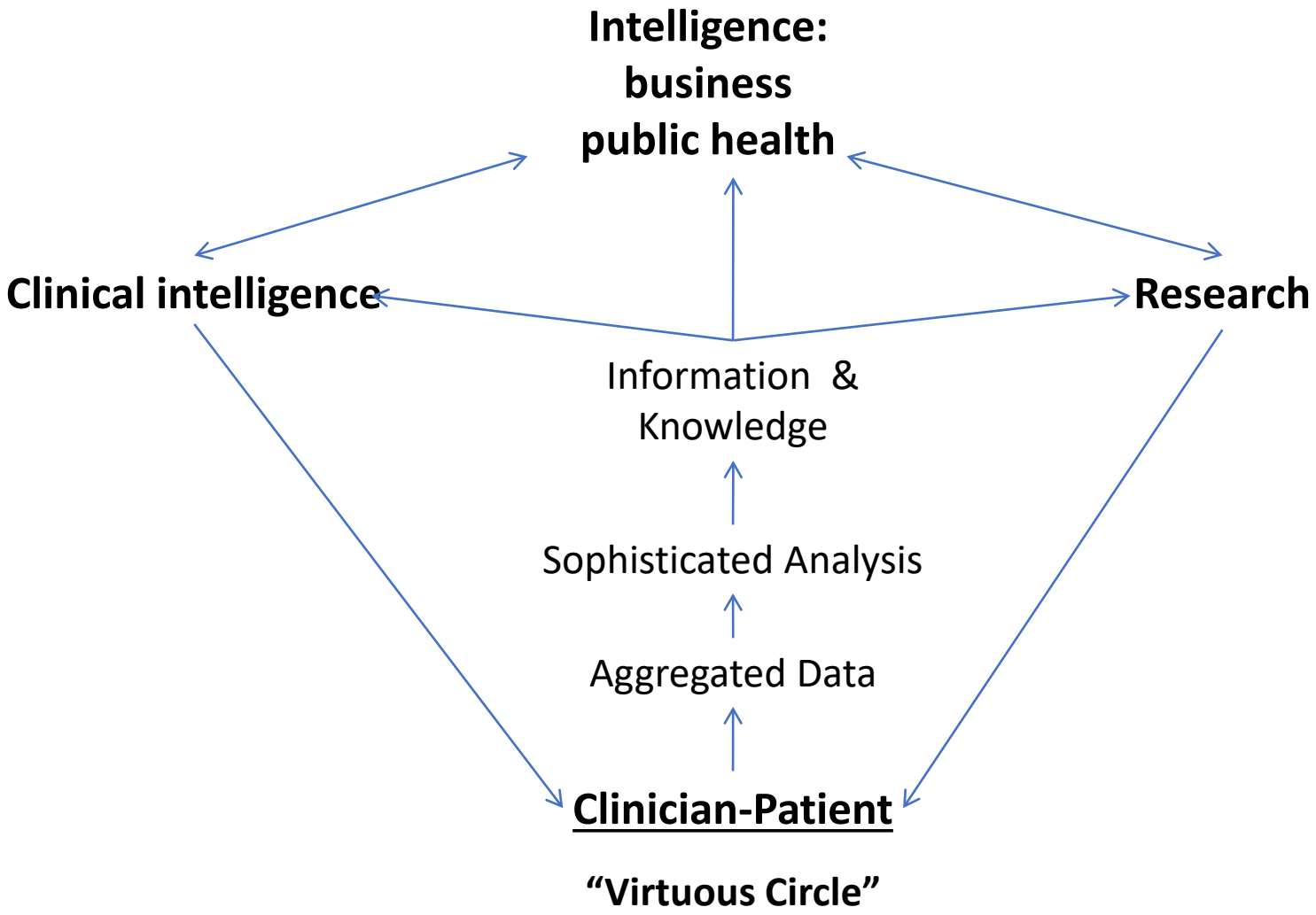
Diagnostic

Tells us why it happened

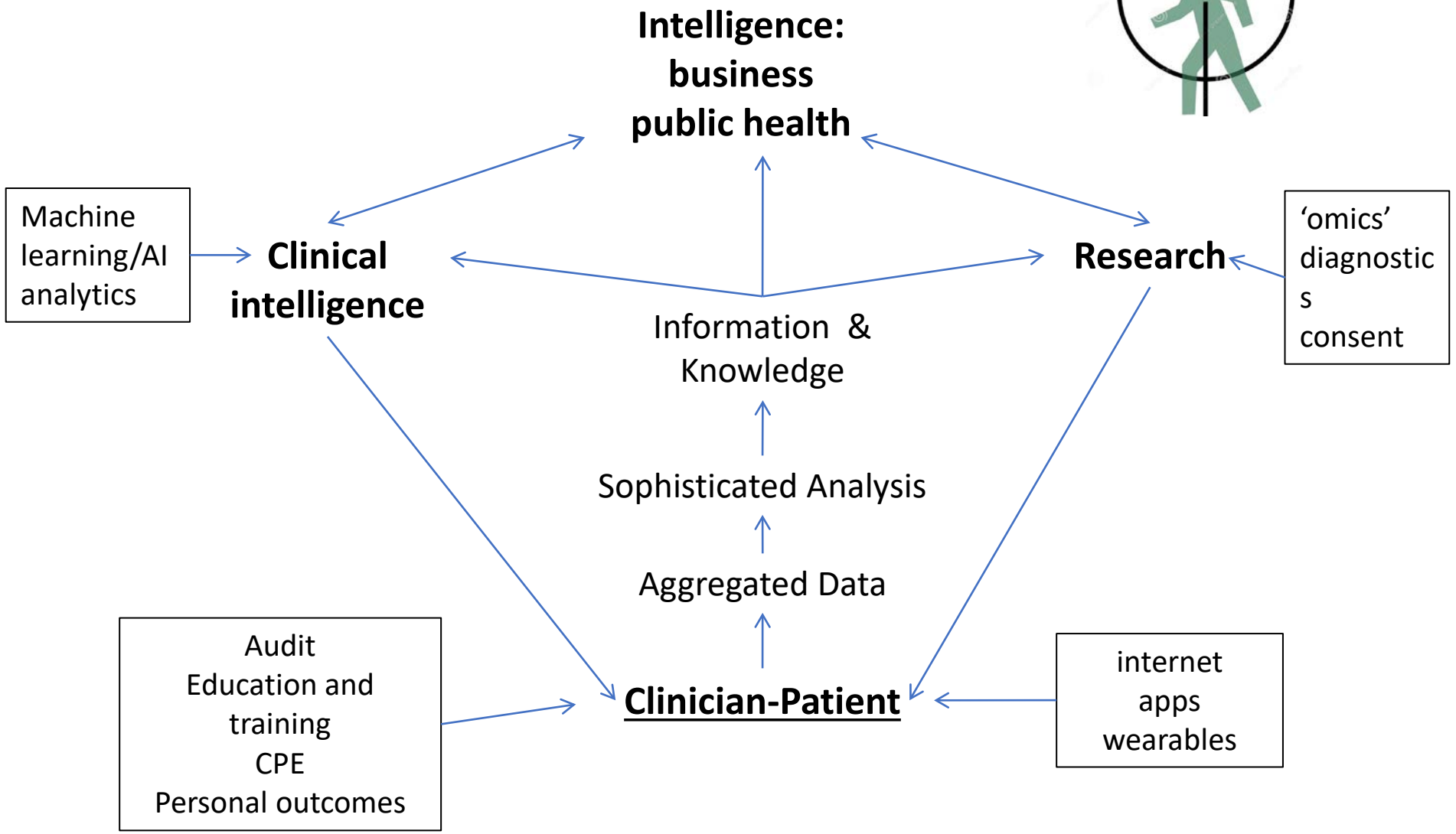
Descriptive - the rear view mirror

Tells us what's happened

Towards a *learning & knowledge* based system



…and on to *precision medicine*

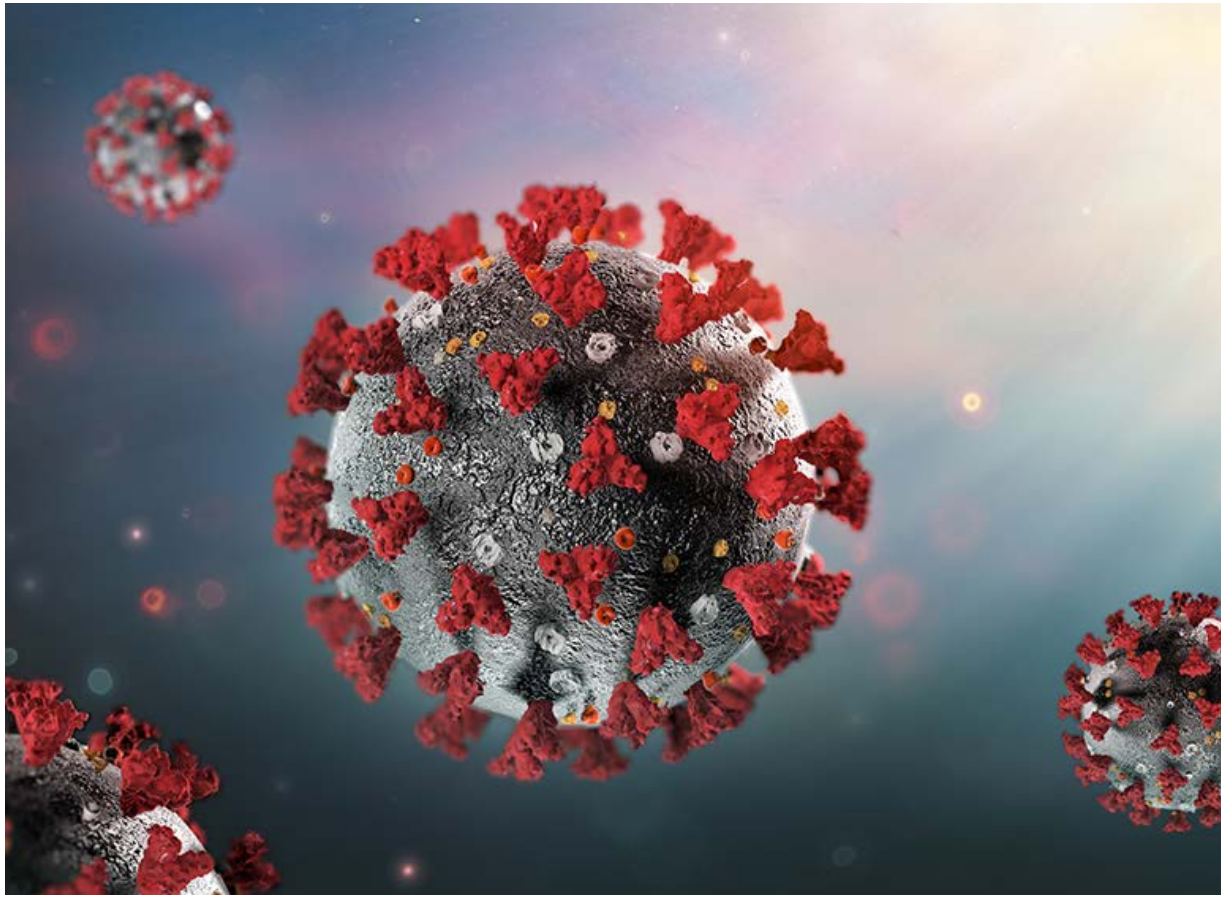


Safe, sustainable high quality patient outcomes…

Arch disruptor - SARS CoV-2

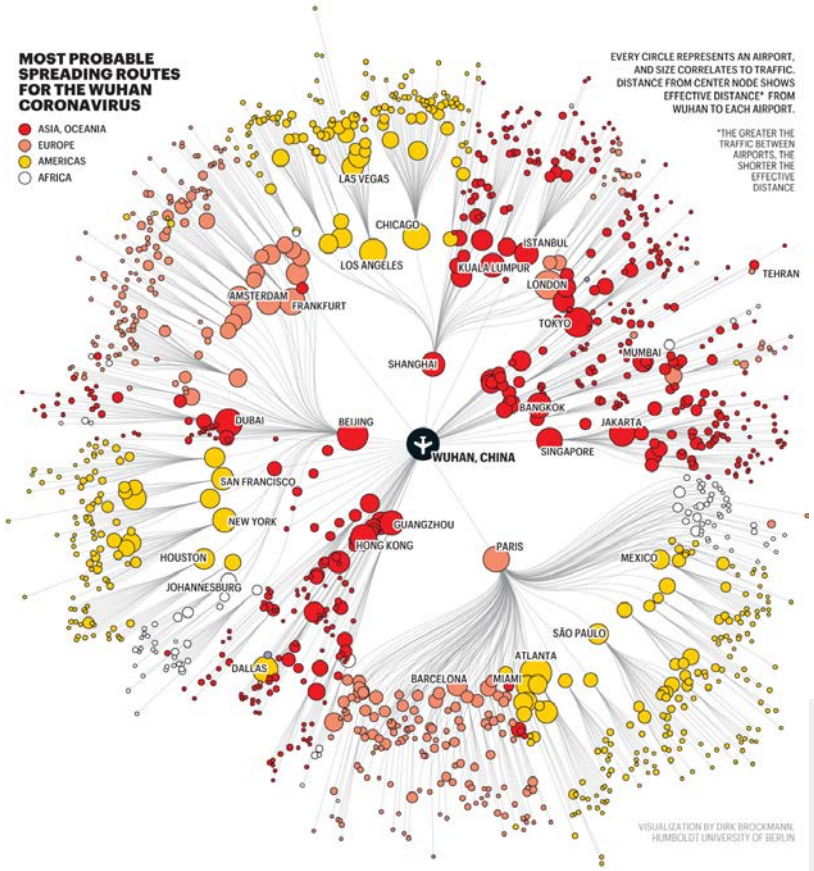
Corona virus
Catastrophe
Contagion
Chaos & Complexity

& fake news!



Chaos Fact!

…what about the flap of a bat's wings in Wuhan?



Chaos & Complexity 101

Tiny input…catastrophic, unanticipated consequences!

COVID Response Planning:
Information dependent

Are we ready?

What are we aiming for?

What more do we need?

Information & Chaos

Information brings order to chaos…

…***data enables the reduction of uncertainty***

Chaos is not random

It just ***appears unpredictable*** because we can't measure &/or interpret all the variables & variation in the ***data***

Our ability to understand and

thrive in a ***complex*** system is

dependent on the quality of the

information that is available to us,

and how we use that information

Clinical Business Intelligence

Cloud based information framework

Data data everywhere and not a byte to think!

CBI Service Offerings

Raw Data **Services**

The CBI Operational Data Store (ODS) is a centralised repository that allows both structured and unstructured (raw) data to be stored in a central location. It is a secure, scalable, standards-based data platform from which new use cases can be built and new data sources can be managed.

Curated Data Services

The CBI Curated Data Service (otherwise known as data vault) is a detail oriented, historical tracking and uniquely linked set of data that can support one or more functional areas of business. The design is flexible, scalable, consistent, adaptable to the needs of the enterprise and based on a standard methodology and design patterns. Curated data can include data that has been historized, integrated or cleansed.

Self-Managed Analytical Services

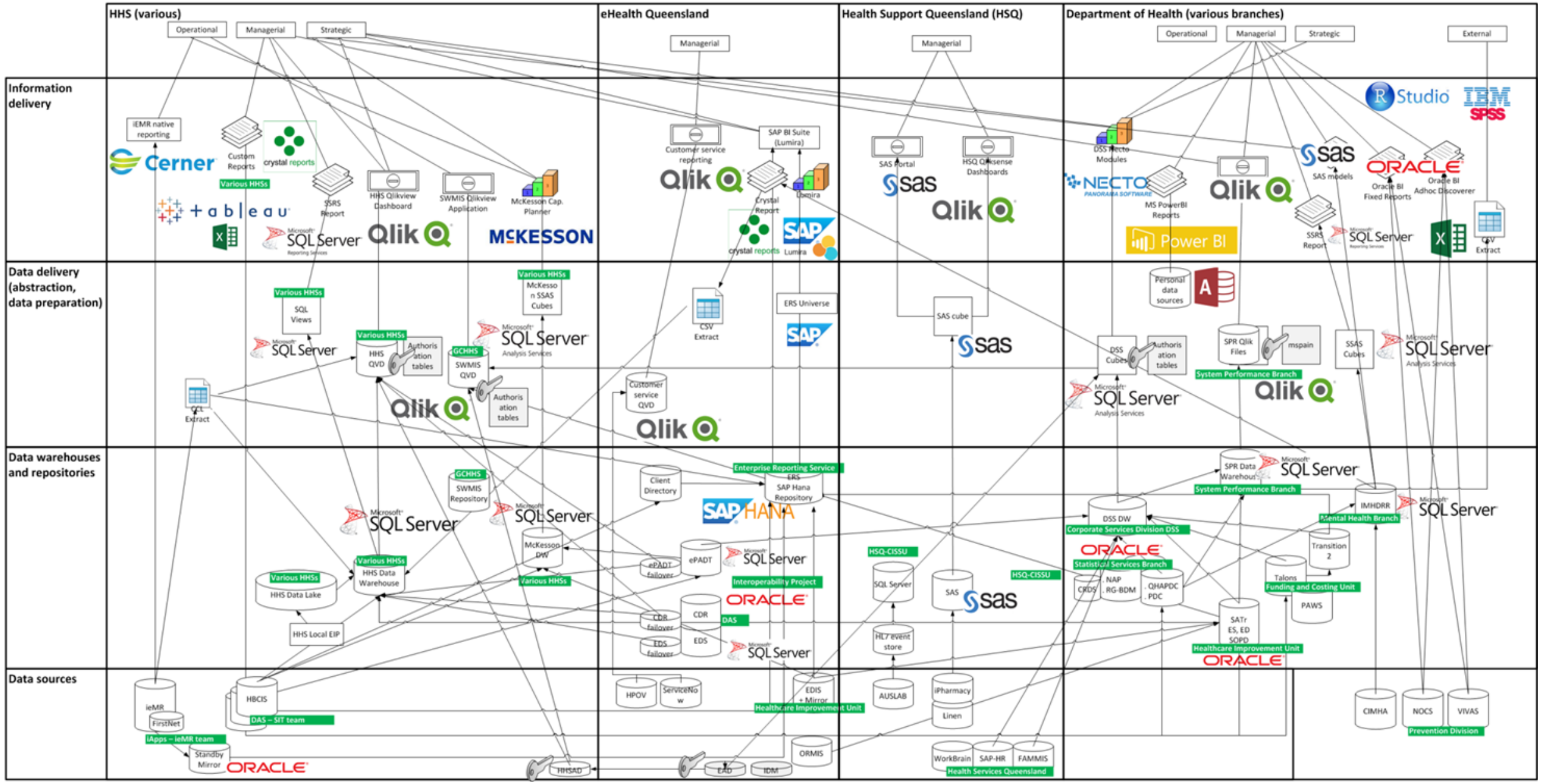
The CBI Self-Managed Analytical Services provides a suite of reporting and analytics tools and services based on trusted, validated, reusable data. Self-Managed Analytical Services currently comes in two forms – Infomarts and Dashboards.

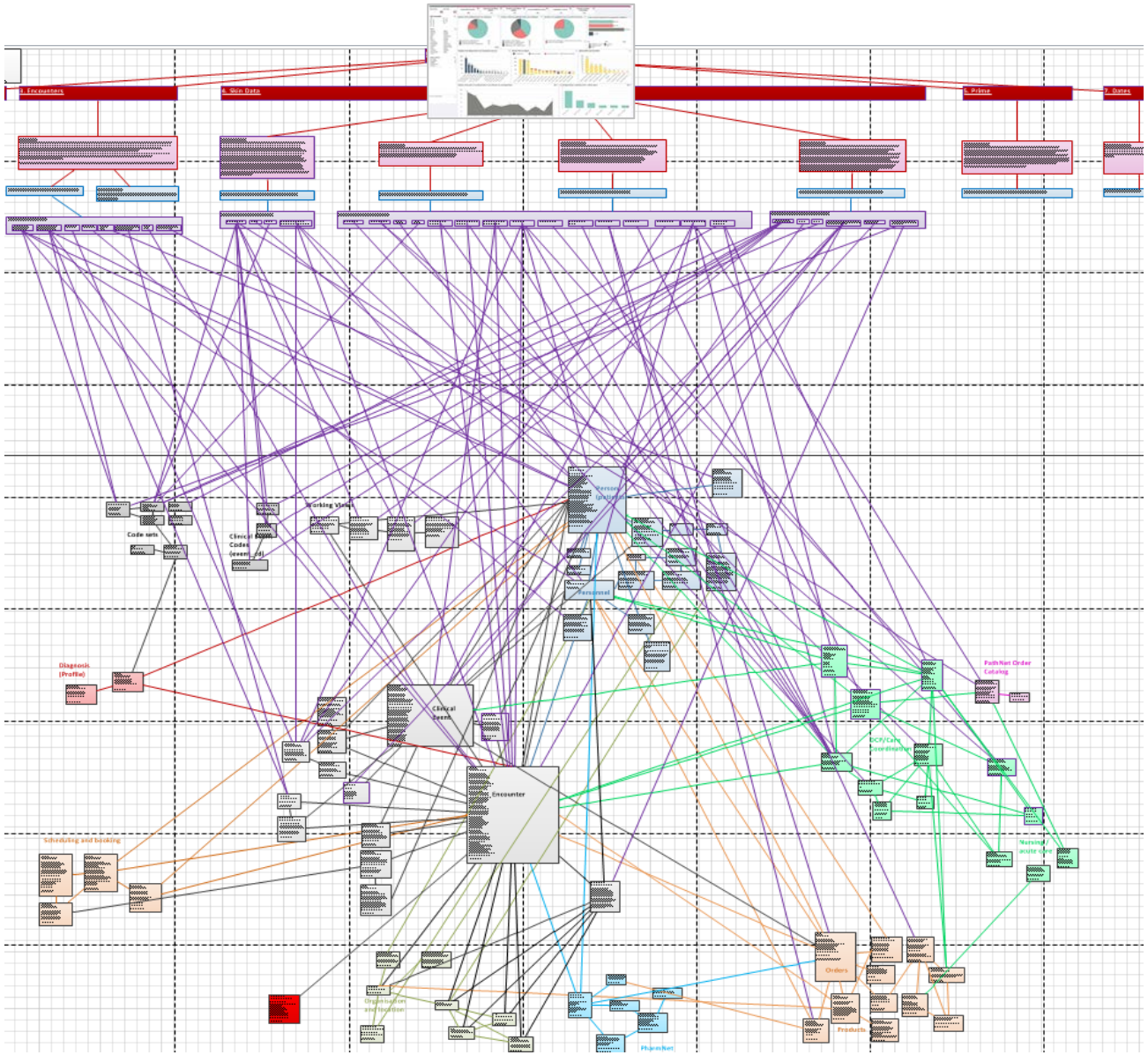
Queensland Health

Clinical and Business Intelligence Current State Summary Overview

Note: This diagram is prepared for illustrative purposes only and does not describe the full CBI landscape.

Prepared by: Benson Choy, Enterprise Information Architect,
eHealth Digital Architecture
Updated: 19/09/2017





Staff change

Requirement change

Rule change

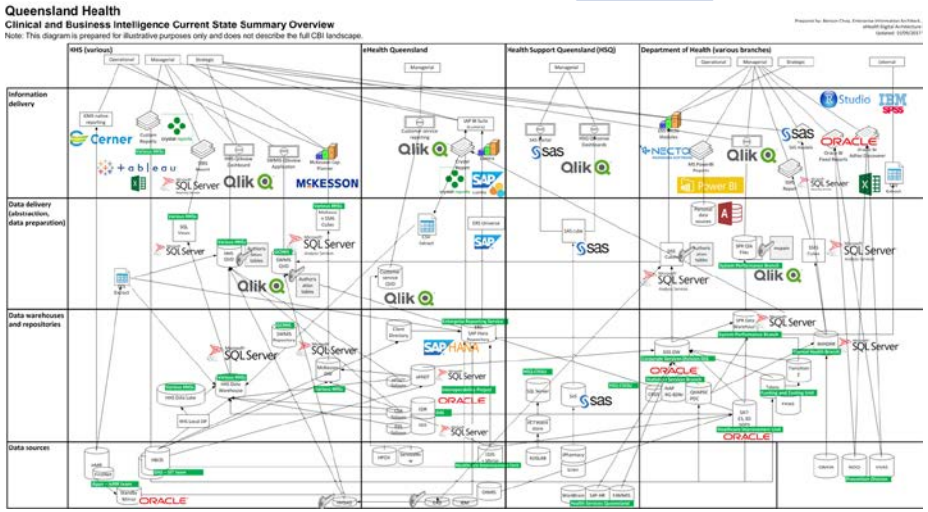
Schema change

Clinical and Business Intelligence

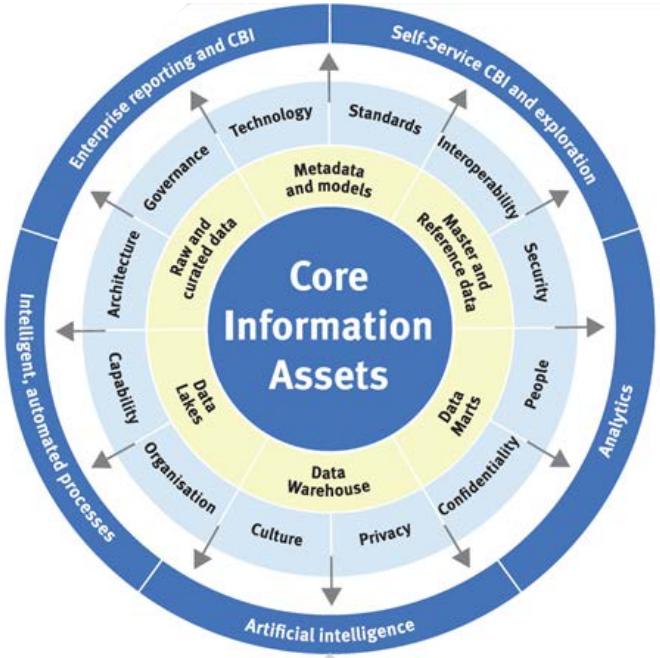
'Better insights, better focus… better health for Queensland'

Implementation of a **State-wide Clinical and Business Intelligence Platform** is progressively establishing a strong foundation for clinical data and analytics in Queensland.

Today



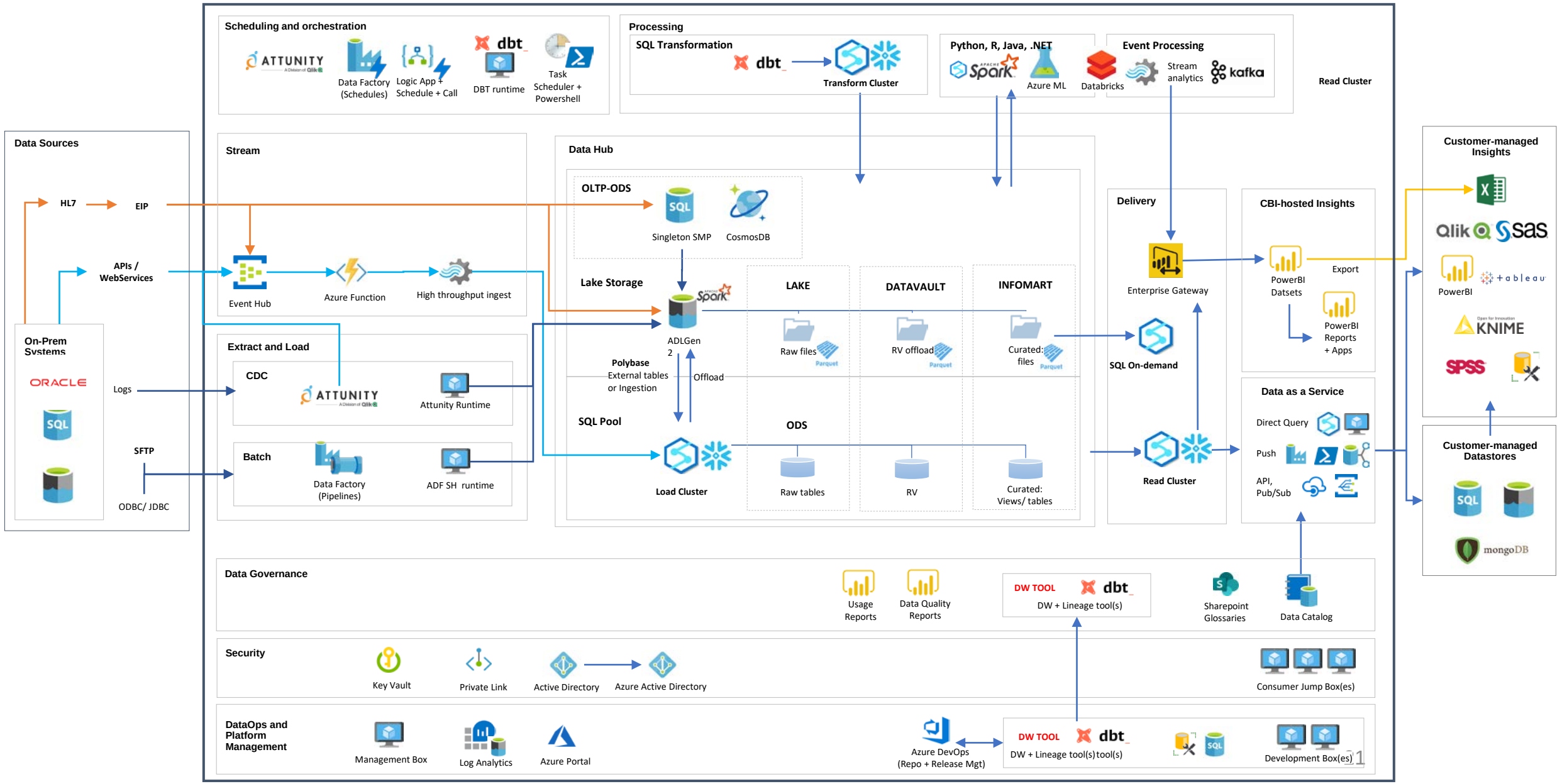
Future



Internet of healthcare things | Clinical data (ieMR) | Genomics data | Behavioural data | Corporate data | Geospatial | External data

Statewide integrated data capability enabling:

- Real-time decision support
- Artificial Intelligence
- Robotics & Machine Learning
- Analytics: Predictive & Prescriptive
- Research


Scheduling and orchestration
ATTUNITY
Data Factory (Schedules)
Logic App + Schedule + Call
dbt
DBT runtime
Task Scheduler + Powershell
Processing
SQL Transformation
dbt
Transform Cluster
Python, R, Java, .NET
Spark
Azure ML
Databricks
Event Processing
Stream analytics
kafka
Read Cluster
Data Sources
HL7
EIP
APIs / WebServices
On-Prem Systems
ORACLE
SQL
Logs
SFTP
ODBC/ JDBC
Stream
Event Hub
Azure Function
High throughput ingest
Extract and Load
CDC
ATTUNITY
Attunity Runtime
Batch
Data Factory (Pipelines)
ADF SH runtime
Data Hub
OLTP-ODS
SQL
Singleton SMP
CosmosDB
Lake Storage
Spark
ADLGen 2
Polybase
External tables or Ingestion
Offload
SQL Pool
Load Cluster
LAKE
Raw files
Parquet
DATAVAULT
RV offload
Parquet
INFOMART
Curated: files
Parquet
ODS
Raw tables
RV
Curated: Views/ tables
Delivery
Enterprise Gateway
SQL On-demand
Read Cluster
CBI-hosted Insights
PowerBI Datasets
Export
PowerBI Reports + Apps
Data as a Service
Direct Query
Push
API, Pub/Sub
Customer-managed Insights
Qlik
SAS
PowerBI
+ableau
KNIME
SPSS
Customer-managed Datastores
SQL
mongoDB
Data Governance
Usage Reports
Data Quality Reports
DW TOOL
dbt
DW + Lineage tool(s)
Sharepoint Glossaries
Data Catalog
Security
Key Vault
Private Link
Active Directory
Azure Active Directory
Consumer Jump Box(es)
DataOps and Platform Management
Management Box
Log Analytics
Azure Portal
Azure DevOps (Repo + Release Mgt)
DW TOOL
dbt
DW + Lineage tool(s)tool(s)
SQL
Development Box(es)

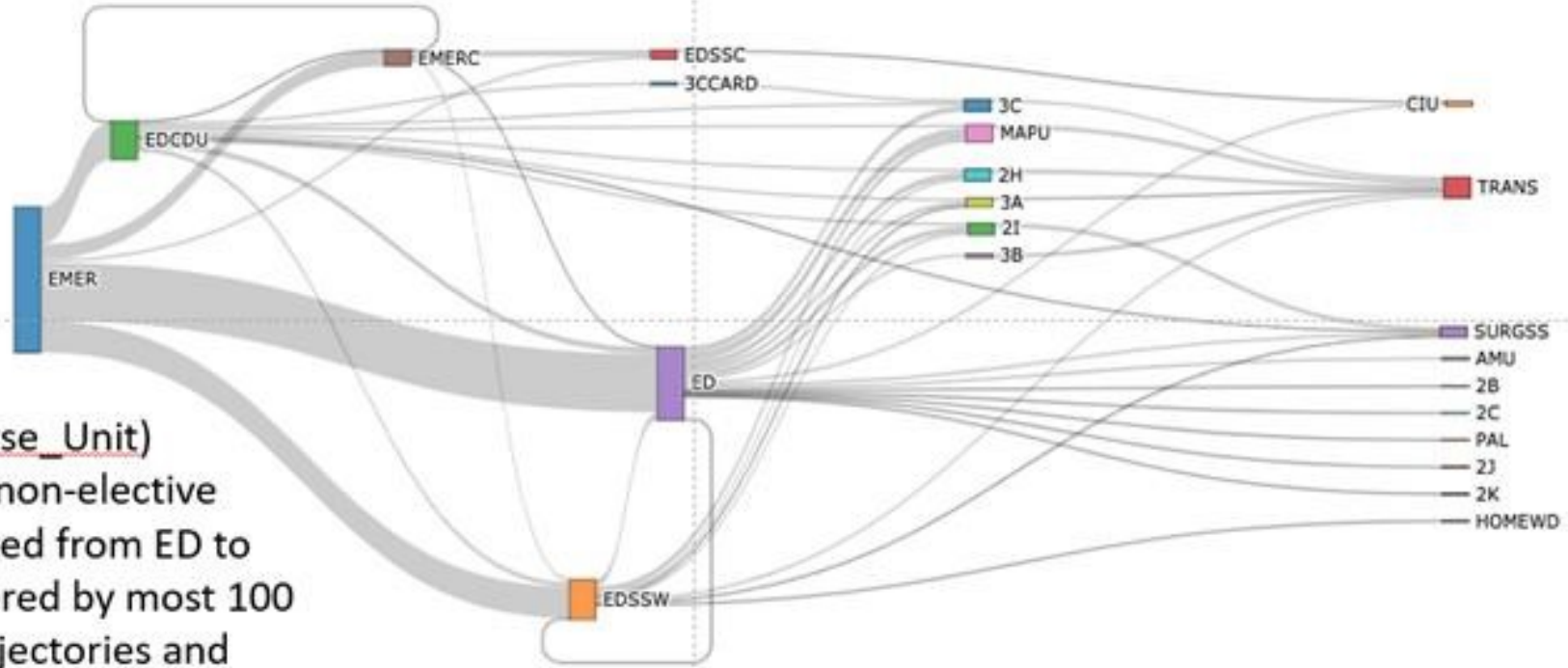
CBI Service Delivery Models

	Complete Solution Example	Data Delivery Service	Data Platform Service	Co-Developed Insights	Fully Managed Insights
Not Applicable	Business Change	Business Change	Business Change	Business Change	Business Change
	Business Requirements	Business Requirements	Business Requirements	Business Requirements	Business Requirements
	Release Management	Release Management	Release Management	Release Management	Release Management
	Visualisation	Visualisation	Visualisation	Visualisation	Visualisation
Customer	Customer Info Marts	Customer Info Marts	Customer Info Marts	Customer Info Marts	Customer Info Marts
	Data Analysis	Data Analysis	Data Analysis	Data Analysis	Data Analysis
	Customer Data Ingestion	Customer Data Ingestion	Customer Data Ingestion	Customer Data Ingestion	Customer Data Ingestion
	Data Sharing	Data Sharing	Data Sharing	Data Sharing	Data Sharing
CBI/Customer	State-wide Info Marts	State-wide Info Marts	State-wide Info Marts	State-wide Info Marts	State-wide Info Marts
	Data Warehousing	Data Warehousing	Data Warehousing	Data Warehousing	Data Warehousing
	Data Lake	Data Lake	Data Lake	Data Lake	Data Lake
	State-wide Data Ingestion	State-wide Data Ingestion	State-wide Data Ingestion	State-wide Data Ingestion	State-wide Data Ingestion
	Data Governance	Data Governance	Data Governance	Data Governance	Data Custodianship
CBI	Platform Management	Platform Management	Platform Management	Platform Management	Platform Management
	Platform Development	Platform Development	Platform Development	Platform Development	Platform Development
	Platform Security	Platform Security	Platform Security	Platform Security	Platform Security
	Platform Architecture	Platform Architecture	Platform Architecture	Platform Architecture	Platform Architecture

Use Cases


July
August
September
October
November
December
2008
February
March
April
May
June
July
August
September
October
November
December
2009
February
March
April
May
900
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
Patients

Simulation and Modelling - Patient Trajectory – Admitted Patients



Wards (Loc_Nurse_Unit) Trajectories for non-elective patients (admitted from ED to Inpatient) – filtered by most 100 frequent full trajectories and minimum pairwise frequency of 1

Advancing Kidney Care Information Solution

Queensland Health

Kidney Transplants Recipients: Summary

Queensland Government

FY 18-19

163

Recipients

FY 17-18

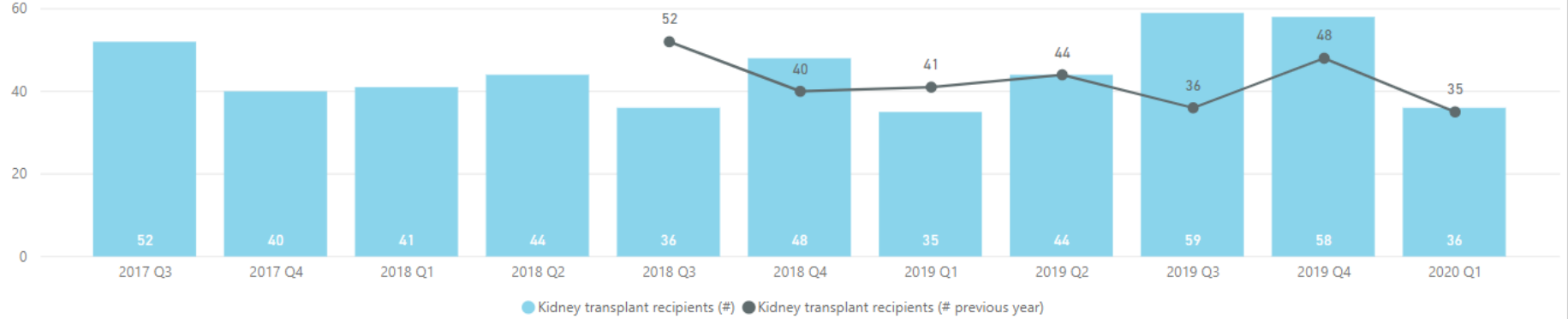
177

Recipients

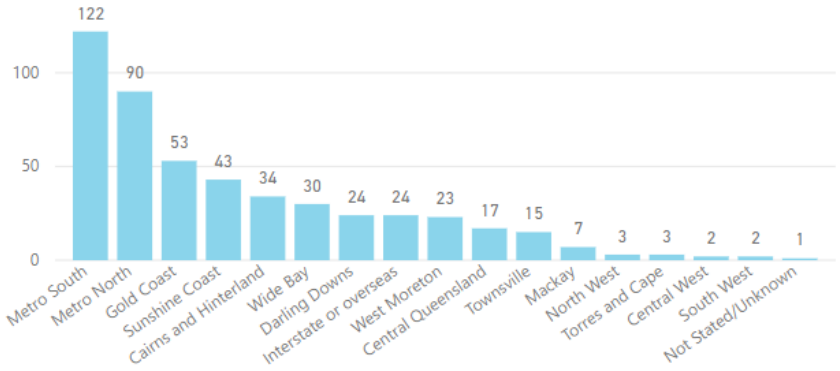
Monthly | Quarterly

Kidney transplant recipients over time

Displayed date range: Jul 2017 - Mar 2020



Kidney transplant recipients by HHS (patient address)



Kidney transplant recipients by sex and Indigenous status

Sex	Indigenous	non-Indigenous	Total
Female	20	169	**189**
Male	20	284	**304**
Total	**40**	**453**	**493**

Kidney transplant recipients by age and Indigenous status

Age group	Indigenous	non-Indigenous	Total
18 - 24 years	1	26	**27**
25 - 34 years	5	42	**47**
35 - 44 years	5	75	**80**
45 - 54 years	13	97	**110**
55 - 64 years	10	124	**134**
65 - 74 years	6	86	**92**
75 + years		3	**3**
Total	**40**	**453**	**493**

No filters applied

Filters

Search

Filters on this page

- Complete quarter is (All)
- Year quarter (calendar) is (All)
- Month year is (All)
- Patient sub age group is (All)

Filters on all pages

- Patient sex is (All)
- Patient Indigenous st... is (All)
- Principal diagnosis is (All)
- Socio-economic (SEIF... is (All)
- Remoteness (ARIA) pa... is (All)
- HHS patient address is (All)

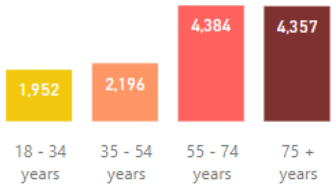
Advancing Kidney Care Information Solution
Queensland Health

Acute Kidney Injury: Demographics (Multiple HHS)

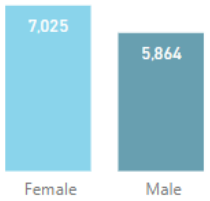
Queensland Government

Displayed date range: Jul 2017 - Mar 2020

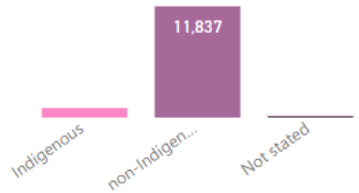
Age

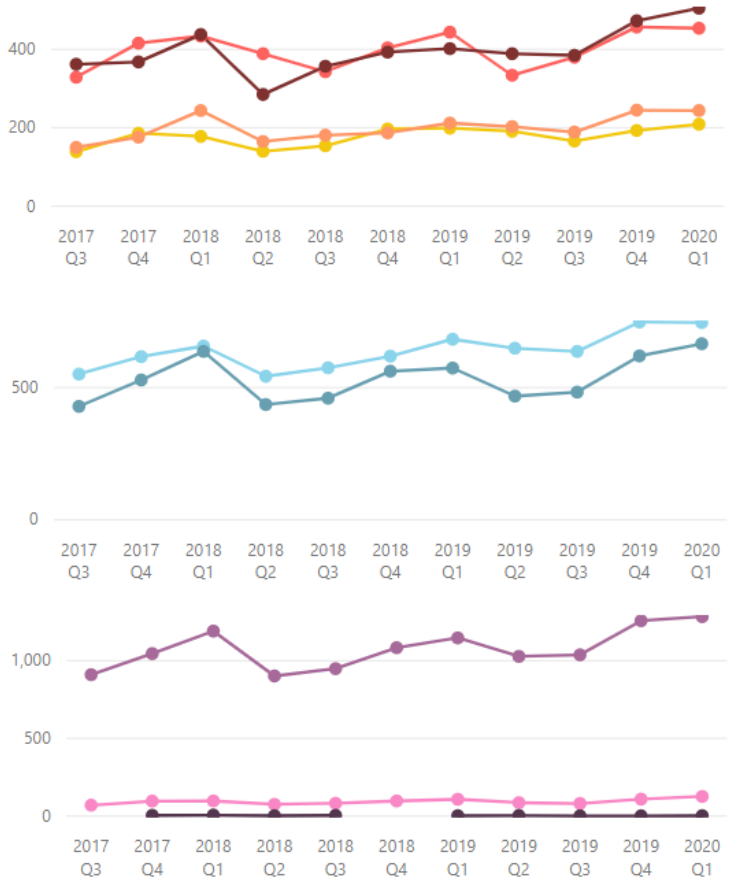


Sex

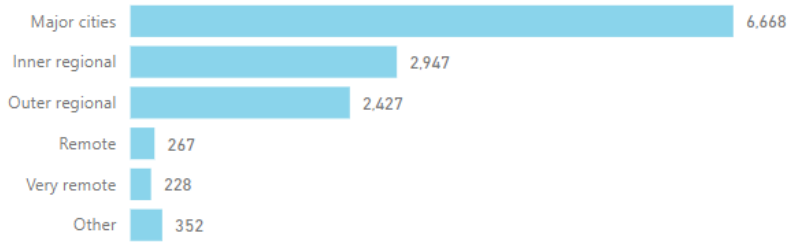


Indigenous status

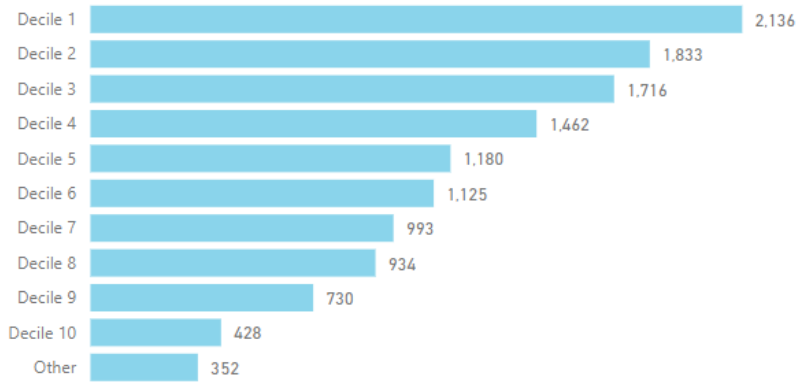




Remoteness of residence (ARIA)



Index of Relative Socio-Economic Advantage and Disadvantage (SEIFA-IRSAD)



Decile 10 = Most advantaged Decile 1 = Most disadvantaged

AKI diagnosis = AKI primary diagnosis |

Filters

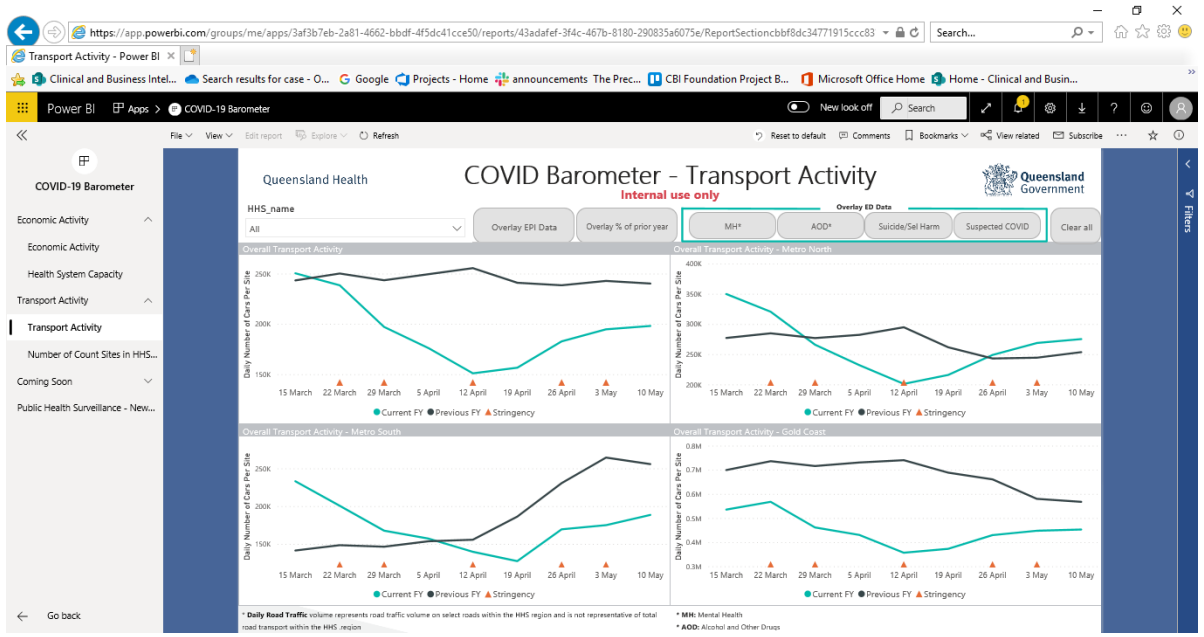
Search

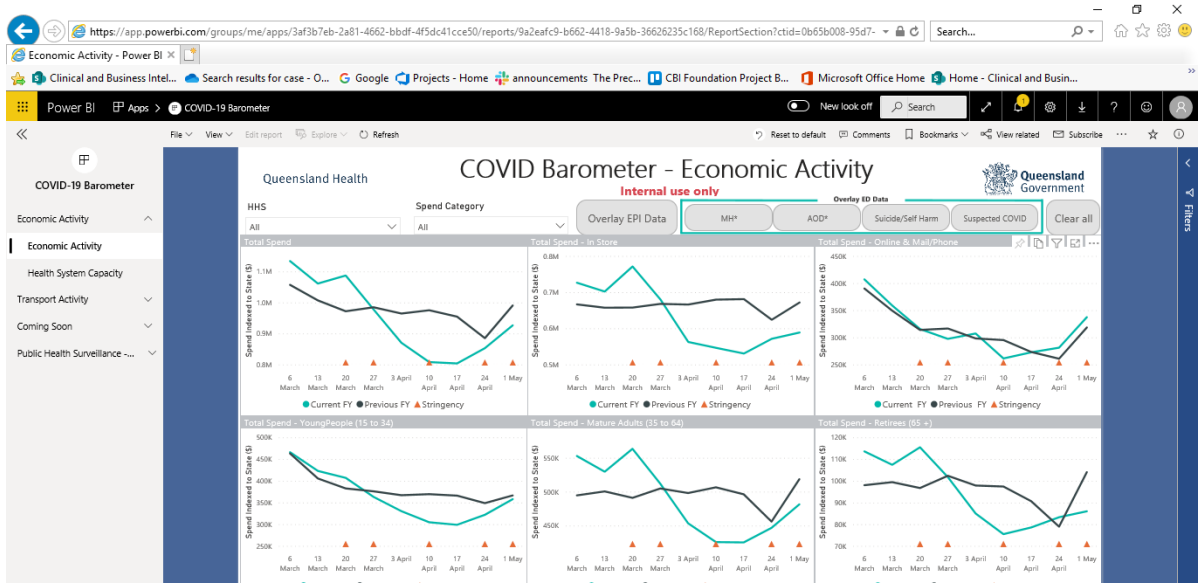
Filters on this page

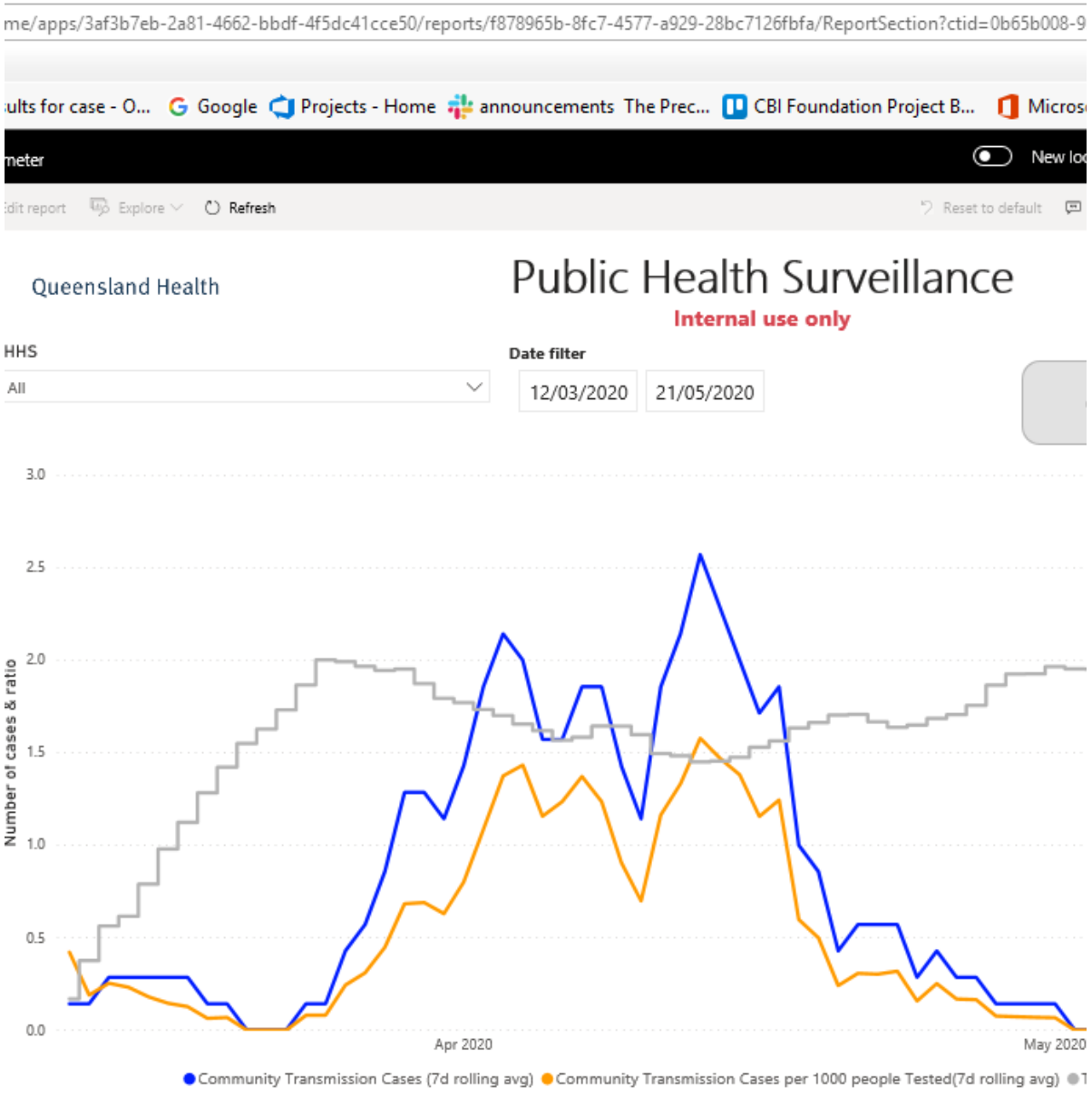
- Complete quarter is (All)
- **AKI diagnosis** is AKI primary diagnosis
- Patient age group is (All)

Filters on all pages

- Year quarter (calendar) is (All)
- HHS is (All)
- Facility is (All)
- Admission ward code is (All)
- Patient sex is (All)
- Patient Indigenous st... is (All)
- Diagnosis (primary A... is (All)
- Socio-economic (SEIF... is (All)
- Remoteness (ARIA) pa... is (All)
- HHS patient address is (All)


Power BI
COVID-19 Barometer
Queensland Health
COVID Barometer - Transport Activity
Internal use only
Queensland Government
HHS_name
All
Overlay EPI Data
Overlay % of prior year
Overlay ED Data
MH*
AOD*
Suicide/Sel Harm
Suspected COVID
Clear all
Overall Transport Activity
Overall Transport Activity - Metro North
Overall Transport Activity - Metro South
Overall Transport Activity - Gold Coast
Daily Number of Cars Per Site
15 March
22 March
29 March
5 April
12 April
19 April
26 April
3 May
10 May
Current FY
Previous FY
Stringency
* Daily Road Traffic volume represents road traffic volume on select roads within the HHS region and is not representative of total road transport within the HHS region
* MH: Mental Health
* AOD: Alcohol and Other Drugs
Economic Activity
Health System Capacity
Transport Activity
Number of Count Sites in HHS...
Coming Soon
Public Health Surveillance - New...
Go back


Power BI
COVID-19 Barometer
Queensland Health
COVID Barometer - Economic Activity
Internal use only
Queensland Government
HHS
Spend Category
All
Overlay EPI Data
Overlay ED Data
MH*
AOD*
Suicide/Self Harm
Suspected COVID
Clear all
Total Spend
Total Spend - In Store
Total Spend - Online & Mail/Phone
Total Spend - YoungPeople (15 to 34)
Total Spend - Mature Adults (35 to 64)
Total Spend - Retirees (65 +)
Spend Indexed to State ($)
Current FY
Previous FY
Stringency
Economic Activity
Health System Capacity
Transport Activity
Coming Soon
Public Health Surveillance -...


Queensland Health
Public Health Surveillance
Internal use only
HHS
All
Date filter
12/03/2020
21/05/2020
Number of cases & ratio
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Apr 2020
May 2020
Community Transmission Cases (7d rolling avg)
Community Transmission Cases per 1000 people Tested(7d rolling avg)

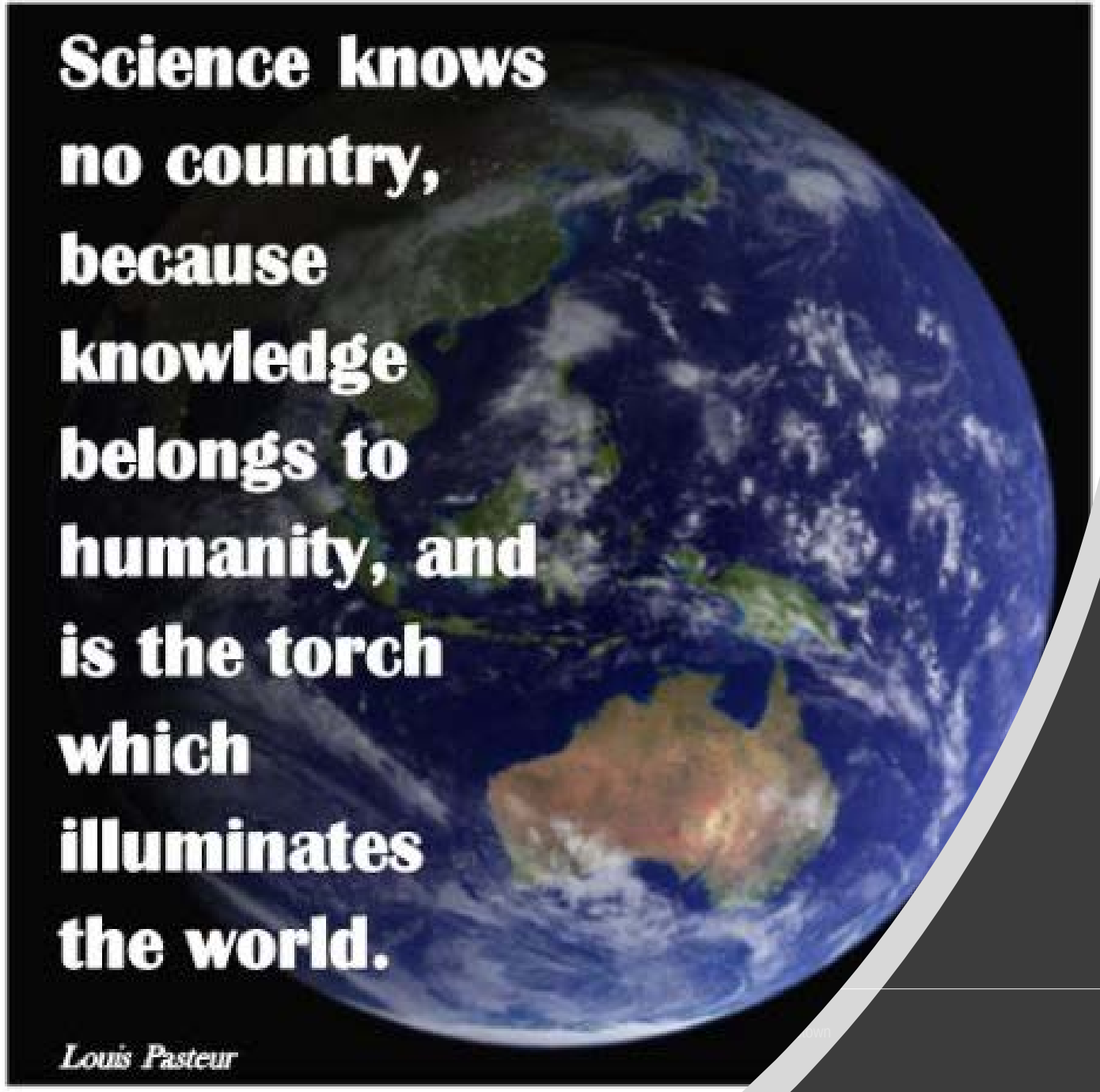
Artificial Intelligence

"The task is not so much to see what no one has yet seen,

but to think what nobody has yet thought

but which everyone sees"

Arthur Schopenhaur



Democratise data - FAIR