The Answer is Digital…
…but what’s the Question?

Professor Keith McNeil
CCIO Queensland Health
Our Challenge…

How do we move from data, to highly effective decision making?
The path to...

"Vague but exciting"
Mike Sindall 1989
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...”,

Also, sometimes you had to learn a different program on each computer.
...the here & now
...the here & now...in healthcare!
This is all about patient outcomes
...not just technology!
Great news!

Life expectancy reaches all-time high

Declines in death rates from most major causes have pushed Americans’ life expectancy to a record 77.6 years.

Estimated life expectancy, 1943-2003

By race and gender, 2003

<table>
<thead>
<tr>
<th>Race</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>80.5</td>
<td>75.4</td>
</tr>
<tr>
<td>Black</td>
<td>76.1</td>
<td>69.2</td>
</tr>
</tbody>
</table>

SOURCE: Centers for Disease Control and Prevention

AP
Healthcare in the 21st century
And... within this context

• The “triple aim” of healthcare is to provide:
  – better *clinical outcomes*
  – with a better *patient experience*
  – with better *affordability*

= Value
And...do this in a complex world of competing logics

Global and local economic crisis

Political expectations

Corporate expectations

Patient / consumer expectations

Public expectation

Clinician expectations

Triple Aim
Information & Chaos

• **Information** brings order to chaos...
  ...*data enables the reduction of uncertainty*

• Our understanding of **complexity & chaos** is dependent on the quality of the **information** we have available

• **Chaos is not random**
  – It only appears unpredictable because we can’t measure & interpret all the variables and variation in the data
    • ventricular fibrillation...
Ventricular fibrillation – not random after all (but it is chaotic!)
We have systems...perfectly designed to deliver what they deliver!
...and that's just not good enough!
And, we have made an unholy mess of it!
2 Case Studies

• NASA, the Moonshot and Challenger

• Joint Taskforce against AQI 2003
• The Moonshot
  – First US manned space mission in 1961
    • Apollo 11 just 8 years later
  – required radical re-thinking around organisational dynamics
  – critically reliant on networks and communications between these different groups
    • complex adaptive organisation
Challenger 1986
NASA’s devolution
JTO in Iraq

• 2003
  – 13 missions per month
  – command & control organisation
    • information shared on a “need to know” basis

• 2007
  – 300 missions per month
    • little increase in funding or personnel
  – complex adaptive organisation – “team of teams”
    • shared intelligence
    • high quality, real time information access
    • everybody “needed to know”!
Move away from 19th century thinking...

• Grip

= Control

• Levers
... into the 21st century
Critical to dealing with complexity

- Allowing ecosystems to become self-organising
  - fostering organisational resilience at every level
  - distributed decision making is key
    - dependent on the effective flow of information

The 17 minute story
Leadership in the Digital Age

As in any age, leadership is critical to encouraging and enabling innovation;

...and engaging and empowering those who actually deliver, and are recipients of, healthcare services
How do we achieve all this?
...democratise data

Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world.

Louis Pasteur
which brings us to…

Our Digital Health Agenda
Data data everywhere and not a byte to think
Why digital?

• Last 2 years
  – more data generated than in all human history
  – by 2025 - 47 zetabytes!!!

• 100,000 genomes = 21 petabytes
  • 1 Pb music – 2000 years of continuous playing!

• Opportunity for use of AI & machine learning
  – reliant on accurate longitudinal data sets
There is a better way!
The Aim...

- Create *learning/knowledge based organisations*; at all levels
  - use *information & knowledge* to make more informed and therefore better decisions
    - at all points of decision making
Towards a **learning & knowledge based** system

"Virtuous Circle"
...and on to *precision medicine*

- **Clinical intelligence**
  - Information & Knowledge
  - Aggregated data
  - Sophisticated analysis
- **Research**
  - ‘omics’ diagnostics consent
  - Machine learning/AI analytics
  - Internet
  - Apps
  - Wearables
  - Public health
  - Business
- **Clinician-Patient**
  - Audit
  - Education and training
  - CPE
  - Personal outcomes
System Sustainability

The Two Keys to Unlocking the Productivity Paradox of Digital Transformation

Improve the technology

Reimagine the work itself

Reference: Erik Brynjolfsson, MIT
The Strategy...

- Enable structured/standardised *data* collection from across the system
  - We all talk the same language

- Enable that *data* to be distributed across the system
  - JTO productivity dividend

- Encourage innovative ways of capturing *data*
  - wearable's, apps etc

- Facilitate analysis and application of *data* at multiple levels
  - local, population, cohort, metadata sets, ‘big’ datasets
Digital Transformation of Healthcare
Our workforce builds digital literacy

Integrating information and technology

Collecting and collating

Broadens workflows to improve care

Intelligent use of data

Transparency to increase efficiency

Live streaming analytics

Establish links between data and analytics

Innovative workforce

Digital innovation allows new models of care

Predictive and prescriptive analytics available

Integrate innovative technology in the digital platform

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CULTURAL READINESS

TECHNICAL EXCELLENCE

DIGITAL CLINICAL GOVERNANCE

SINGLE SOURCE OF TRUTH FOR DATA

INFORMATION GOVERNANCE AND TRANSPARENCY

INTEGRATION

DISASTER RECOVERY AND CYBERSECURITY

DIGITAL PARTNERSHIPS WITH RESEARCH TEAMS AND UNIVERSITIES
HORIZON 1  BUILDING DIGITAL FOUNDATIONS: BETTER CARE FOR INDIVIDUAL PATIENTS
HORIZON 2  TRANSFORMING PATIENT CARE: BETTER CARE FOR GROUPS OF PATIENTS

National Safety and Quality Standards dashboards
• We leverage our digital platform to innovate and deliver new models of care and research capability
Where we are we now...
Where we want to be...

- A learning & knowledge based organization at all levels, at the cutting edge of digital medicine, where:
  
  - individuals use data to drive their own Q
    » improving patient and organizational outcomes
  
  - learning and benefits are shared across the system

- system sustainability and enhanced effectiveness is embedded
The ieMR Program now has a growing body of evidence emerging from the current ieMR sites. The actuals have now been validated locally and are being measured, monitored and acted upon as the Program progresses.

### Key benefits achieved to date*

<table>
<thead>
<tr>
<th>Core Business Case Benefits</th>
<th>Weighted Average</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in time taken to record vital signs</td>
<td>-</td>
<td>56%</td>
</tr>
<tr>
<td>Reduction in stationery costs</td>
<td>53%</td>
<td>88%</td>
</tr>
<tr>
<td>Reduction in emergency readmissions</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Reduction in diagnostic imaging</td>
<td>7%</td>
<td>26%</td>
</tr>
<tr>
<td>Reduction in length of stay</td>
<td>4%</td>
<td>6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Emergent Benefits</th>
<th>Weighted Average</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in medical record maintenance</td>
<td>87%</td>
<td>99%</td>
</tr>
<tr>
<td>Reduction in admin time spent retrieving records</td>
<td>57%</td>
<td>97%</td>
</tr>
<tr>
<td>Reduction in hospital acquired pressure injuries</td>
<td>34%</td>
<td>88%</td>
</tr>
<tr>
<td>Reduction in hospital acquired infections</td>
<td>9%</td>
<td>37%</td>
</tr>
<tr>
<td>Reduction in hospital standardised mortality ratio</td>
<td>18%</td>
<td>23%</td>
</tr>
</tbody>
</table>

* Key benefits achieved to date: based on aggregated data provided and validated by the relevant ieMR sites. Figures are represented as weighted averages across the current participating sites; where data is available (rounded to the nearest integer). Benefits have been normalised to consistent state-wide indicators as endorsed by DHPC in November 2017.
From Data to Decisions…

**Data**
- **Descriptive** - the rear view mirror
  - Tells us what’s happened

**Decisions**
- **Diagnostic**
  - Tells us why it happened

- **Predictive**
  - Tells us what’s going to happen

- **Prescriptive**
  - Tell us what to do before it happens!

…and this is how we will transform healthcare