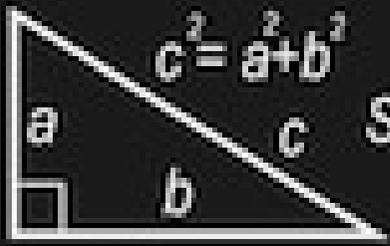


Two Worlds of Health IT Collide

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?





$$c^2 = a^2 + b^2$$

$$\sin^2 \alpha + \cos^2 \beta = 1$$

$$\sin \alpha = \cos(90^\circ - \alpha)$$

$$\lim_{x \rightarrow 0} \frac{\log_e(1+x)}{x} = \log_e e = \frac{1}{\ln a}$$

$$\lim_{x \rightarrow 0} x^n \log_e x = 0, \quad (n > 0)$$

$$K_1(t,s) = K(t,s)$$

$$\text{Arc SIN } z = -i \text{Ln}(iz + \sqrt{1-z^2})$$

$$\text{Arc COS } z = -i \text{Ln}(z + i \sqrt{1-z^2})$$

$$A = \frac{1}{2} ab$$

$$V = \frac{1}{3} \pi r^2 h$$



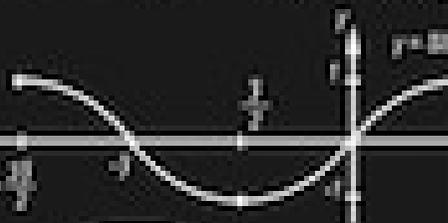
$$K_1(x,0) = K(x,0) \quad \varphi(x) = \lambda \int K(x,s) \varphi(s) ds + f(x) \quad z = re^{i\theta}$$

$$\cot \alpha + \cot \beta = \frac{\sin(\alpha + \beta)}{\sin \alpha \sin \beta}$$

$$\tan \alpha + \tan \beta = \frac{\sin(\alpha + \beta)}{\cos \alpha \cos \beta}$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$$

$$A = \frac{1}{2} ap$$



$$V = \frac{4}{3} \pi r^3$$

The bat = £1.05
The ball = 5p

How many of you wrote down or wanted to write down the ball is 10p?

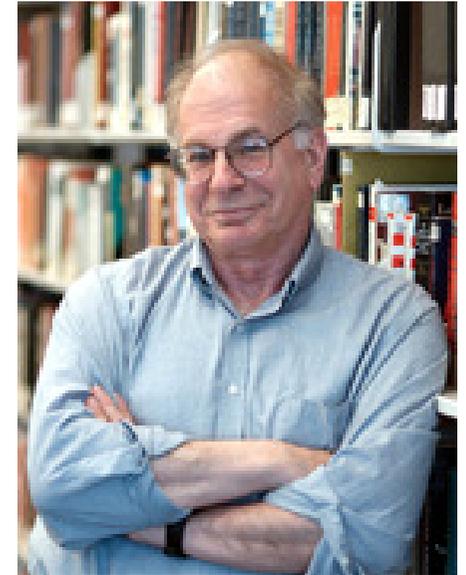
$$z = re^{i\theta} \quad \log_e |xy| = \log_e |x| + \log_e |y| \quad a^{\frac{1}{n}} = \sqrt[n]{a} \quad \varphi(x) = \lambda \int K(x,s) \varphi(s) ds + f(x)$$

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



NESTLE'S
MILK

MILKMAID BRAND

NESTLE'S MILK

NESTLE'S
SWISS
MILK

ONE QUALITY
THE BEST

MILKMAID BRAND

WALLERS
SCOTCH
ADVANCED
INTEREST
HULL

WITCHER



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

Area of investment	How much	What
GDEs	£311m for first 23 GDE and 17 FF	EPRs and provider digitisation
STPs	£412.5m	Provider digitization, infrastructure and integrated care
ePrescribing	£75m	Clinical applications
LHCREs	£37.5	Shared records and interoperability
Future GDEs and FFs	£200m	Provider digitization and clinical applications

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

WIG

Support the Clinician

Primary Care

General Practice systems & services
GP Transformation
GP Data Implementation

Digitising Providers - Exemplars

GDE, 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

Services: Electronic Prescription Services (EPS)

Legacy & Knowledge Service: LSP, SLCS

Social Care: CPIS

Infrastructure Programme

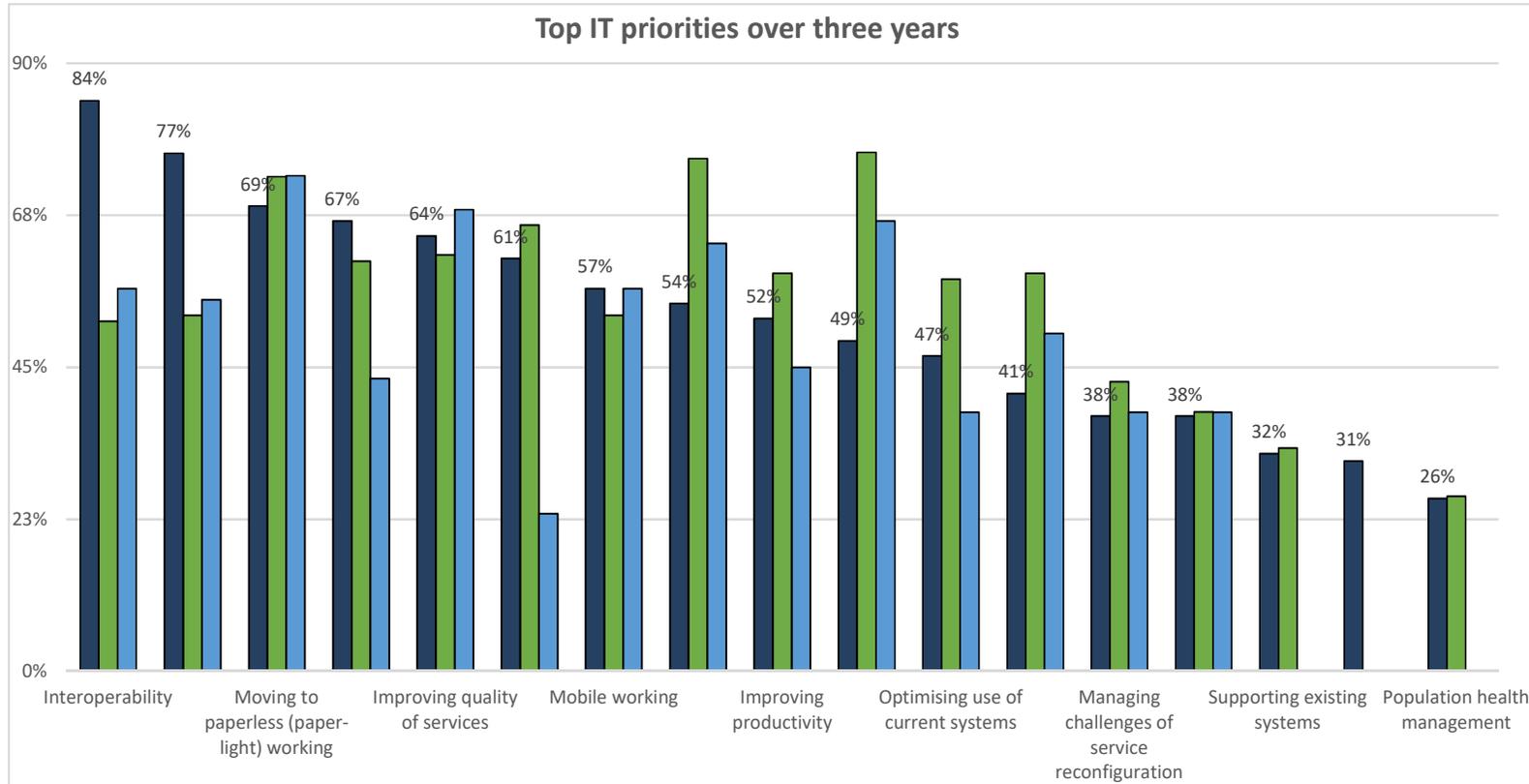
SRO:
HSCN

Services: Digital Referrals Service e-RS, TAL, Pathways

Architecture & Core Services: Cyber Security Service, Standards Development

Data & Secondary Uses: SUS, Information & Analytics, Systems & Service Delivery, DID, PBCL, NMA5, MCDS

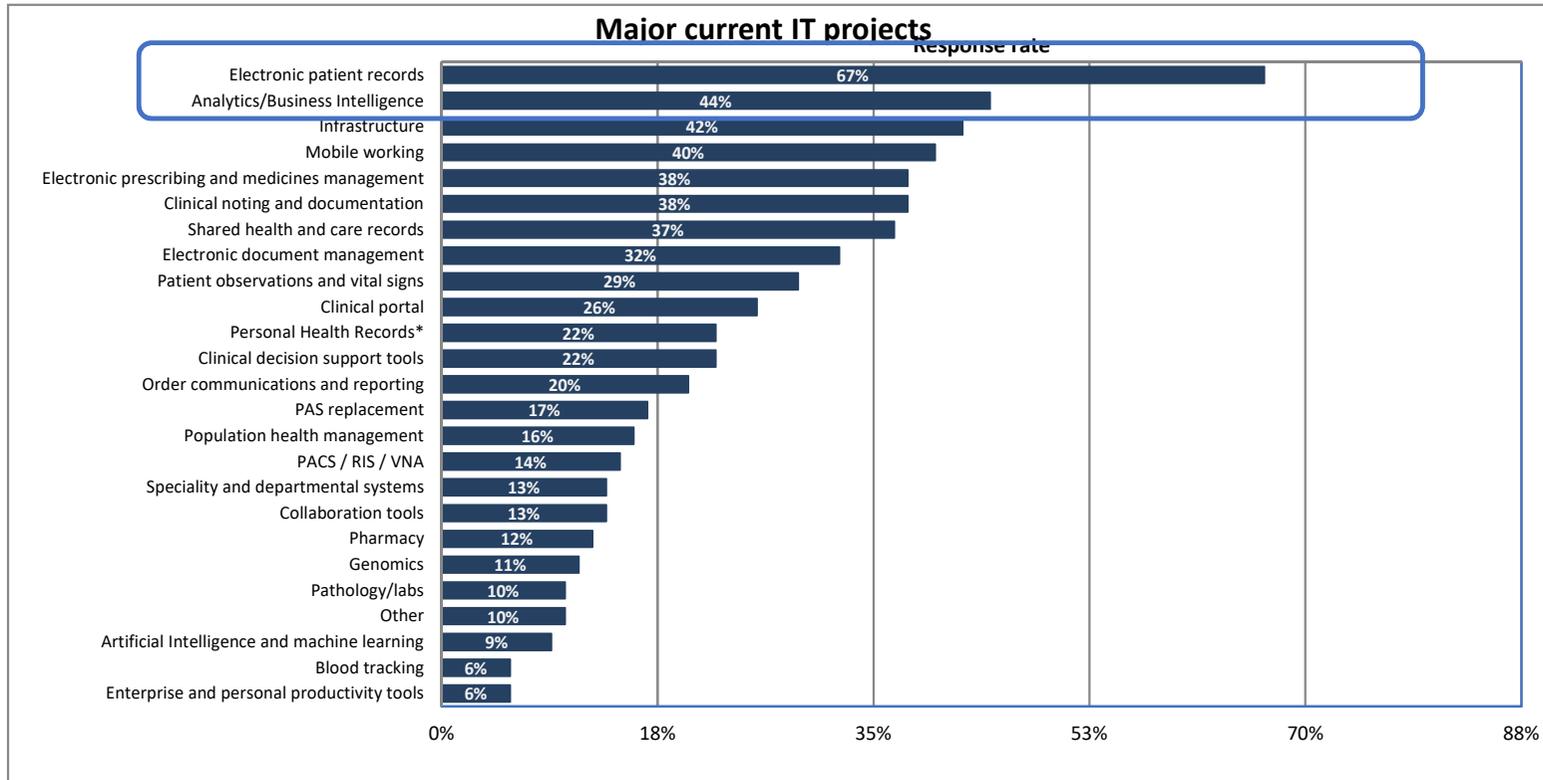
Top priorities over next 3 years



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%

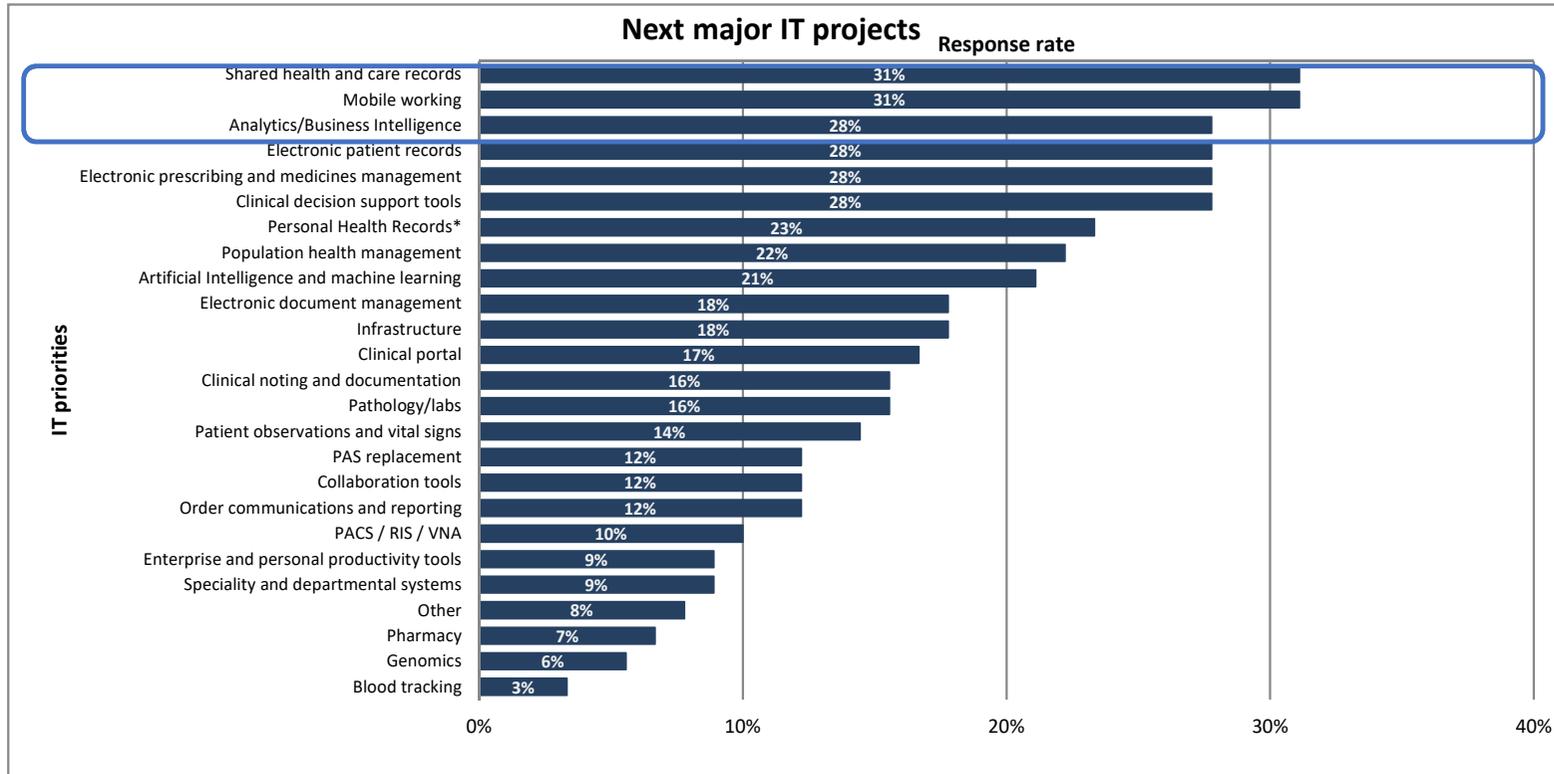
Major current IT Projects



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%

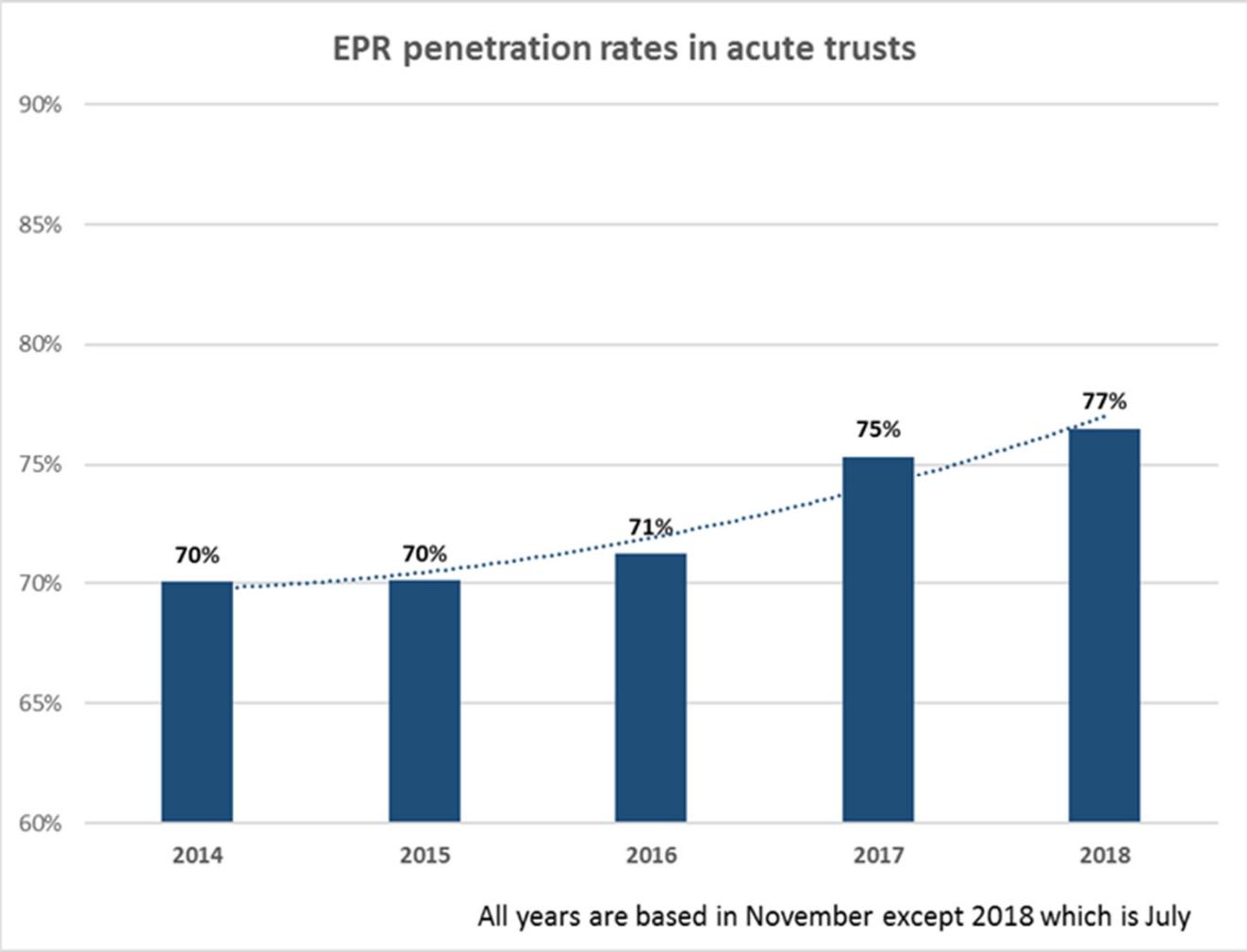
Next major projects



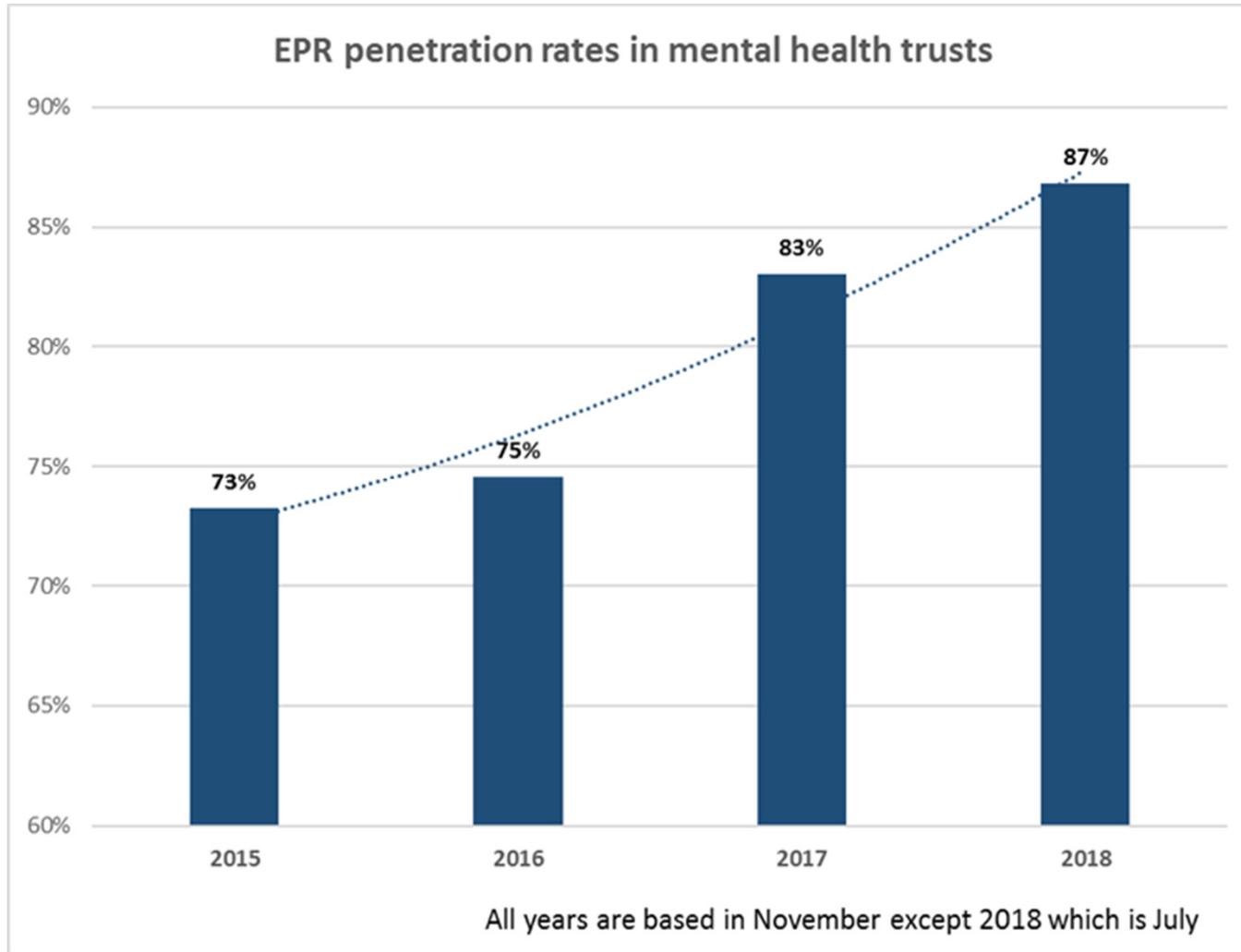
Top 5 next major projects

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%





Source: Digital Health Intelligence, CDMI data



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



20 years to go from
<25% with EPR to >75%



Taken 20+ years but digital Infrastructure now in place to build on



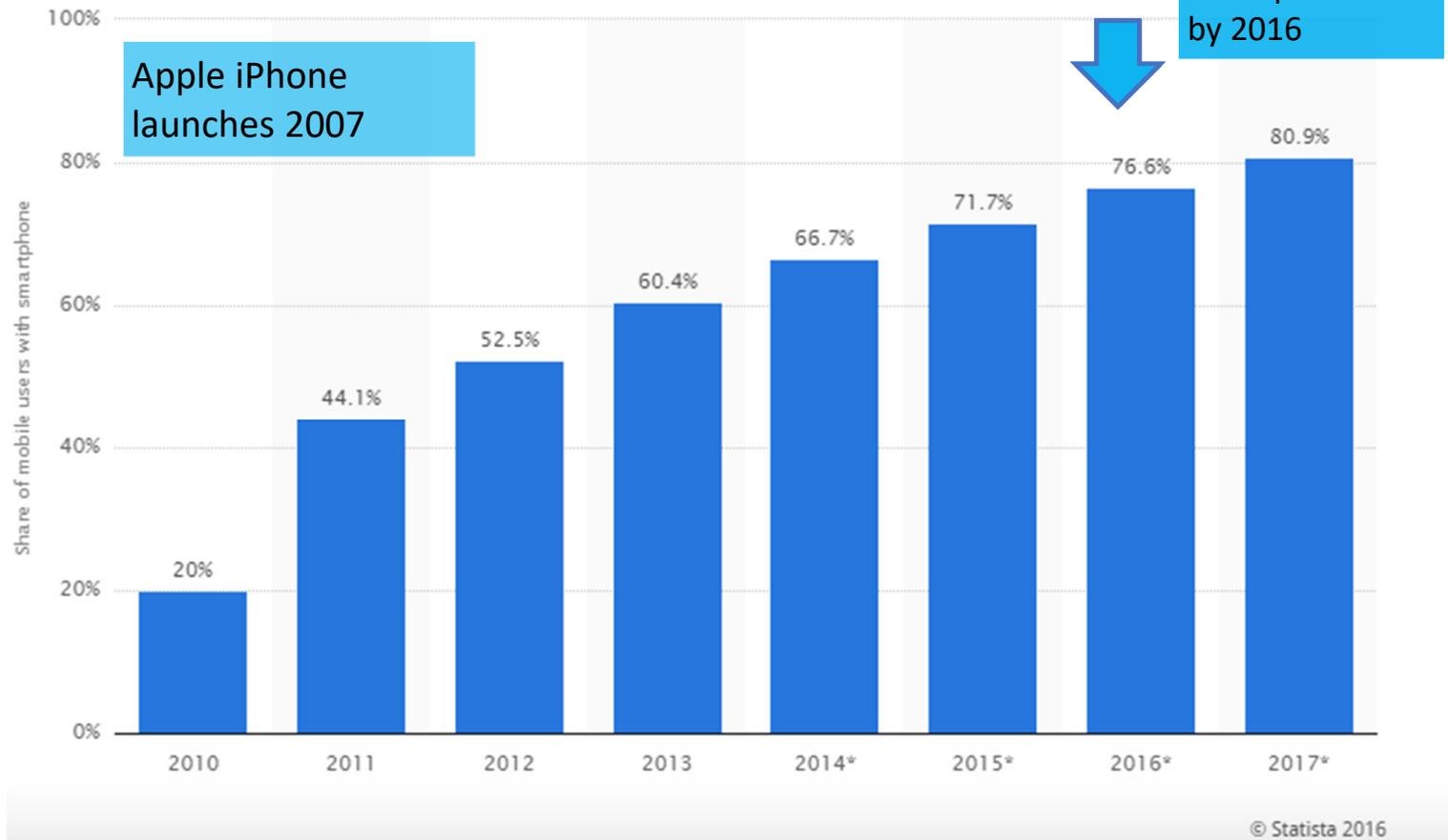
New horseless world of Digital Health

- 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)

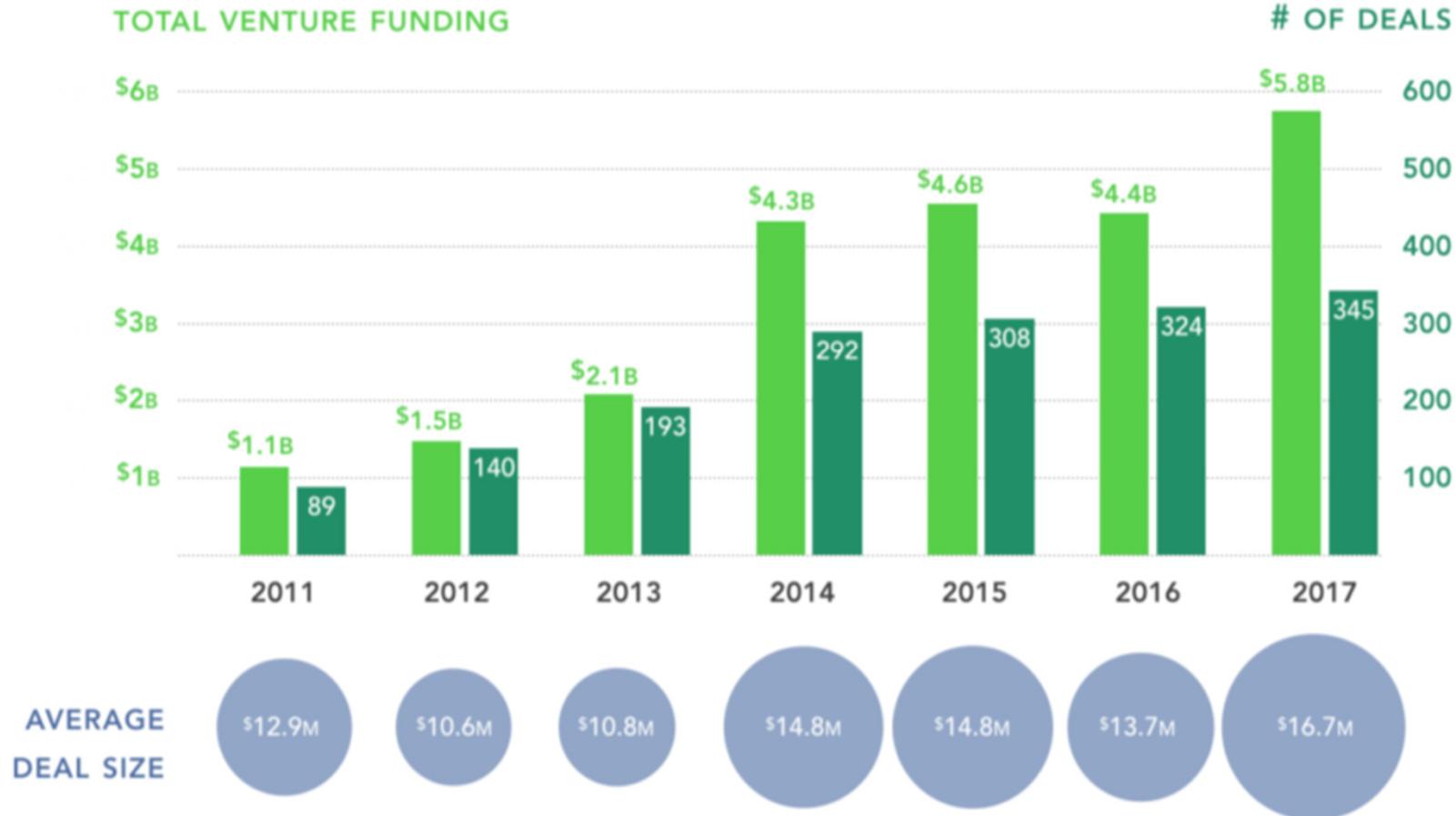
- Based on open platforms
- Common standards
- Cloud first strategy
- Use standard commercial tech services where possible
- Local choice and build-up NHS capability
- Avoid standardized systems
- Avoiding vendor lock-in
- Encourage innovation
- Agile

Smartphone adoption UK



DIGITAL HEALTH FUNDING

2011-2017



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)

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

Source Startup Health

Most active applications of 2018 (YTD)

Application	Deal count	Average deal size
Diagnostics and screening	57	\$34m
Genomics	29	\$56m
Fitness	38	\$32m
Clinical Decision Support	45	\$24m
Telemedicine/Virtual Care	53	\$19m

Source Startup Health

NHS

Providing NHS services

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**
GP at hand

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



PATIENTS KNOW BEST®
MANAGE YOUR HEALTH

- **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?

#uberforhealth





MP's 'horror' at getting £4.2bn to digitise NHS with no plan

By Brian Wheeler
Political reporter

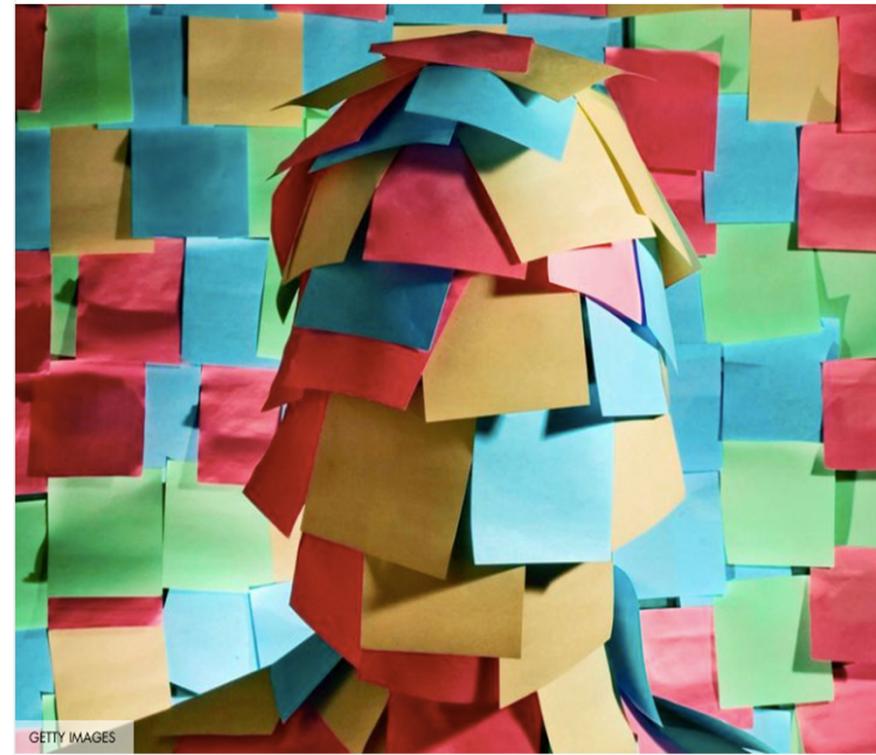
🕒 2 October 2018



Conservative Party Conference



- George Freeman
- New world may be agile but lacks knowledge of how Old World works.
- Both worlds need one another



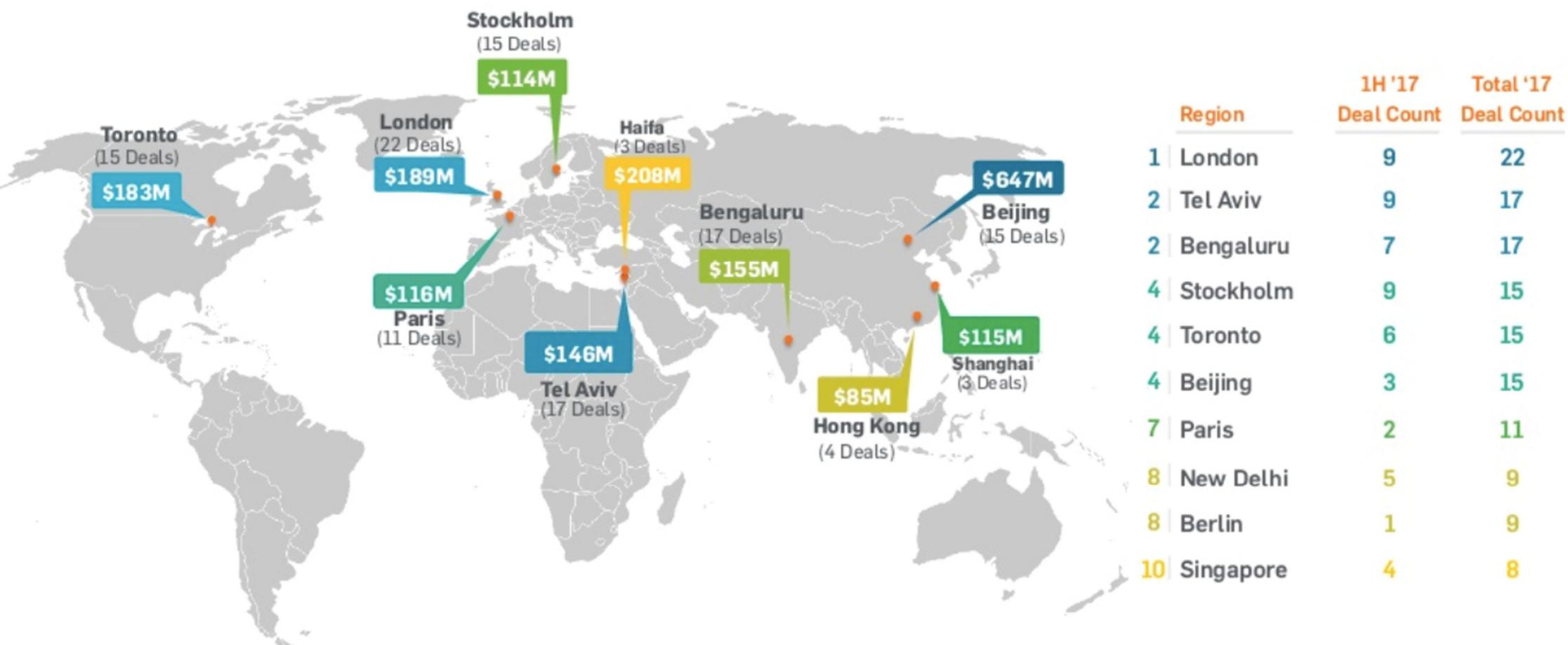
PROFES



THE
FRESHMAN

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.



* Map shows Top 10 Metro Areas by Total Deals (USD)

digitalhealth

REWAIRED

LONDON 2019

MARCH 25/26

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25 – 26 March 2019
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?