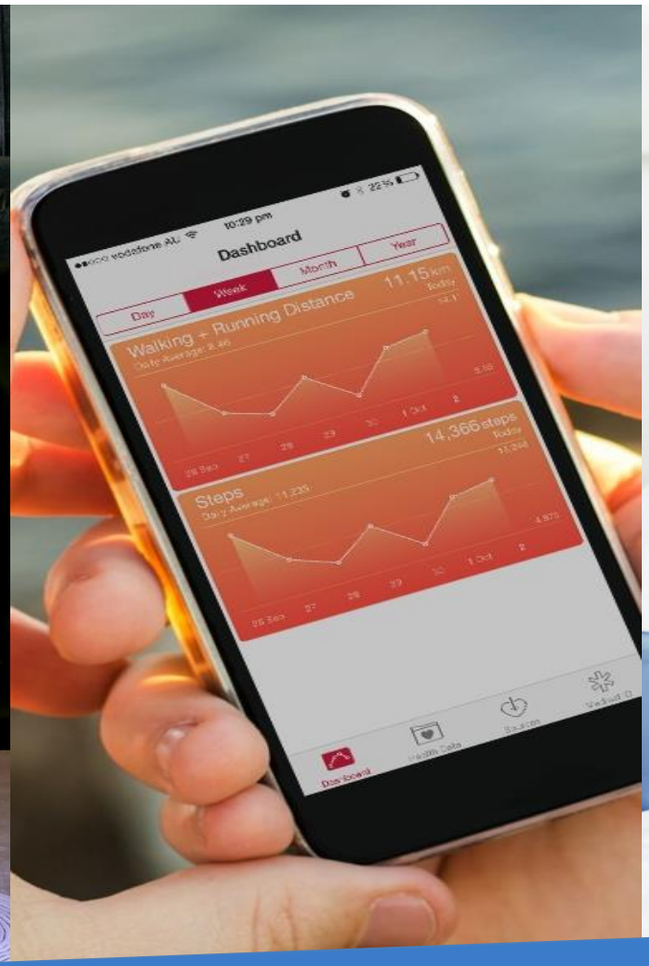
DICOM Educational Workshop





The future is digital: What will this mean for medical imaging and how does interoperability play a role?

Corey Monaghan, A/Chief Digital Strategy Officer, Queensland Health

Queensland Government

Discussion Points

- Interoperability – what is it? More than integration and information sharing
- Critical challenges for interoperability; particularly for Medical Imaging
- Benefits of using digital by design
- Big Data, Analytics, IoT and other sexy terms
- Cyber Security

Interoperability

In healthcare, interoperability is the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged.

Interoperability means the ability of health information systems to work together within and across organisational boundaries in order to advance the effective delivery of healthcare for individuals and communities”

- Healthcare Information and Management Systems Society

Queensland Health interoperability vision

The current situation

Healthcare service in Queensland are delivered by multiple providers, all working together in a diverse health ecosystem which comprises of:

16 Hospital and Health Services (HHSs) across rural and remote, regional and metropolitan areas

...with 183 hospitals

...and 16 local ambulance service networks that respond to more than 870,000 incidents per year

...working with 7 primary health networks, other government agencies and numerous private providers

...to deliver services to a population growing by almost 9 people per hour dispersed across more than 1,850,000 km^2

The collection and management of information is siloed and the exchange of information (which is often captured in different ways) creates inefficiencies across the healthcare system and reduces the ability to communicate effectively.

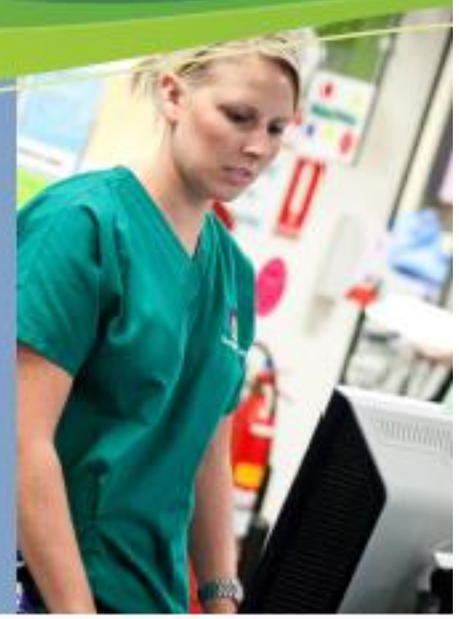
Our vision

Information that is captured and exchanged is fit-for-purpose and consistently understood by all participants involved in the care of the patient across the patient journey, ultimately resulting in improved health outcomes for Queenslanders and improved working environment for healthcare providers.

Principles

The vision is guided by the following interoperability principles:

- support effective healthcare service delivery
- enable patients to participate in their own healthcare
- support current and evolving models of care
- privacy, security and integrity of patient health information will be maintained
- data is shared from clearly defined and agreed authoritative data sources
- data quality approaches are used to ensure data can be trusted
- information is available when and where needed within legislative controls
- focus will be on information exchange using common standards, not common technology.



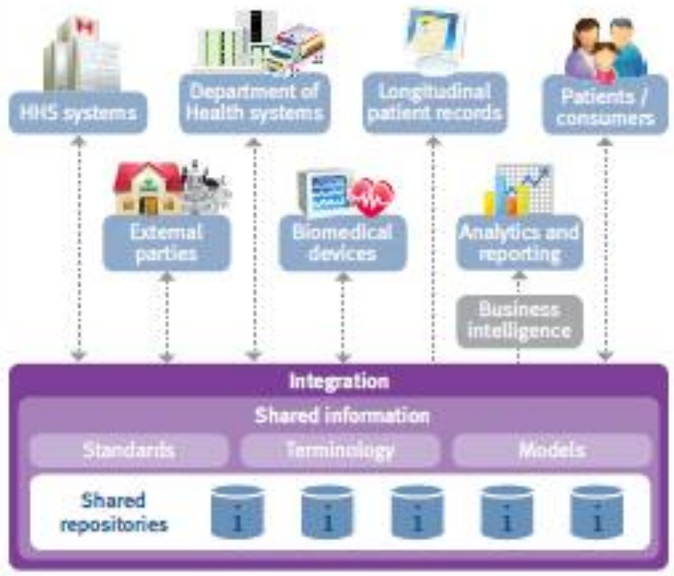
Desired outcomes

Queensland requires the ability to deliver excellent healthcare in an integrated environment supporting the movement of patients and providers between all services. In this integrated environment there is a need to receive and disseminate timely, reliable and secure information when and where required.

In a broader context, interoperability is fundamental to the success of connected government – to enable a collaborative, effective and efficient government and the delivery of seamless government services.

1. Support the flow of information throughout the patient journey ensuring it is accessible anywhere, any time on a wide variety of devices.
2. Provide access to accurate, timely and relevant information to support clinicians, staff and patients in making informed decisions.
3. Support sharing of information with other health care providers.
4. Support a devolved healthcare delivery model, where HHSs have choice in what services and technologies they invest in.
5. Enable information to be consolidated, analysed and shared supporting system-wide outcomes, transparency of government, enhanced planning, reporting and research.
6. Support Queensland Government's open data and ICT strategies, including a "cloud first" approach.
7. Support flexible workforce strategies by providing access to relevant information anywhere, anytime.

Interoperability in action



"In healthcare, interoperability is the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged. Interoperability means the ability of health information systems to work together within and across organisational boundaries in order to advance the effective delivery of healthcare for individuals and communities"

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https://qheps.health.qld.gov.au/__data/assets/pdf_file/0036/458784/interoperability-vision.pdf

Great state. Great opportunity.
And a plan for the future.

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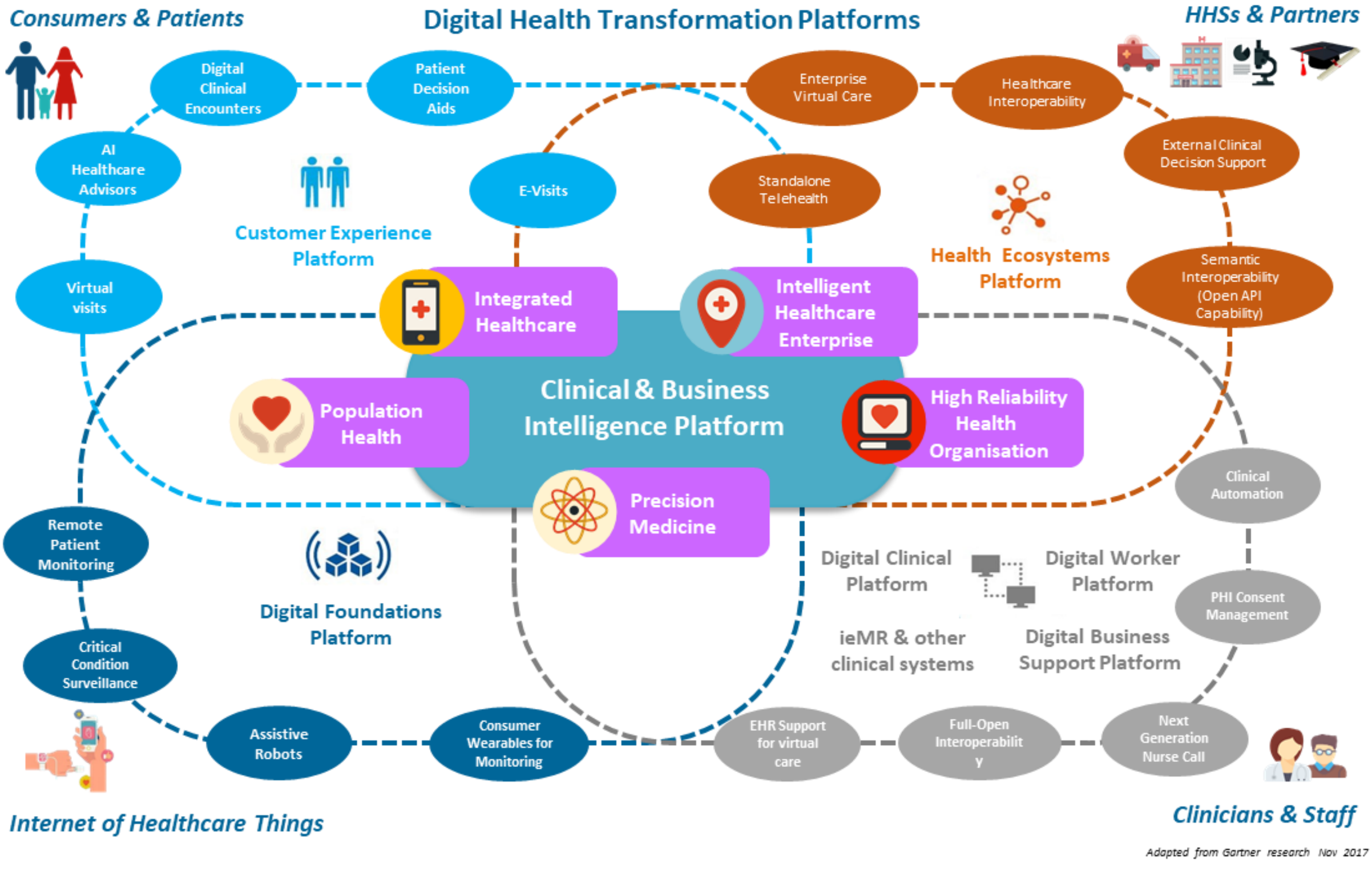
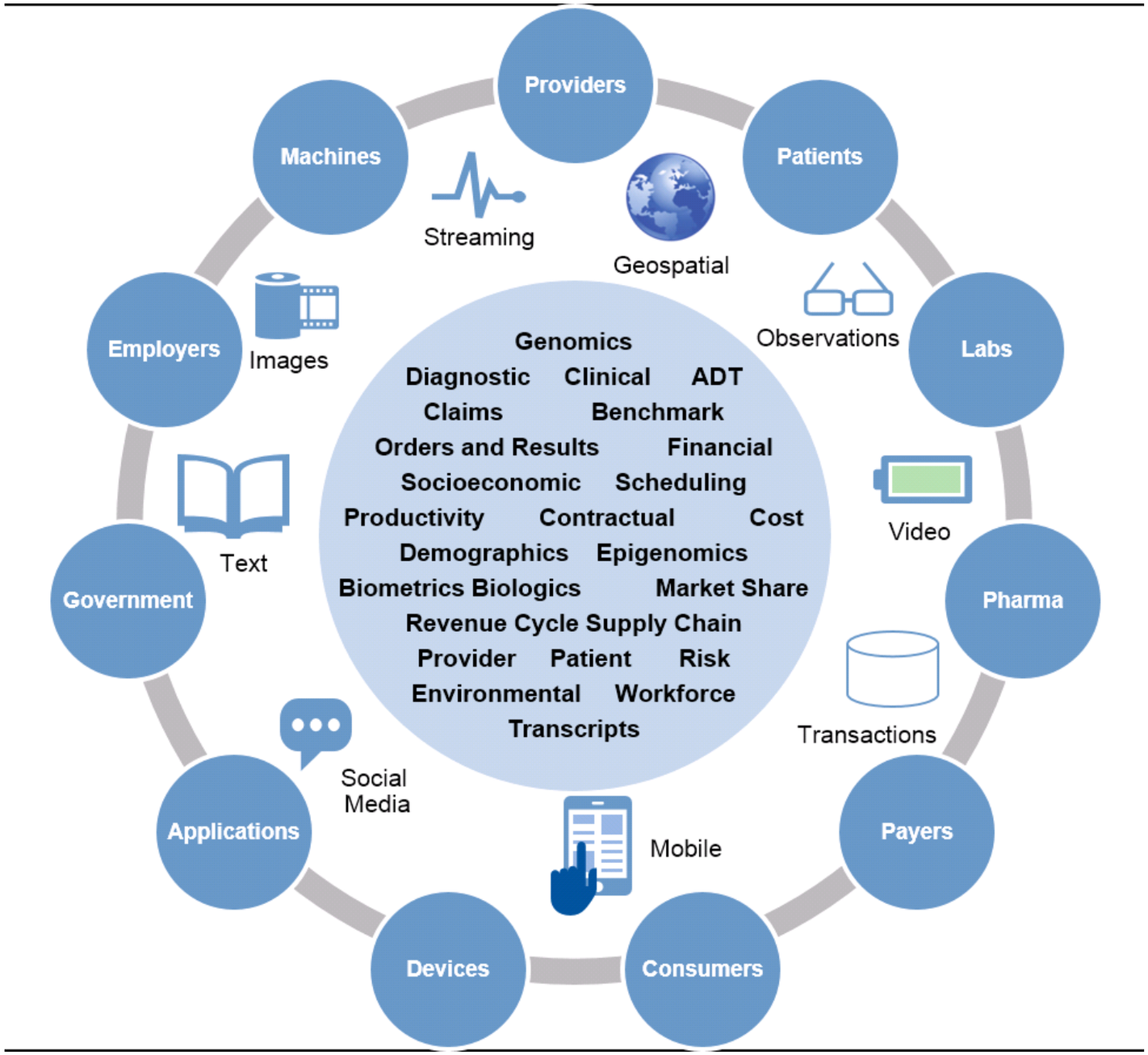


Adapted from Gartner research Nov 2017

Challenge 1: The Expanding Universe of Healthcare Data



Other key challenges

- Informatics and literacy
- New ways of working
- Terminology
- Data Definitions
- Identity
- Order sets and agreed orders / results catalogues (all “…ologies”)
- Hybrid (paper, multi system, integrated)
- Device density and connectivity

Without digital non of the following are possible

- Predictive analytics
- Prescriptive analytics
- Big data / small data
- Augmented intelligence / Swarm intelligence
- Machine learning
- Visualisation / virtualisation
- Gamification

We must support:

- The flow of information throughout the patient journey ensuring it is accessible anywhere, any time on a wide variety of devices.
- Access to accurate, timely and relevant information to support clinicians, staff and patients in making informed decisions.
- Sharing of information with other health care providers.
- A devolved healthcare delivery model, where HHSs have choice in what services and technologies they invest in.
- The ability for information to be consolidated, analysed and shared supporting system-wide outcomes, transparency of government, enhanced planning, reporting and research.
- Queensland Government's open data and ICT strategies, including a "cloud first" approach.
- Flexible workforce strategies by providing access to relevant information anywhere, anytime

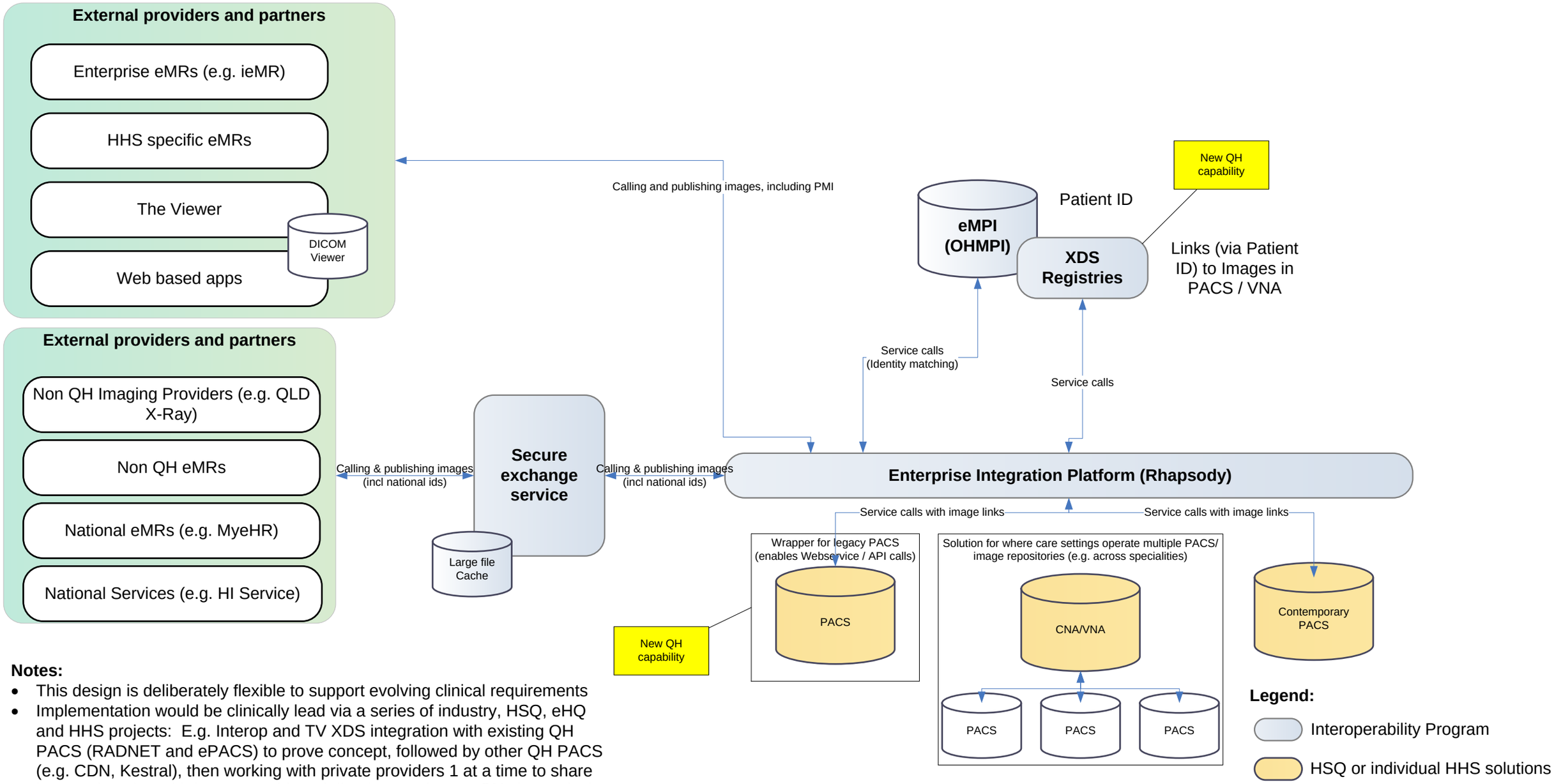
We are already seeing significant benefit for us and our patients

Better consumer and staff experience ✓ ✓ ✓

Safer Care	
Medication errors	↓
Serious falls	↓
Hospital infection	↓
VTE	↓
Cardiac arrests (record high 16/17 activity – Record low cardiac arrest)	↓
Evidence based care	↑
Readmissions	↓

Efficiency and Productivity	
Length of stay (800 bed hospital)	↓
Nursing care time	↑
Activity	↑
Duplication	↓
Cost per WAU	↓
Access and throughput indicators record high	✓

Image Anywhere Architecture



Notes:

- This design is deliberately flexible to support evolving clinical requirements
- Implementation would be clinically lead via a series of industry, HSQ, eHQ and HHS projects: E.g. Interop and TV XDS integration with existing QH PACS (RADNET and ePACS) to prove concept, followed by other QH PACS (e.g. CDN, Kestral), then working with private providers 1 at a time to share images (starting with image providers delivering services to QH sites today)
- The solution is standards based

“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” NSW Health 2016

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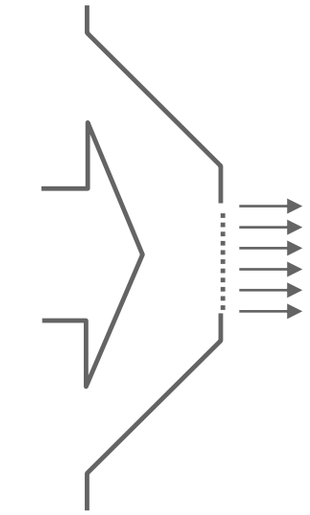
Information Management Strategy and Roadmap for Queensland Health

Figure one: Digital health themes



Information Management areas of focus

1. Governance of data
2. Data standards and infostructure
3. Consent and privacy – use of data
4. Transition of information to digital
5. Data quality
6. Storage of data / digital continuity
7. Security of data / data breaches
8. Information sharing
9. Health intelligence and data analytics
10. Knowledge management stewardship

Roadmap journey across the horizons

Information Management Strategy direction across:	Horizon 1: Building (within three years)	Horizon 2: Optimising (within five years)	Horizon 3: Transforming (within seven years)
eHealth Queensland	• Drive the Information Management Strategy and Roadmap; that are resourced for implementation • Strategic use cases for data and information are developed and used statewide • Processes, standards, policies for strategic use cases for data and information are developed • Maturity models for information management and health intelligence developed for local division and HHS use • Data and information custodians in place • Lead the development of standards and processes reflect current privacy / security processes and legislation • Coaching and training for digital workers established across Queensland Health	• Action plan for shared data with strategic external partnership established • Queensland Legislation in line with requirements from strategic use cases, privacy and security has been refreshed • Assessment of information management technology 'smart' tools to assist Queensland Health undertaken • Resources for digital workers and digital citizens available	• Future strategy and roadmap is planned against strategic priorities • Information Management Strategy updated • Tools, processes and policies to enable sharing of appropriate information across whole of government established • Processes to adapt smart technologies for information management established
IMSGC	• Governance structures align with strategy and roadmap with strong sponsorship implemented • Metrics and reporting structures are integrated statewide allowing practical management and action • Support agile governance for strategic use cases of data and information that have been developed and are in use • Drive the progression of governance for data, information, and records	• Govern, monitor and control information management across the state; including sub-working groups • Maturity models are well established and known through data, information and records managers • Continual review and alignment to strategy and roadmap	• Lead the review and update of the Information Management Strategy • Further strategic mapping and development of roadmap for priority use cases for data and information
Queensland Health divisions and HHS's	• Localised governance is well established and escalation processes are in place (where required) • Maturity plans of information management and health intelligence are known and actioned • Sharing of knowledge across the network is established • Statewide processes, standards, tools are leveraged locally	• Monitor and control at the local level with recommendations on information management locally or across the network • Maturity models are well established and known through data, information and records management • Statewide processes and standards have been localised	• The culture promotes innovation and leading practice for information management, that support data as a strategic asset • Local use cases for data and information for current and future use are known at the statewide level, for inclusion in the Information Management Strategy

Roadmap executive themes

- There is an increased focus on the **importance** of data and information
- Custodianship is a great start; however **strategic drive** for information is needed
- **Strategic use cases** for current and planned uses of data should underpin all activities to provide direction and actions
- New **agile** ways are needed for developing new data standards, processes, custodians (etc), for emerging technologies and new information uses
- **Maturity** of digital health information management and health intelligence needs to be increased across Queensland Health Business divisions and HHS's
- There is a need to increase the **knowledge** of the digital workers and digital consumers through access to information
- Strategic partnerships for internal and external **information sharing** need leadership, agreements and processes
- **Knowledge sharing** needs to be fostered across divisions and HHS's for information management initiatives and innovation
- Divisions and HHS's need to **localise** the statewide processes, increase maturity, share and learn
- The availability of information tools and technologies across all Queensland Health services needs to be **equitable**

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Strategic Challenges

1. Foundations

- Maturity - good CBI is more than just a dashboard
- BI and analytics is increasingly critical. Needs DR and HA

2. Federation

- How to be *consistent* & *governed* while also
- *Flexible* & *localised*

3. Fragmentation

- Finance & HR, performance, clinical
- Common data but
- Varied objectives, perspectives, models and maturity

4. Complexity

- Tactical over strategic decisions
- Lack of agility
- Technical debt

5. Varied needs

- Services to support new ways of working
- Data as a service

6. Scaling maturity

- We innovate but we CANT scale
- Emergence of realtime is a new paradigm

Note:

- This summary of challenges does not refer to any single CBI application, branch/division or HHS but has been generalised across the CBI landscape as a whole, with a primary focus on enterprise rather than local challenges.
- It should be acknowledged that some HHSs and DoH branches/divisions have demonstrated exemplar maturity and capability in some of these areas. Their work has the potential to be expanded upon and shared for the wider benefit of QH.

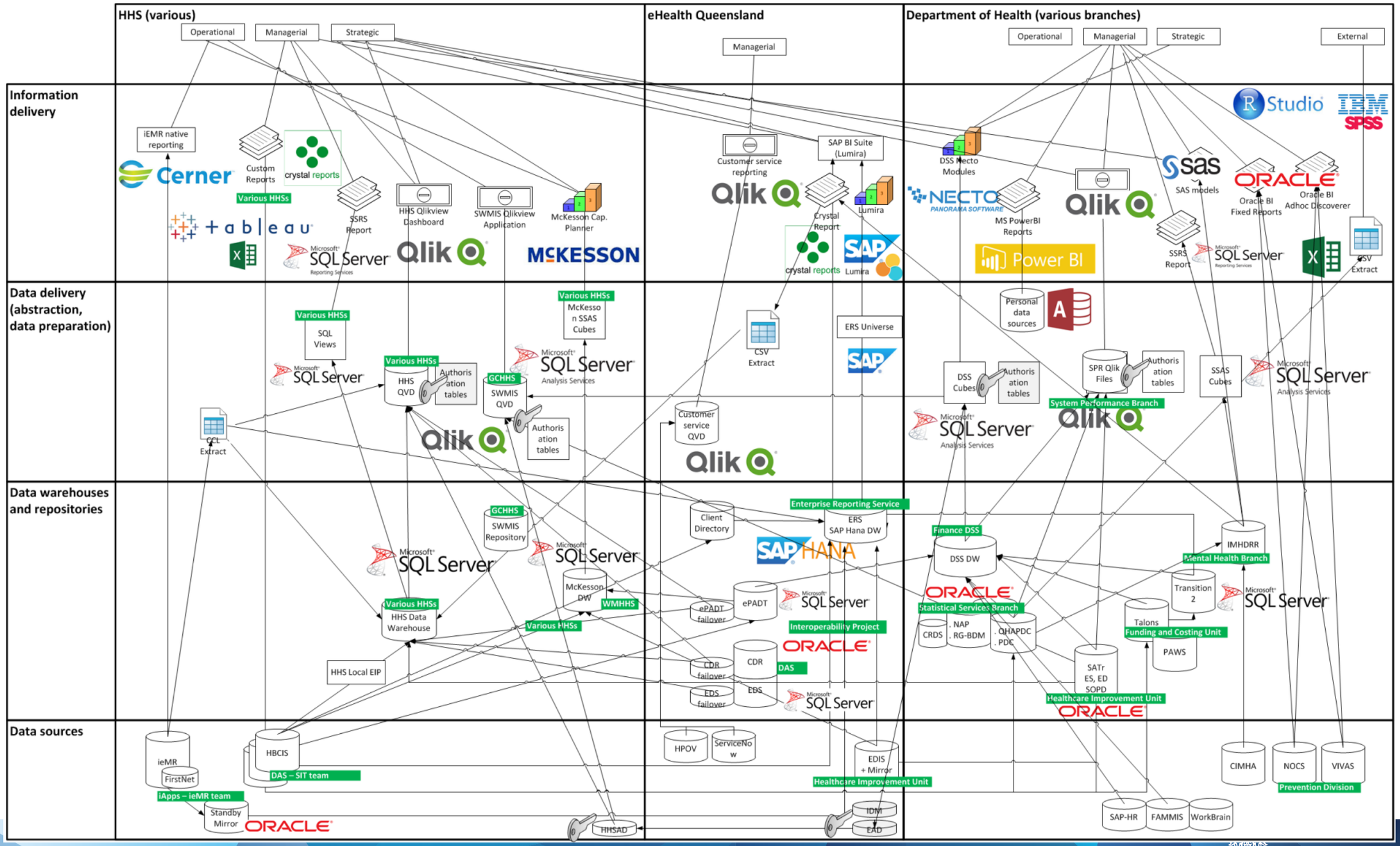
Current State: CBI Landscape

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: 04/07/2017



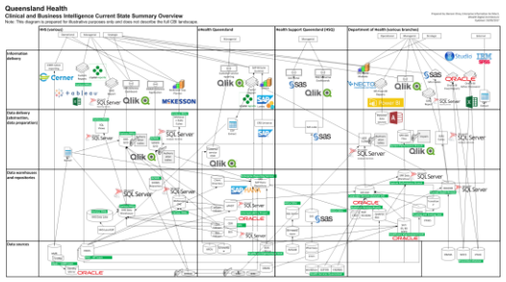
Data warehouse portfolio standardisation and lifecycle management

Today

An entanglement of data

- Siloed legacy repositories,
- Disjoint models
- Low integration
- Tech debt

e.g.
SATR
ePADT
QHIPS
PADR
Various marts



(see CBI current state)

Stage 1 – standardisation

Centralised / De-centralised mix with standardisation

- Multiple, parallel new warehouse projects commenced 2018
- Data Vault 2.0 framework lets us one day integrate and unite around common business keys

e.g.

CBI Foundation (ieMR+), eHQ

Common Services data warehouse, eHQ

LIS data warehouse, HSQ

eReferrals data warehouse, CED

PHN Frailty Data Vault MNHHS

GPResearch Data Vault SCHHS

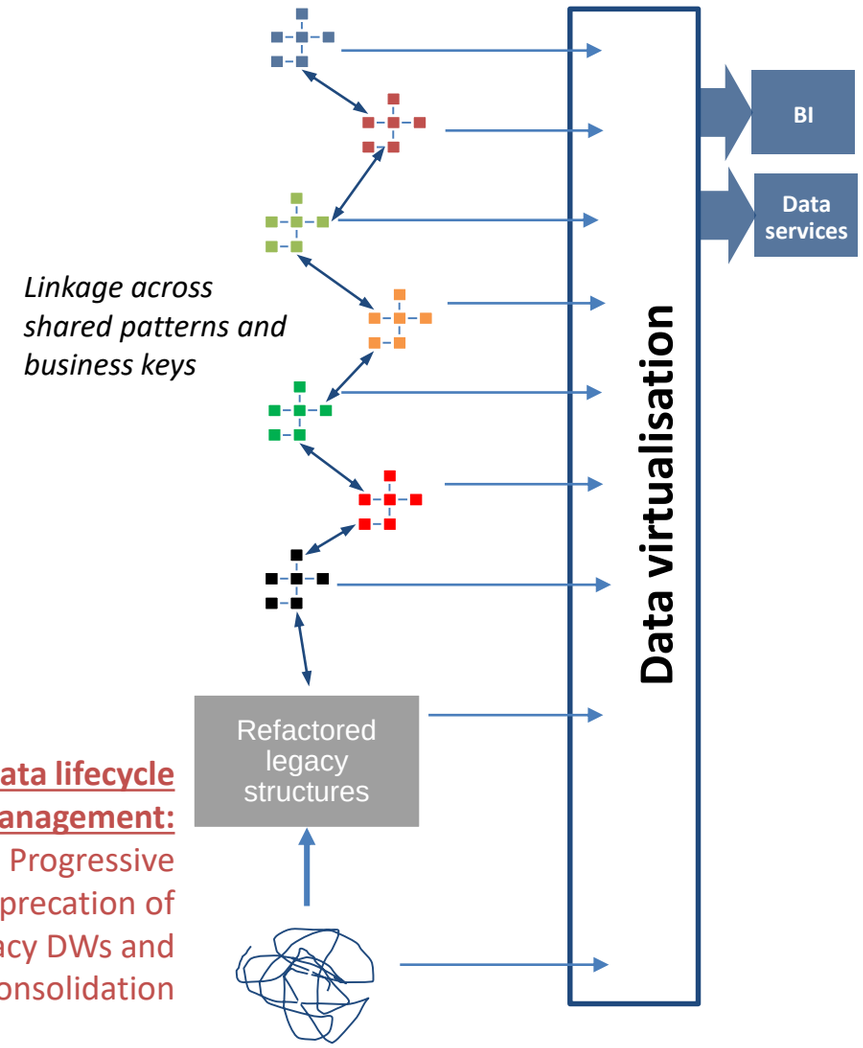
ReHP data warehouse, ReHP

Legacy DWs

Stage 2 consolidation and integration

Integrated supported by Federation

- Hybrid (logical/physical) statewide enterprise data warehouse
- Prevent re-engineering and tech debt



Data lifecycle management: Progressive deprecation of legacy DWs and consolidation

What is cyber security?

Information **kept in-confidence**, is **accurate** and **available 24/7** to support the delivery of healthcare across Queensland

Why is cyber security important?

Enable secure digital healthcare delivery

Protect connected patients

Protect information and prevent breaches

Protecting connected patients: **Biomedical Devices**

St. Jude Medical's radio-frequency–enabled implantable cardiac devices can be accessed and controled by attackers.

Johnson & Johnson warned its customers about a security bug in one of its **insulin pumps** that could allow an overdose to diabetic patients.

Hospira released that its **infusion pump** can allow an attacker to remotely control the device and alter therapy administration.

Can you guess how many healthcare records were breached?

Incidents:

Phishing

15,000
patient records

Ransomware

300,000
patient records

Lost laptop

200,000
patient records

Employee misuse

108,000
patient records

Cloud

4,800,000
patient records

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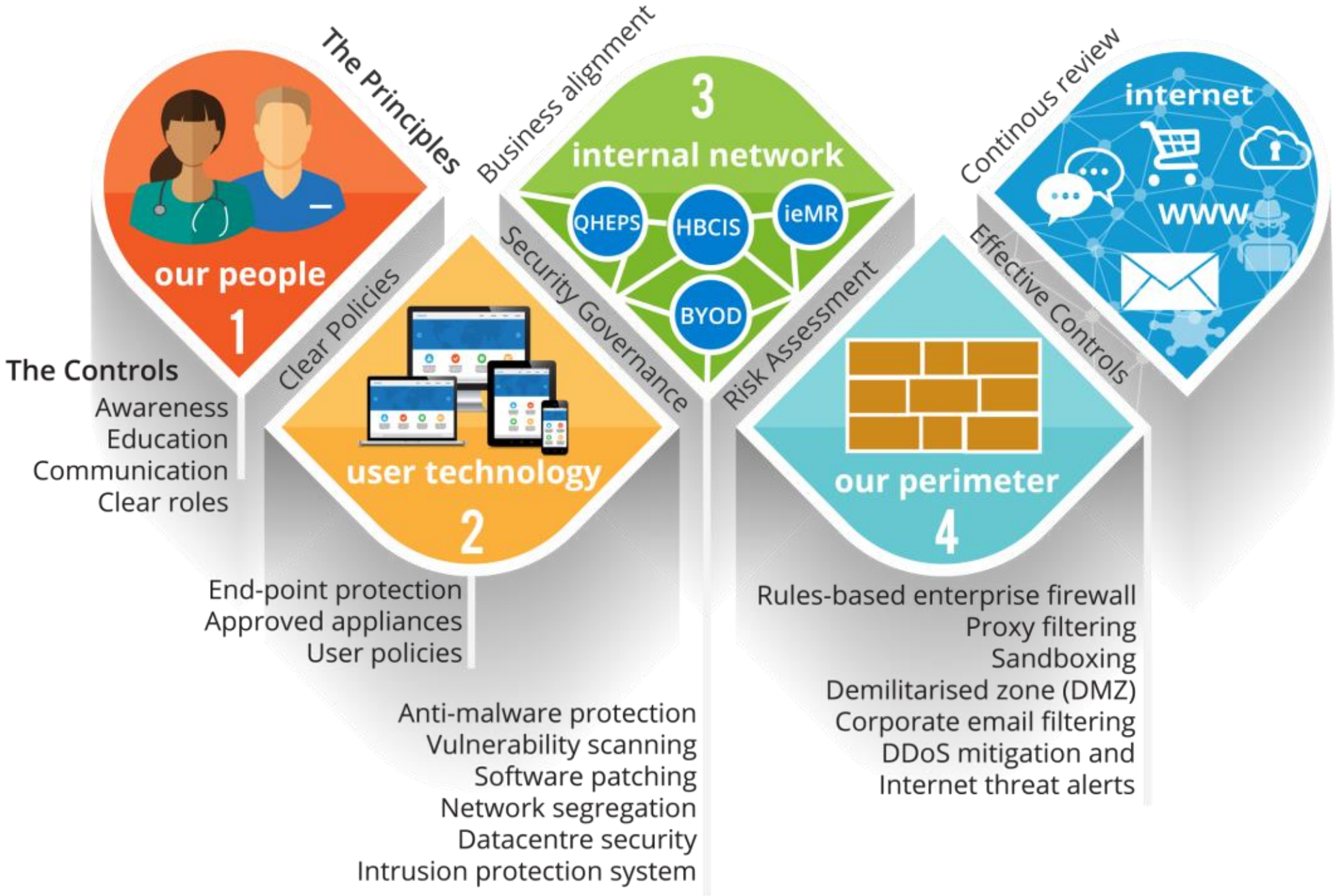
Q: What is the value of Queensland Health's patient information on the dark web?

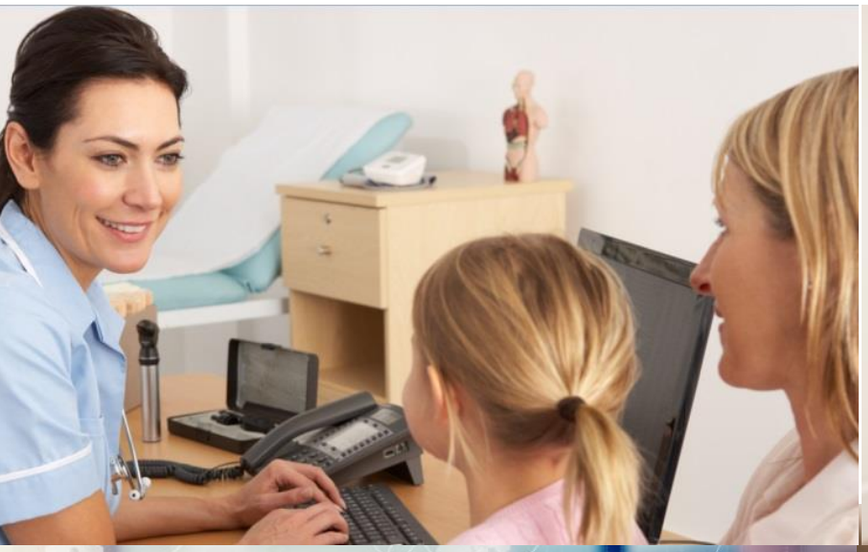
A: $438 million

How do we achieve security?



https://qheps.health.qld.gov.au/cybersecurity

Questions?









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