Two Worlds of Health IT Collide

Jon Hoeksma – CEO Digital Health
A bat and a ball together cost £1.10
The bat costs £1.00 more than the ball
How much is the ball?
The bat = £1.05
The ball = 5p

How many of you wrote down or wanted to write down the ball is 10p?
Thinking Fast, Thinking Slow
Daniel Kahneman

So why was it hard to work out the cost of the ball?

It’s because we all have system 1 and system 2 thinking

• System 1 – Fast - instinctive, leaps to assumptions, switched on the whole time, but often wrong without ever knowing it

• System 2 – Slow - is analytical, builds and tests complex hypotheses, but it’s also incredibly lazy and has takes real effort to switch on and operate
Our current horse-drawn world of Health IT

- Slow to automate core processes
- Data locked into proprietary silos
- Limited standardization
- Absence of systematically used industry standards – no W3C
- Risk averse (no bad thing in health but slows things down)
- Heavily regulated
- Entrenched provider interests
- Limited delivery of productivity benefits (so far – on their way says Wachter – argues a productivity lag is standard)
Follow the money: current national investment in digital health

<table>
<thead>
<tr>
<th>Area of investment</th>
<th>How much</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDEs</td>
<td>£311m for first 23 GDE and 17 FF</td>
<td>EPRs and provider digitisation</td>
</tr>
<tr>
<td>STPs</td>
<td>£412.5m</td>
<td>Provider digitization, infrastructure and integrated care</td>
</tr>
<tr>
<td>ePrescribing</td>
<td>£75m</td>
<td>Clinical applications</td>
</tr>
<tr>
<td>LHCREs</td>
<td>£37.5</td>
<td>Shared records and interoperability</td>
</tr>
<tr>
<td>Future GDEs and FFs</td>
<td>£200m</td>
<td>Provider digitization and clinical applications</td>
</tr>
</tbody>
</table>
Digital technology in health & care

Empower the Person
- Digital Platforms, Products & Services
  - The NHS App
  - Citizen ID
  - NHS.uk
- Digital Ecosystem & Standards
  - Health Apps Assessment & Uptake
  - Widening Digital Participation
  - PHR
- Digital Early Years
  - Digital Child Health
  - Digitising Maternity
- Infrastructure Projects
  - e.g.

Support the Clinician
- Primary Care
  - General Practice systems & services
  - GP Transformation
  - GP Data Implementation
- Digitising Providers - Exemplars
  - GOE, Fast Followers and Blue Printing
- Digitising Providers
  - Carter Money and Local STP Funding
- Value from Medicines
  - Digitising Community Pharmacy & Medicines
  - Medicines Data
  - Integrating Pharmacy across Settings
- Social Care
  - Social Care

Integrate Services
- Digital Urgent & Emergency Care
  - Clinical Triage Support (incl. NHS 111 Online)
  - Access to Service Implementation
- Integrating Care Locally
  - Integrating Care
- Elective Care
  - Digital Referrals & Consultations
- Local Health Care Record
  - Local Health Care Record

Manage the System Effectively
- Data Transformation
  - Data Services Platform
  - Data Content & New Data Collections
- Trust & Security
  - Data & Cyber Security
  - Microsoft Enterprise Wide Agreement
  - National Opt Out
- Strengthening our Workforce
  - Building a Digital Ready Workforce

Create the Future
- Genomics
- Artificial Intelligence
- Bioinformatics Institute
- Life Sciences

Infrastructure Programme
- SRO: HSCN
- Services: Digital Referrals Service e-Ref, TAL, Pathways
- Architecture & Core Services: Cyber Security
  - Service, Standards Development
- Data & Secondary Use - SUS, Information & Analytics Systems & Service Delivery, DID
  - PBC, NMAS, NCDs
- Services: Electronic Prescription Services (EPS)
- Legacy & Knowledge Service: LSP, SLCS
- Social Care: CPIS
What’s on the minds of NHS IT leaders?
Top priorities over next 3 years

- Interoperability: 84%
- Moving to paperless (paper-light) working: 77%
- Improving quality of services: 69%
- Mobile working: 64%
- Optimising productivity: 57%
- Improving quality of services: 54%
- Optimising use of current systems: 52%
- Managing challenges of service reconfiguration: 49%
- Optimising productivity: 47%
- Optimising use of current systems: 41%
- Supporting existing systems: 38%
- Supporting existing systems: 38%
- Optimising use of current systems: 32%
- Supporting existing systems: 31%
- Improving quality of services: 26%
Top 5 IT projects over next 3 years

1. Interoperability 84%
2. Clinical engagement 76%
3. Moving to paperless (paper-light) working 73%
4. Reliable, resilient, secure infrastructure 67%
5. Improving quality of services 64%
Major current IT Projects

Electron Patient Records: 67%
Analytics/Business Intelligence: 44%
Infrastructure: 42%
Mobile working: 40%
Electronic prescribing and medicines management: 38%
Clinical noting and documentation: 38%
Shared health and care records: 37%
Electronic document management: 32%
Patient observations and vital signs: 29%
Clinical portal: 26%
Personal Health Records*: 22%
Clinical decision support tools: 22%
Order communications and reporting: 20%
PAS replacement: 17%
Population health management: 16%
PACS / RIS / VNA: 14%
Speciality and departmental systems: 13%
Collaboration tools: 13%
Pharmacy: 12%
Genomics: 11%
Pathology/labs: 10%
Other: 10%
Artificial Intelligence and machine learning: 9%
Blood tracking: 6%
Enterprise and personal productivity tools: 6%
Top 5 current major projects

1. Electronic patient records – 67%
2. Analytics/Business Intelligence – 44%
3. Infrastructure – 42%
4. Mobile working – 40%
5. Electronic prescribing and meds mgt – 38%
Next major projects

- Shared health and care records: 31%
- Mobile working: 31%
- Analytics/Business Intelligence: 28%
- Electronic patient records: 28%
- Electronic prescribing and medicines management: 28%
- Clinical decision support tools: 23%
- Personal Health Records*: 22%
- Population health management: 22%
- Artificial Intelligence and machine learning: 21%
- Electronic document management: 18%
- Infrastructure: 18%
- Clinical portal: 17%
- Clinical noting and documentation: 16%
- Pathology/labs: 16%
- Patient observations and vital signs: 14%
- PAS replacement: 12%
- Collaboration tools: 12%
- Order communications and reporting: 12%
- PACS / RIS / VNA: 10%
- Enterprise and personal productivity tools: 9%
- Speciality and departmental systems: 9%
- Other: 8%
- Pharmacy: 6%
- Genomics: 6%
- Blood tracking: 3%
Top 5 next major projects

1. Shared health and care records – 31%
2. Mobile working – 31%
3. Analytics and BI – 28%
4. Electronic patient records – 28%
5. Clinical decision support tools – 28%
EPR penetration rates in acute trusts

All years are based in November except 2018 which is July

Source: Digital Health Intelligence, CDMI data
EPR penetration rates in mental health trusts

Source: Digital Health Intelligence, CDMI data
20 years to reach critical mass on EPR

2018 – October draft tech strategy based on cloud/open platforms/standards

2017 – GDE/FF/LHCRE/Placemat Diagram
*Over 75% of trusts have EPR

2014 – Personalised Health and Care 2020

2010 – NPfIT declared over (not for last time)

2003 – National Programme for IT

1999 – Information for Health
*Less than 75% of trusts had made investments in EHRs

1992 - Information Management and Technology Strategy
Taken 20+ years but digital Infrastructure now in place to build on
New horseless world of Digital Health

- Builds on the infrastructure and services now available
- Characterised by scaling quickly and rapid adoption
- Platform based – builds on existing services
- Adherence to common standards
- Agile / Fail Fast / get MVP out and then iterate
- Regulators scrambling to catch up
- Directly challenge or bypass current suppliers
- Focused on consumer
- Needs Old World
The future of healthcare: our vision for digital, data and technology in health and care (17 October)

- Based on open platforms
- Common standards
- Cloud first strategy
- Use standard commercial tech services where possible
- Local choice and build-up NHS capability
- Avoid standardized systems
- Avoiding vendor lock-in
- Encourage innovation
- Agile
Smartphone adoption UK

Apple iPhone launches 2007

>75% Smartphone use by 2016
DIGITAL HEALTH FUNDING
2011–2017

TOTAL VENTURE FUNDING

<table>
<thead>
<tr>
<th>Year</th>
<th>Funding ($B)</th>
<th>Deals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>$1.1B</td>
<td>89</td>
</tr>
<tr>
<td>2012</td>
<td>$1.5B</td>
<td>140</td>
</tr>
<tr>
<td>2013</td>
<td>$2.1B</td>
<td>193</td>
</tr>
<tr>
<td>2014</td>
<td>$4.3B</td>
<td>292</td>
</tr>
<tr>
<td>2015</td>
<td>$4.6B</td>
<td>308</td>
</tr>
<tr>
<td>2016</td>
<td>$4.4B</td>
<td>324</td>
</tr>
<tr>
<td>2017</td>
<td>$5.8B</td>
<td>345</td>
</tr>
</tbody>
</table>

AVERAGE DEAL SIZE

2011: $12.9M
2012: $10.6M
2013: $10.8M
2014: $14.8M
2015: $14.8M
2016: $13.7M
2017: $16.7M

Source: Rock Health Funding Database
Note: Only includes U.S. deals >$2M; data through December 31, 2017
### Top areas of digital health VC investment internationally in 2018 (YTD)

<table>
<thead>
<tr>
<th>Function</th>
<th>Total raised</th>
<th>Deal count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient empowerment</td>
<td>$2.1bn</td>
<td>149</td>
</tr>
<tr>
<td>Wellness</td>
<td>$1.6bn</td>
<td>64</td>
</tr>
<tr>
<td>Biometric Data Acquisition</td>
<td>$1.5bn</td>
<td>50</td>
</tr>
<tr>
<td>Clinical workflow</td>
<td>$1.1bn</td>
<td>98</td>
</tr>
<tr>
<td>Admin workflow</td>
<td>$1.0bn</td>
<td>85</td>
</tr>
<tr>
<td>Research</td>
<td>$964m</td>
<td>37</td>
</tr>
<tr>
<td>Insurance</td>
<td>$854m</td>
<td>12</td>
</tr>
<tr>
<td>Population Health</td>
<td>$701</td>
<td>27</td>
</tr>
<tr>
<td>Education</td>
<td>$280</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: Startup Health
Most active applications of 2018 (YTD)

<table>
<thead>
<tr>
<th>Application</th>
<th>Deal count</th>
<th>Average deal size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostics and screening</td>
<td>57</td>
<td>$34m</td>
</tr>
<tr>
<td>Genomics</td>
<td>29</td>
<td>$56m</td>
</tr>
<tr>
<td>Fitness</td>
<td>38</td>
<td>$32m</td>
</tr>
<tr>
<td>Clinical Decision Support</td>
<td>45</td>
<td>$24m</td>
</tr>
<tr>
<td>Telemedicine/Virtual Care</td>
<td>53</td>
<td>$19m</td>
</tr>
</tbody>
</table>

Source: Startup Health
Get well soon now

Free NHS GP appointments in minutes on mobile 24/7, and at our clinics across London®

Download the Babylon app

*To register you will need to switch from your current GP practice. A registration period will apply before you are able to access the service. Available for people living or working within 40 minutes of one of our clinic locations. Download app or see website for details.
Babylon Health - UK

• **Proposition:** New digital model of primary care services
• AI and machine learning enable smart triaging of patients and AI-driven differential diagnosis
• Disrupting: GP services
• Fans: Matt Hancock
• Detractors say: Cherry picking primary care. Unsafe, Don’t believe the hype
PatientsKnowBest – UK

- **Proposition**: Patient controlled PHR
- Place patients in control of their records and who can view and access
- Disrupting: Existing provider focused EPR market
- Detractors say: Value-proposition unclear outside specialities
23andme – US

• **Proposition:** personal genomics and precision medicine on demand. 23 pairs of chromosomes = one you

• Disrupting: traditional models of medicine and pharma

• Services: Growing! 5 x Genetic Health Risks, 5 x Wellness, 40 x carrier Status, 25 traits including Misophania (hatred of chewing).

• Detractors say: Being married to Google founder sure helps, at ancestry.com stage
Google Deepmind

• **Proposition:** Digitise and mobilise data across the whole of UK healthcare as opener, in order to then be able to apply AI and machine learning
• Disrupting: concepts of UX and how to develop clinical applications
• Fans: Royal Free and Imperial: chief execs swoon at Deepmind
• Detractors say: Err what about IG? And this may be a bit more complicated.
Sensyne -UK

- **Proposition:** AI data brokerage between NHS and Pharma
- Disrupting: clinical trials and medical research data
- Raised £60m in 2018
- Close links to Oxford Uni and Trust
- Cloud and AI focus
- Founded by Lord Drayson chair of UK Health Cloud
- Detractors say: can’t trusts go direct?
George Freeman
• New world may be agile but lacks knowledge of how Old World works.
• Both worlds need one another
INTERNATIONAL METRO HUBS 2017

Beijing leads the pack with the amount of dollars invested, though it falls into the middle with total deal counts. The last half of the year has significantly increased in investment deals, with Tencent being one of the most active investors in international companies.
digitalhealth REWIRE
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Olympia, London
Thank you - Questions

Jon@digitalhealth.net
@digitalhealth2
07771 657983
Questions for the audience

1. Are we there yet? Do you believe we have reached the critical mass of digitization and automation, particularly on EPRs, that enable us to fundamentally redesign the work of health
Questions for the audience

1. What are the leadership skills required to manage the move to the brave new world of digital health described? What are the key skills for the CIO/CCIO/IT directors now needed
Questions for the audience

3. Why has health not produced a runaway success new digital giant that has turned the sector upside down? Such as Facebook or Google. Does health remain too fragmented, complex and bespoke?