

LUCID

Thank you for attending the LUCID Conference

Innovation to disrupt the NHS

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 @DrTonyYoung

NHS England and NHS Improvement



NHS England

- Population 54m
- Budget £110bn
- 154 Acute Hospital Trusts & 7875 GP Practices
- Average life expectancy 80m/82f
- 1.3m employees
- Deals with 1m patients every 24 hours
- 75m OPD, 23m ER and 16m IP



NHS England and NHS Improvement



How do we futureproof for the decade ahead?

Move from somewhere to everywhere

Take 30m outpatient visits per year out of hospitals

Half maternity related deaths by 2025

Improve early cancer diagnosis from 50% to 75%

Everyone has access to remote consultation

Transform and support the workforce

NHS England and NHS Improvement



**How do we get people to
buy more insurance?**

**The best way to predict the
future is to invent it**

NHS England and NHS Improvement

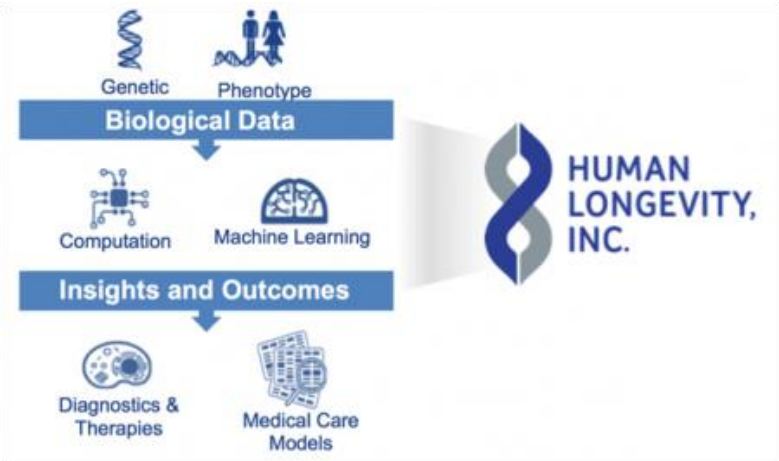
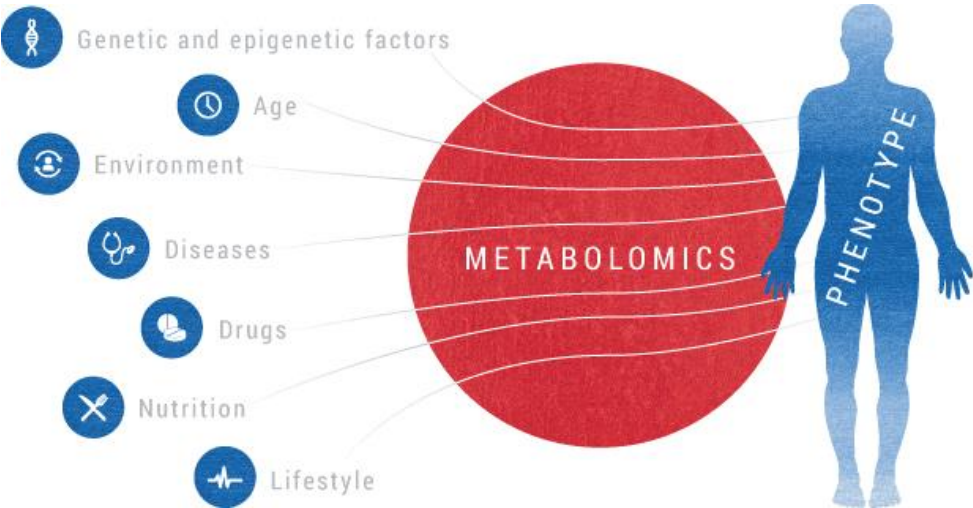
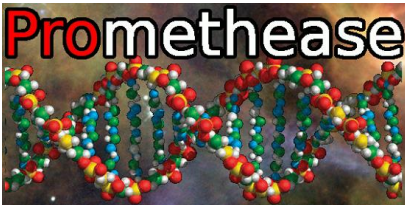


The Personalised, Empowered Health and Care Revolution

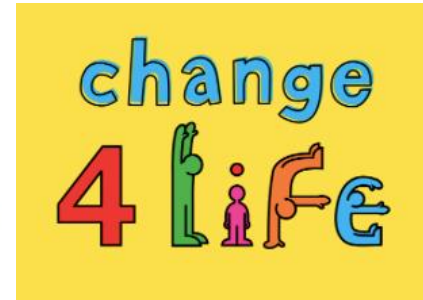
- Omics
- Data analytics, Machine learning, AI
- Predictalytics
- Digital and m-Health
- Advanced Technology
- Ultra-connectivity
- Social Inclusion and networking
- People Centred

The intermittent, reactive sick care of the past will become continuous, proactive healthcare in the future.

Omics



Digital and mHealth



Data Analytics, ML, AI



Brainomix



ada



TOUCHSURGERY



PAIGE

Patient-Facing

AI Chatbots



Wearables & Devices



Personalized Genetics



Mental Health



Women's Health



Skin



Telehealth

Telemedicine



Lifestyle Management



Disease Management



AI in Healthcare

Research

Drug Discovery



Information & Clinical Trials



Genetic Research



Doctor-Facing

Medical Records



Data Analytics



Medical Imaging



Hospital



Review Article | Published: 07 January 2019

High-performance medicine: the convergence of human and artificial intelligence

Eric J. Topol 

Nature Medicine **25**, 44–56 (2019) | [Download Citation](#) 

ARTICLES | [VOLUME 1, ISSUE 6, PE271-E297, OCTOBER 01, 2019](#)

A comparison of deep learning performance against health-care professionals in detecting diseases from medical imaging: a systematic review and meta-analysis

[Xiaoxuan Liu, MBChB](#) [†] • [Livia Faes, MD](#) [†] • [Aditya U Kale, MBChB](#) • [Siegfried K Wagner, BMBCh](#) • [Dun Jack Fu, PhD](#) • [Alice Bruynseels, MBChB](#) • et al. [Show all authors](#) • [Show footnotes](#)

[Open Access](#) • Published: September 25, 2019 • DOI: [https://doi.org/10.1016/S2589-7500\(19\)30123-2](https://doi.org/10.1016/S2589-7500(19)30123-2) •

The Inconvenient Truth

Most Ai not executable on the frontline

Infrastructure - Innovation and Data



Ultra Connectivity - Advanced Tech, Data analytics/Machine learning/AI digital health & Omics



Dexcom[®]
One Step Ahead

 **streams**
by DeepMind Health

verily

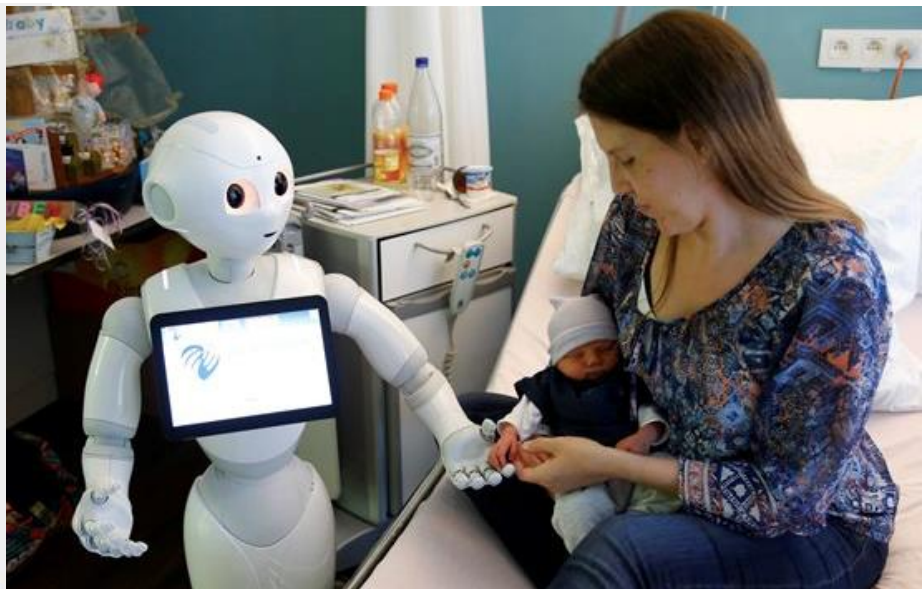
 **VERB**
SURGICAL



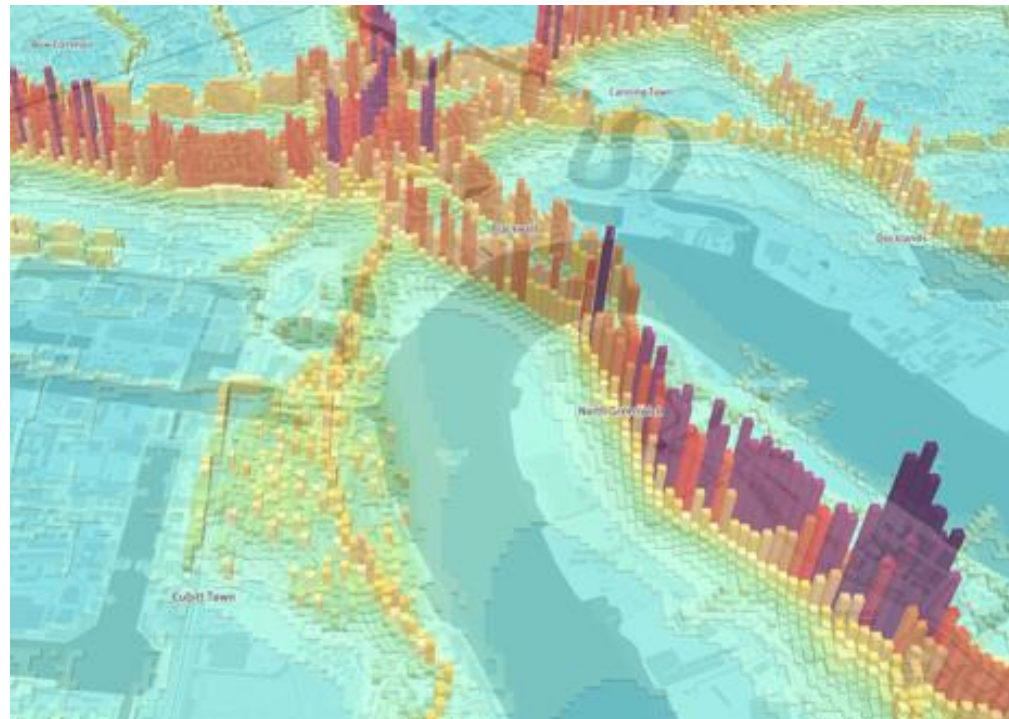
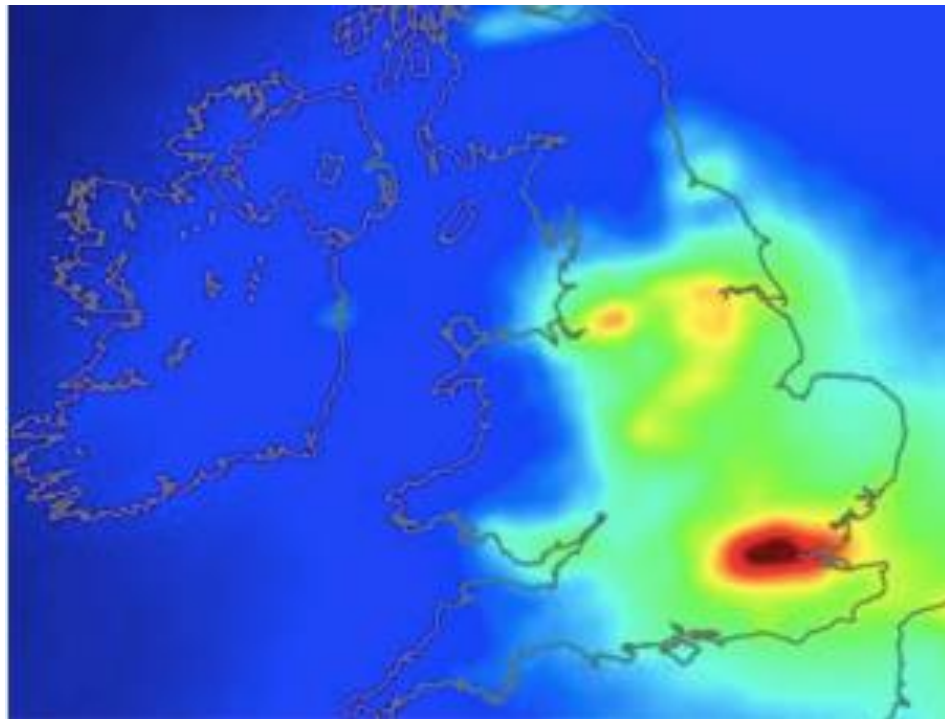
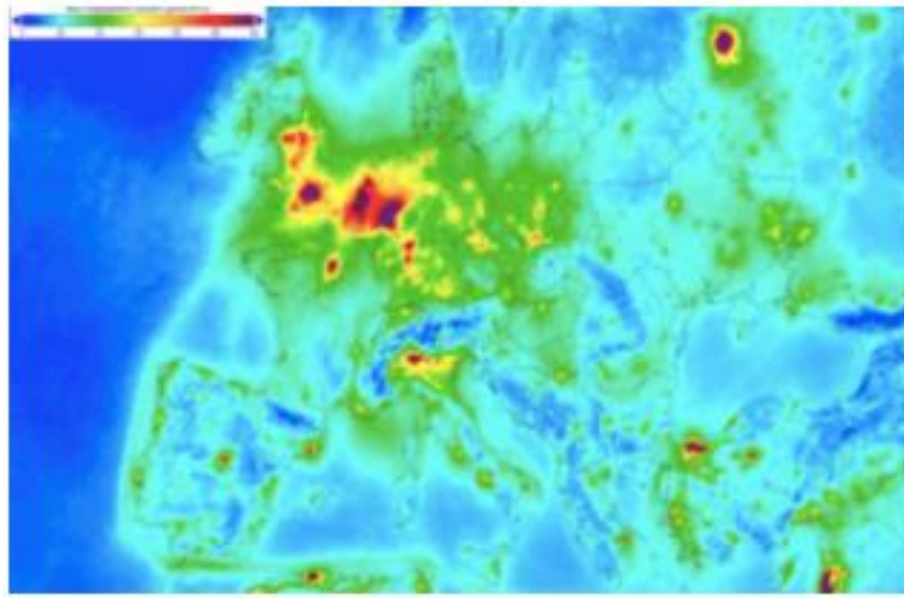
Just as mobile phones overcame the lack of landlines, the use of drones to deliver life-saving medical products can overcome the lack of road infrastructure seen in much of rural Africa.

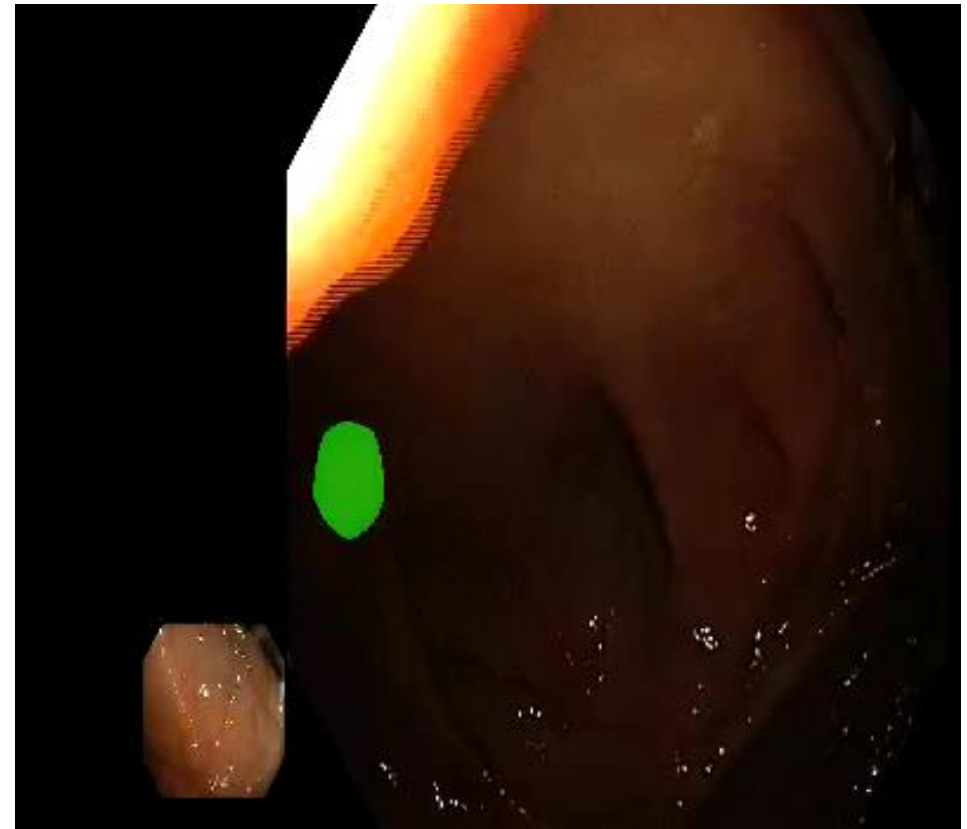
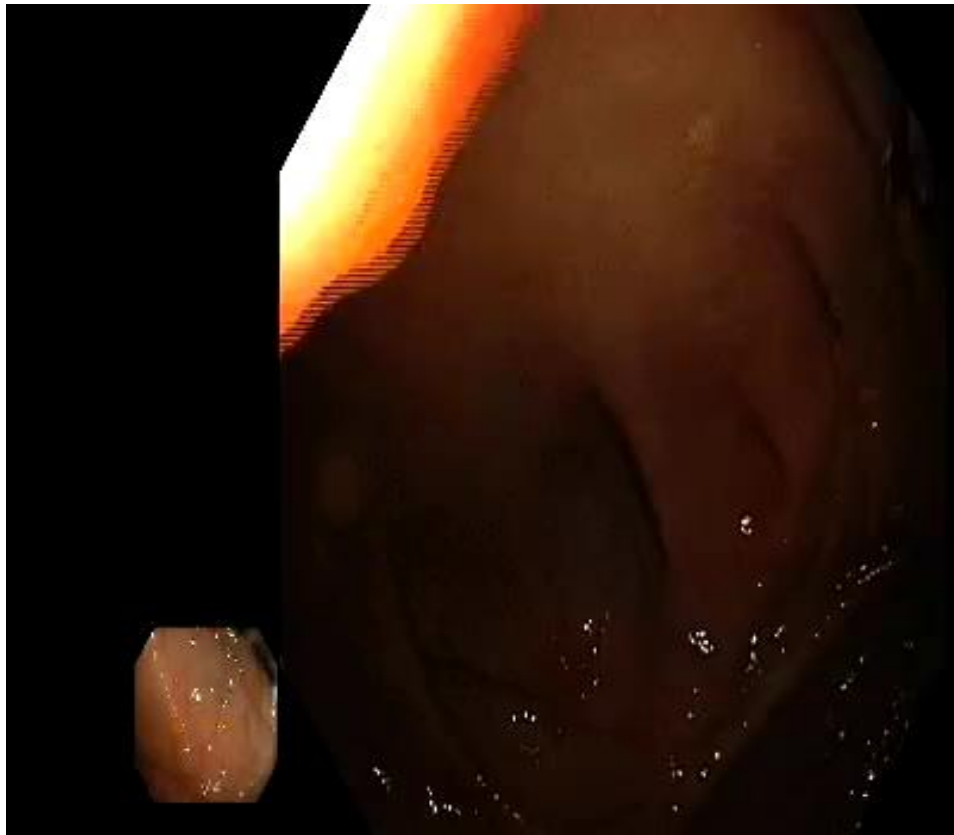


*Margaret Chan, Director General WHO,
MHRA Annual lecture March 2016*









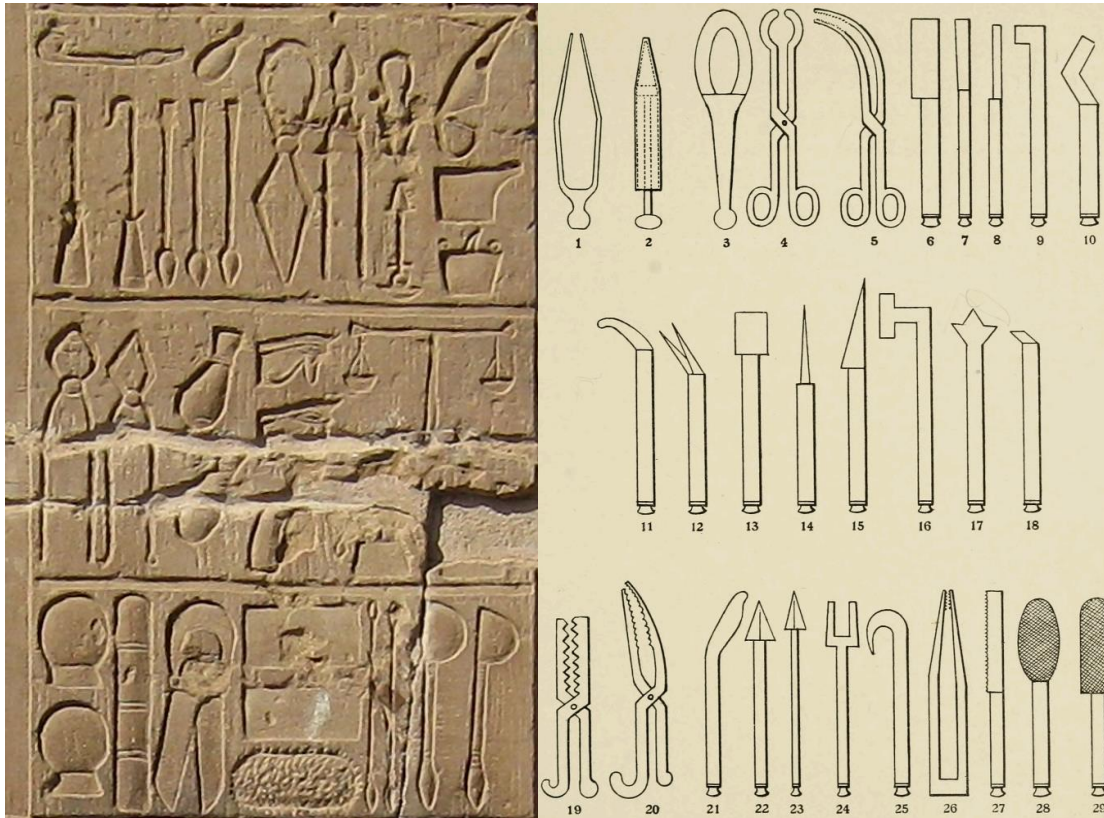
NHS England and NHS Improvement



The difficulty lies, not in the new ideas, but in escaping from the old ones, which ramify, for those brought up as most of us have been, into every corner of our minds.

**John Maynard Keynes, The General Theory of Employment,
Interest and Money (December 1935)**

Evolution of the Doctor's Bag



Circa 1920 AD



Circa 2000 AD



Smart phone plug-ins



Connected devices



The 21st Century Digital Patient Kit



Wearable sensors



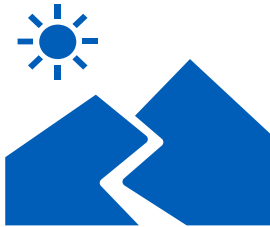
Advanced Portable Technology



Platforms & Condition Specific Apps



The Accelerated Access Collaborative's vision is to make the NHS one of the most pro-innovation health systems in the world



Improved **research** and **horizon scanning** for transformative innovations that addresses the NHS and population needs



Smarter, more 'joined up' investments for game-changing innovations

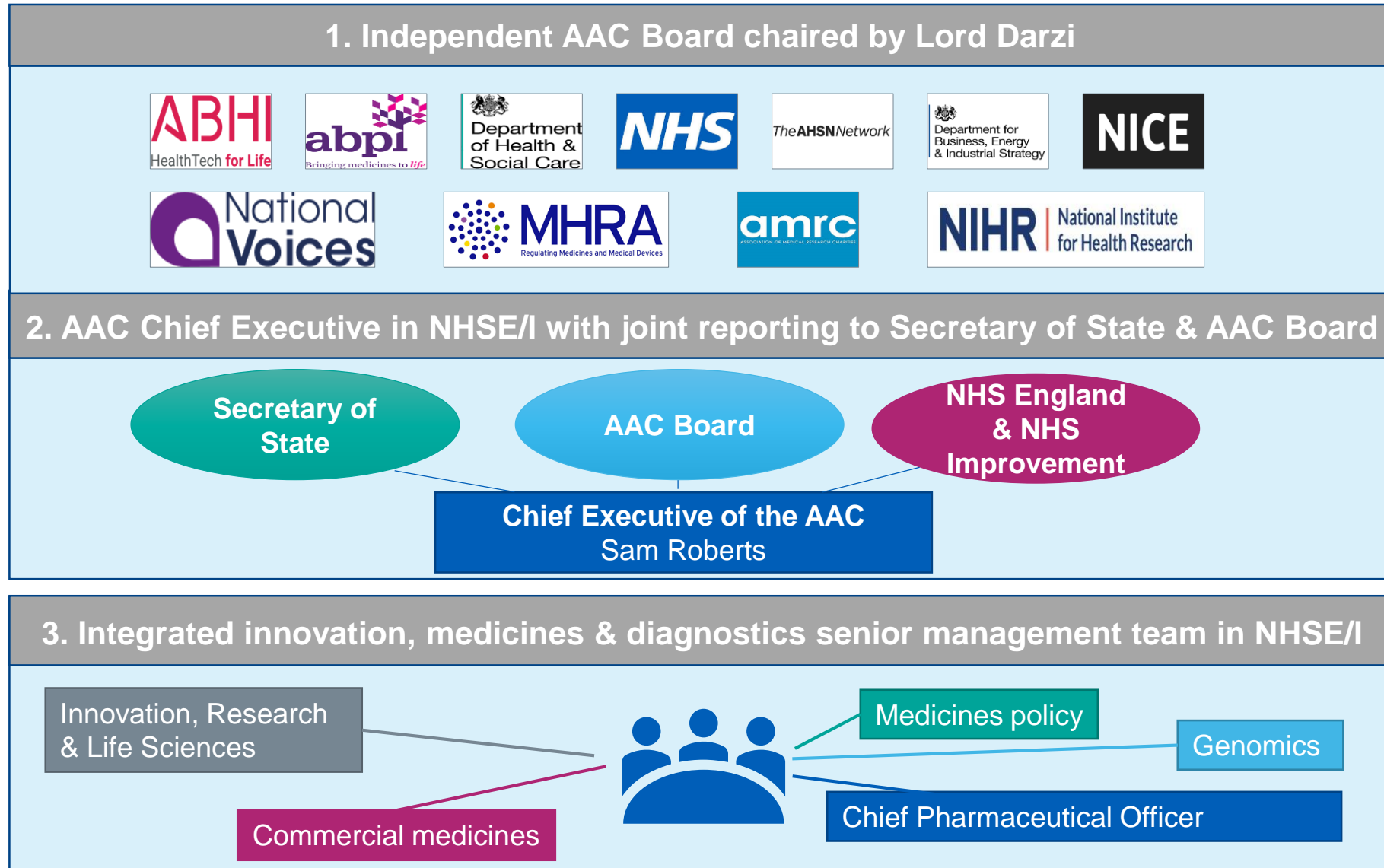


A simpler system for innovators to **navigate**; starting with signalling our needs and a clearer system for funding and adoption

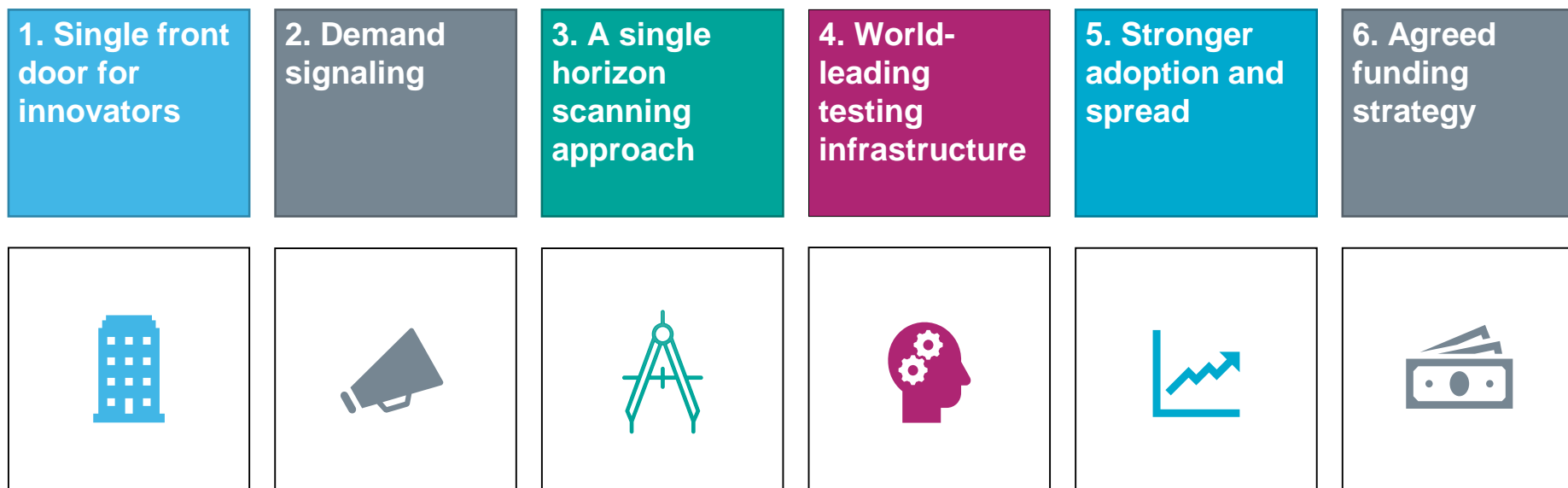
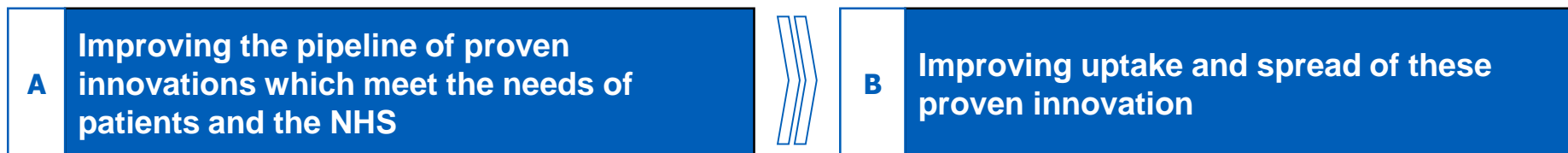


Faster access to innovative treatments and better monitoring and evaluation of the impact of innovations

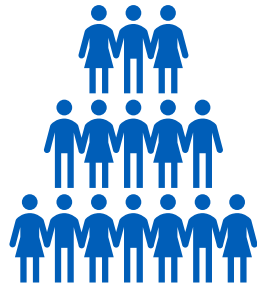
With greater coordination of partners under the umbrella of the Accelerated Access Collaborative...



...working on six key priorities...



...to make a difference to these groups



Patients and service users



Healthcare professional



SME

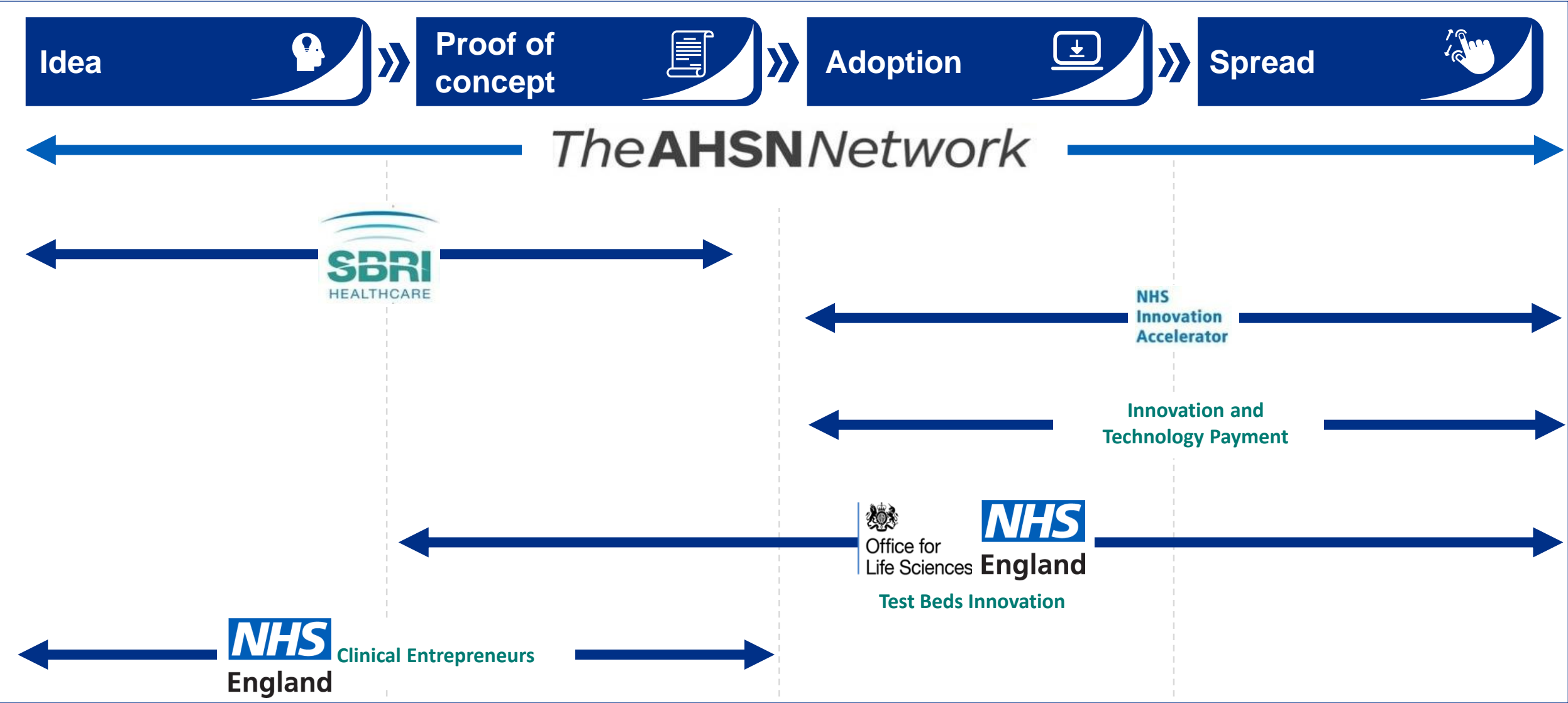


UK life sciences sector



Medium to
large company

Our programmes support innovations along the whole pathway

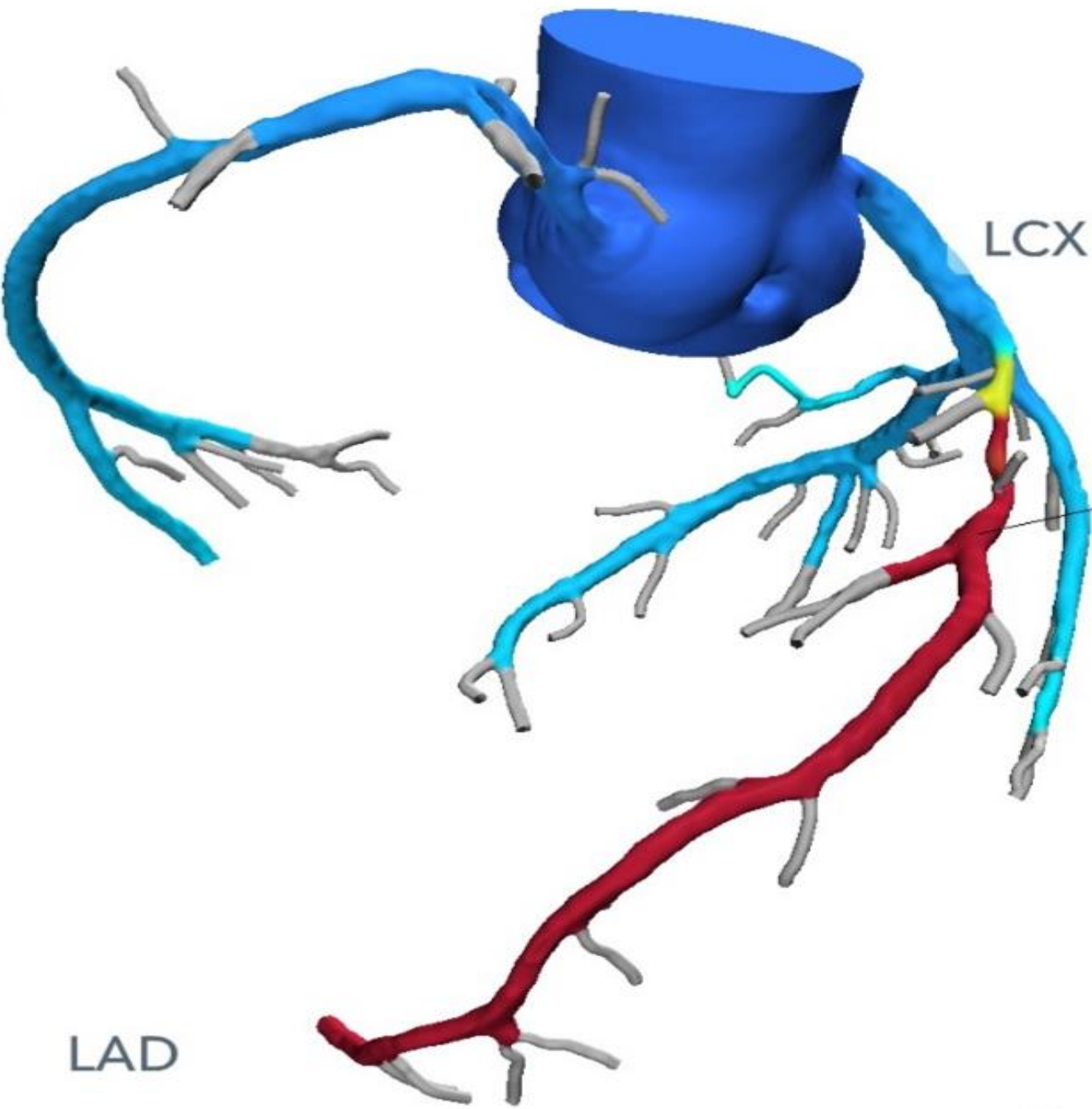


RCA

LCX

0.68

LAD



NICE Recommended Pathway for Patients with Recent Onset Chest Pain

- Integrating the HeartFlow FFR_{CT} Analysis

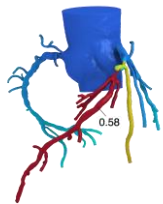


Coronary CTA as a frontline test* for patients with:

- typical or atypical chest pain, or
- abnormal 12-lead resting ECG



Results of coronary CTA indicate coronary artery disease (CAD) of uncertain functional significance or are otherwise indeterminate



The HeartFlow FFR_{CT} Analysis provides clinicians with proven functional information to aid in diagnosing, vessel by vessel, the existence of myocardial ischemia.

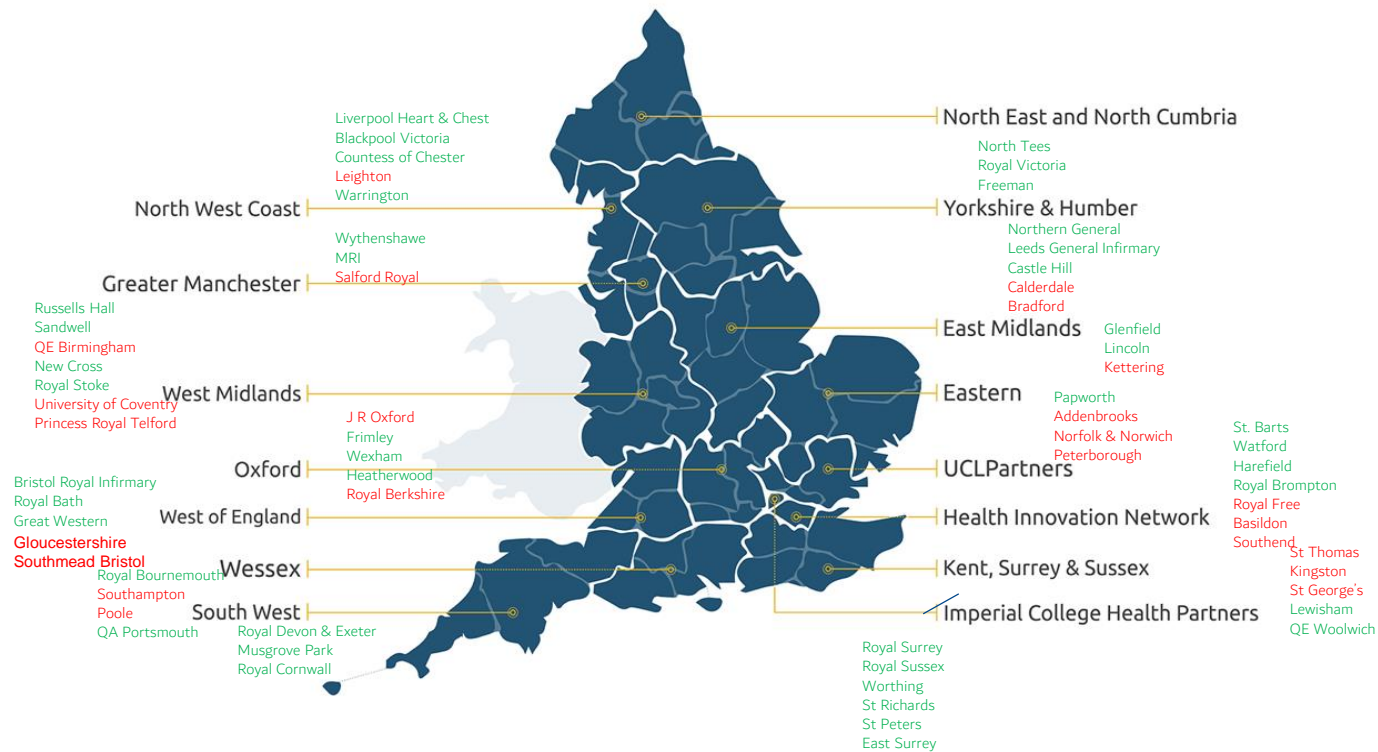


Clinical improvements: avoidance of invasive investigation and simplification of patient pathway

Cost savings: 16% reduction in NHS system costs from patients presenting with recent onset chest pain

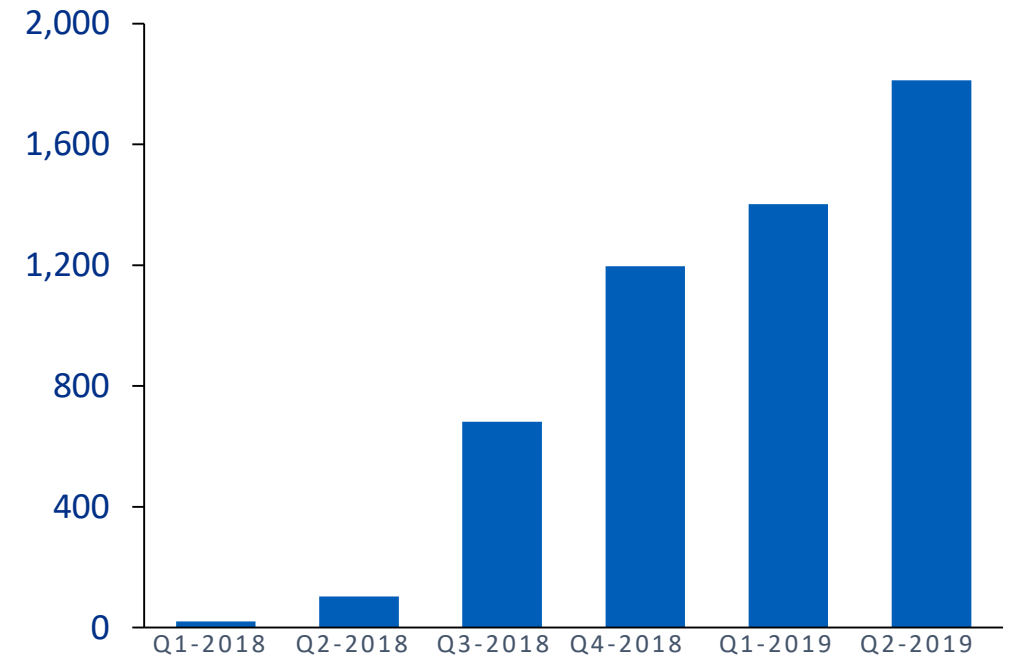
*Based on NICE guidance for chest pain of recent onset (CG95) and medical technology consultation document "HeartFlow FFR_{CT} for estimating fractional flow reserve from coronary CT angiography".

UK adoption of HeartFlow FFR_{CT}

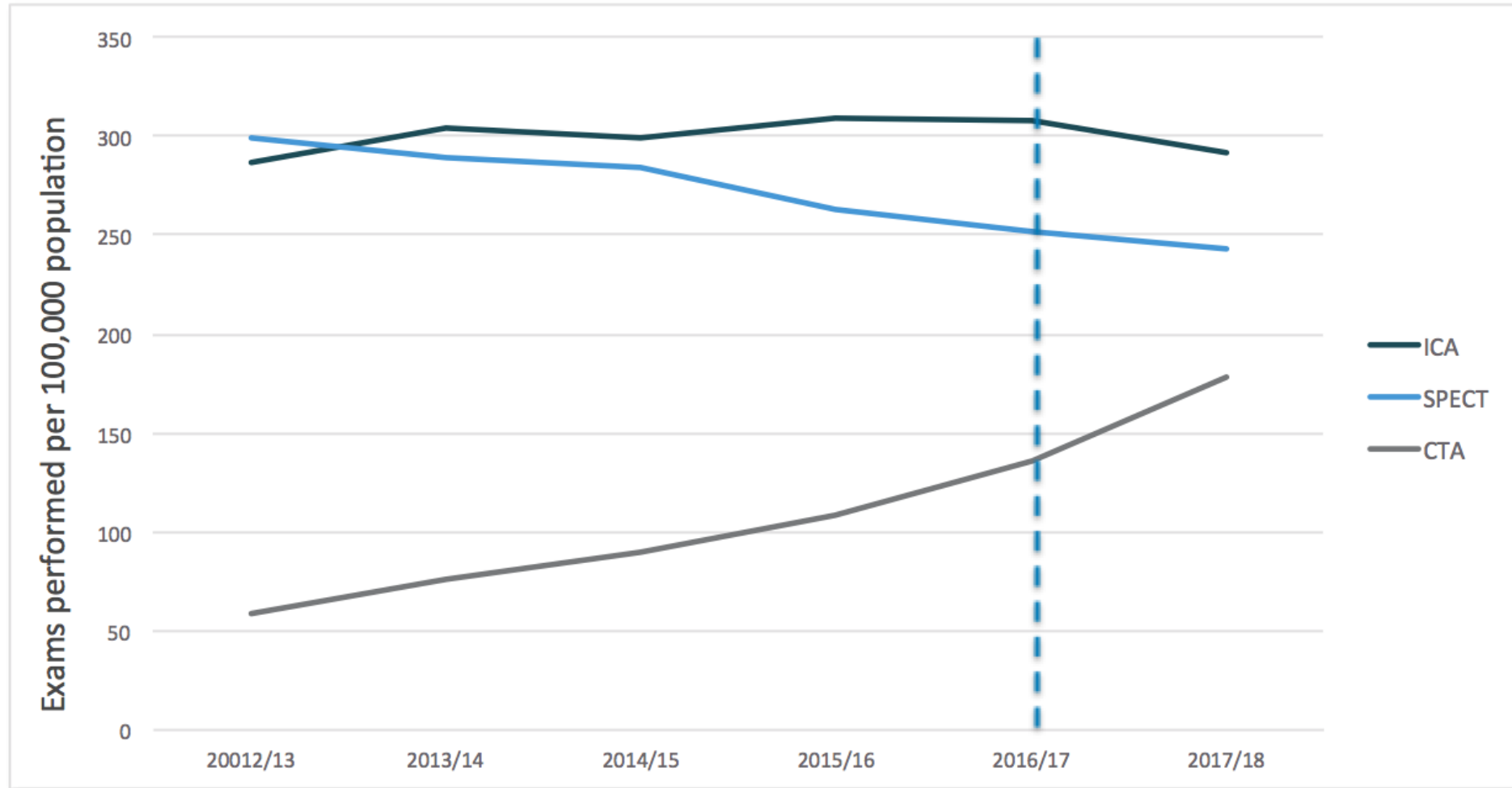


UK FFR_{CT} volume* trend (2018-19YTD)

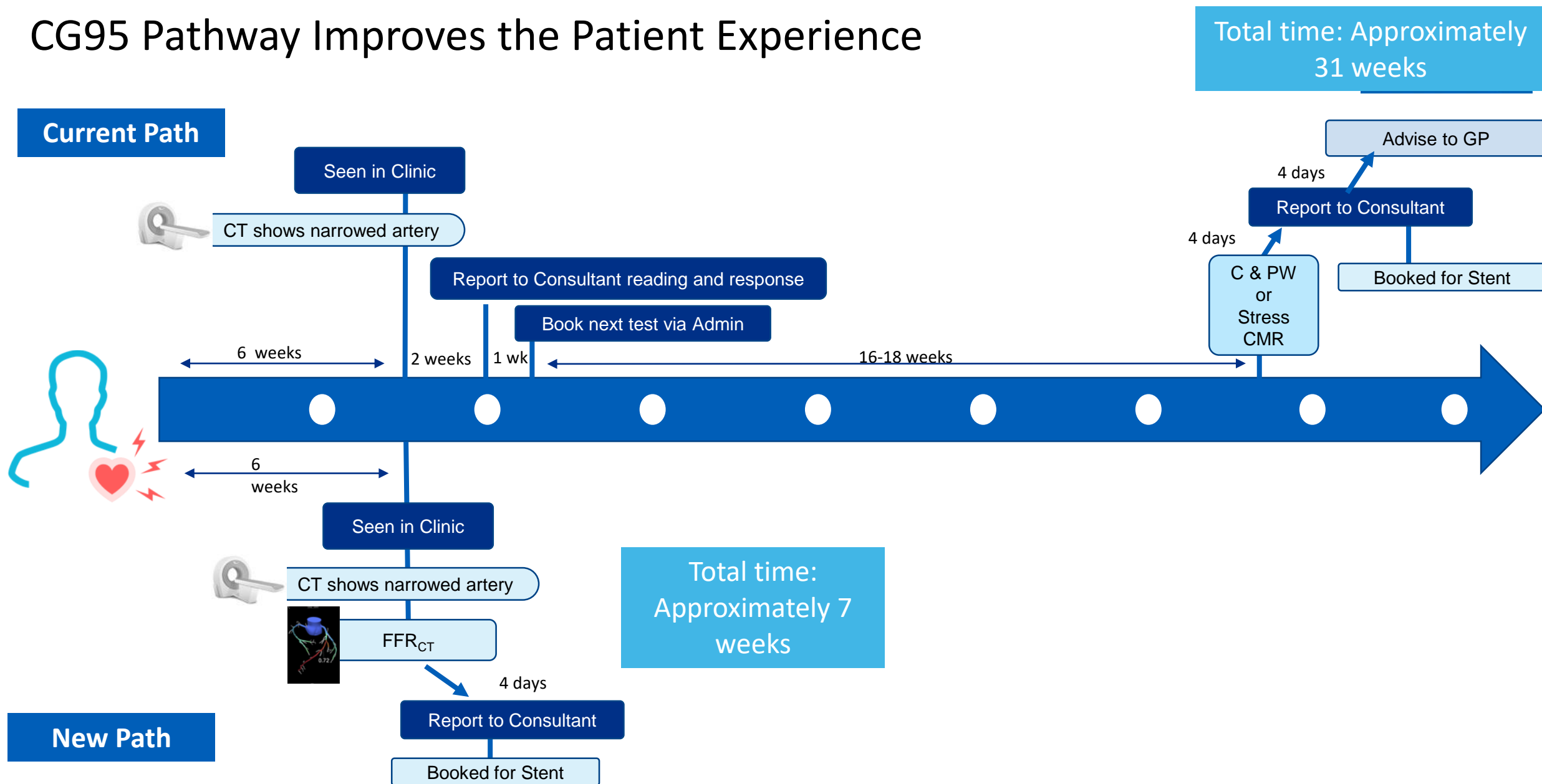
Number of completed FFR_{CT} cases per quarter



Uptake of Coronary CTA in England



CG95 Pathway Improves the Patient Experience





Department
of Health &
Social Care

Guidance

Code of conduct for data-driven health and care technology

Updated 18 July 2019

- **Understand users, their needs and the context**
- **Define the outcome and how the technology will contribute to it**
- **Use data that is in line with appropriate guidelines for the purpose for which it is being used**
- **Be fair, transparent and accountable about what data is being used**
- **Make use of open standards**
- **Be transparent about the limitations of the data used and algorithms deployed**
- **Show what type of algorithm is being developed or deployed, the ethical examination of how the data is used, how its performance will be validated and how it will be integrated into health and care provision**
- **Generate evidence of effectiveness for the intended use and value for money**
- **Make security integral to the design**
- **Define the commercial strategy**

NHSx AI Lab

**How are we training our
clinicians to deliver the
personalized, empowered
health and care revolution ?**

The Clinical Entrepreneur Programme

- Mentoring and coaching
- Less than full time training
- Advanced internships
- Connection to customers and funding
- Education and networking events



The Clinical Entrepreneurs supports the NHS workforce to develop their innovative ideas



3,426

hours of mentoring were delivered to Clinical Entrepreneurs

Year one – 706 Year two – 864
Year three – 1,856



347

innovations are being developed

145

Clinical Entrepreneurs participated in accelerators and business support programmes

Year one – 28 Year two – 47 Year three – 70



1,047

jobs have been created

Year one – 344 Year two – 357
Year three – 346



33

Clinical Entrepreneur innovations are being used internationally

over
500,000,000
social media impressions



175

start-ups have been created

Year one – 50 Year two – 63
Year three – 62

106

clinicians returned to the NHS or were retained within the NHS as a result of the Programme

Year one – 34 Year two – 47
Year three – 25

17.4m



private, professional and patient users of products, processes and services developed by Clinical Entrepreneurs

Year one – 5.6m Year two – 8.1m Year three – 3.7m

10,831

organisations have adopted CE innovations

362



Clinical Entrepreneurs

Year one – 104 Year two – 138
Year three – 120

over
12,000

CPD points have been awarded to Clinical Entrepreneurs

Year two – 5,026 year three – 7,238

More than

£164m



of funding raised

Year one – £51.7m Year two – £67.1m
Year three – £45.3m

1,019

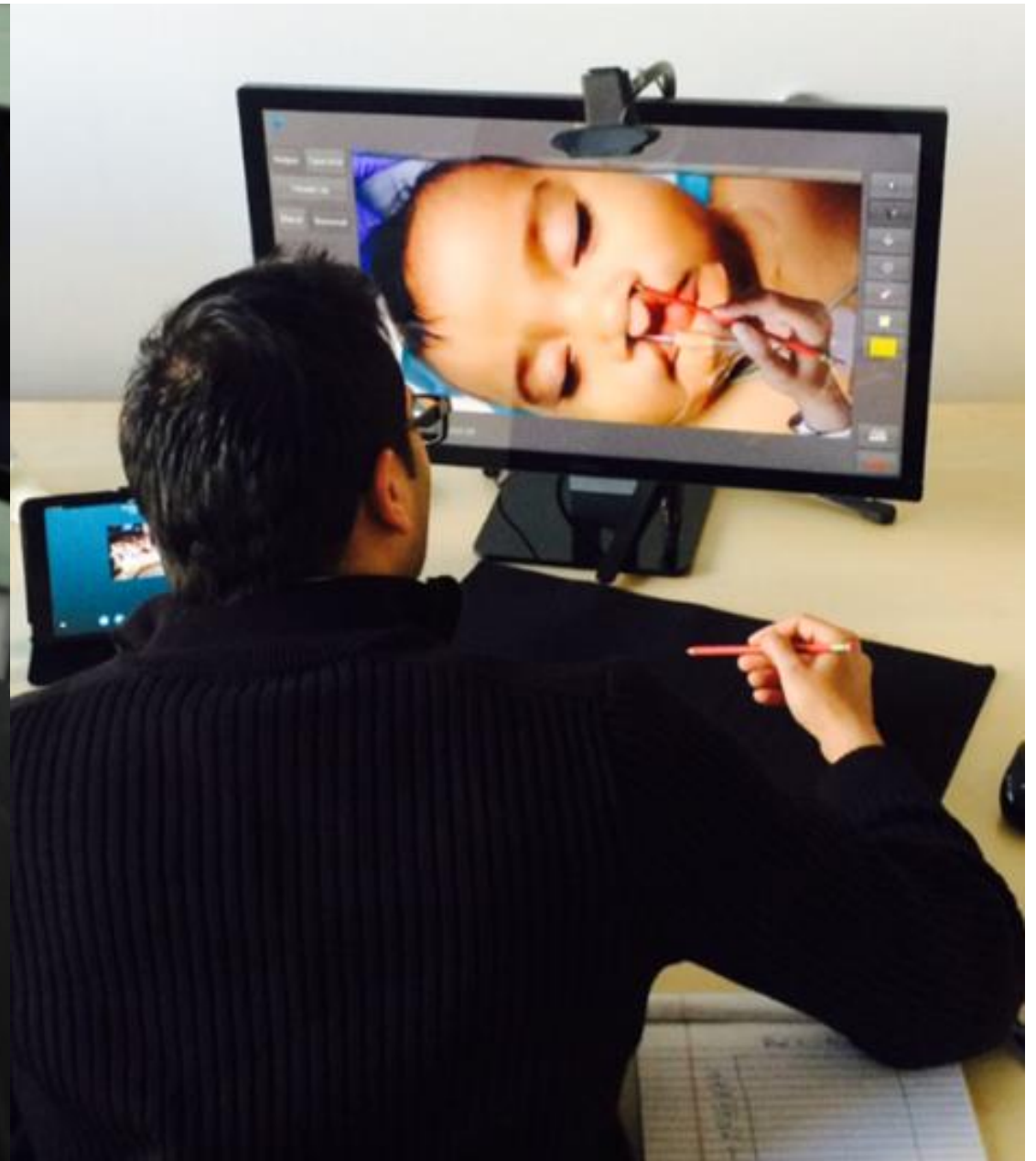
partnerships and collaborations

37

pilots of Clinical Entrepreneurs products, processes and services are in operation

These figures are based on 254 respondents





AUGMENTED
REALITY
PROCTORING

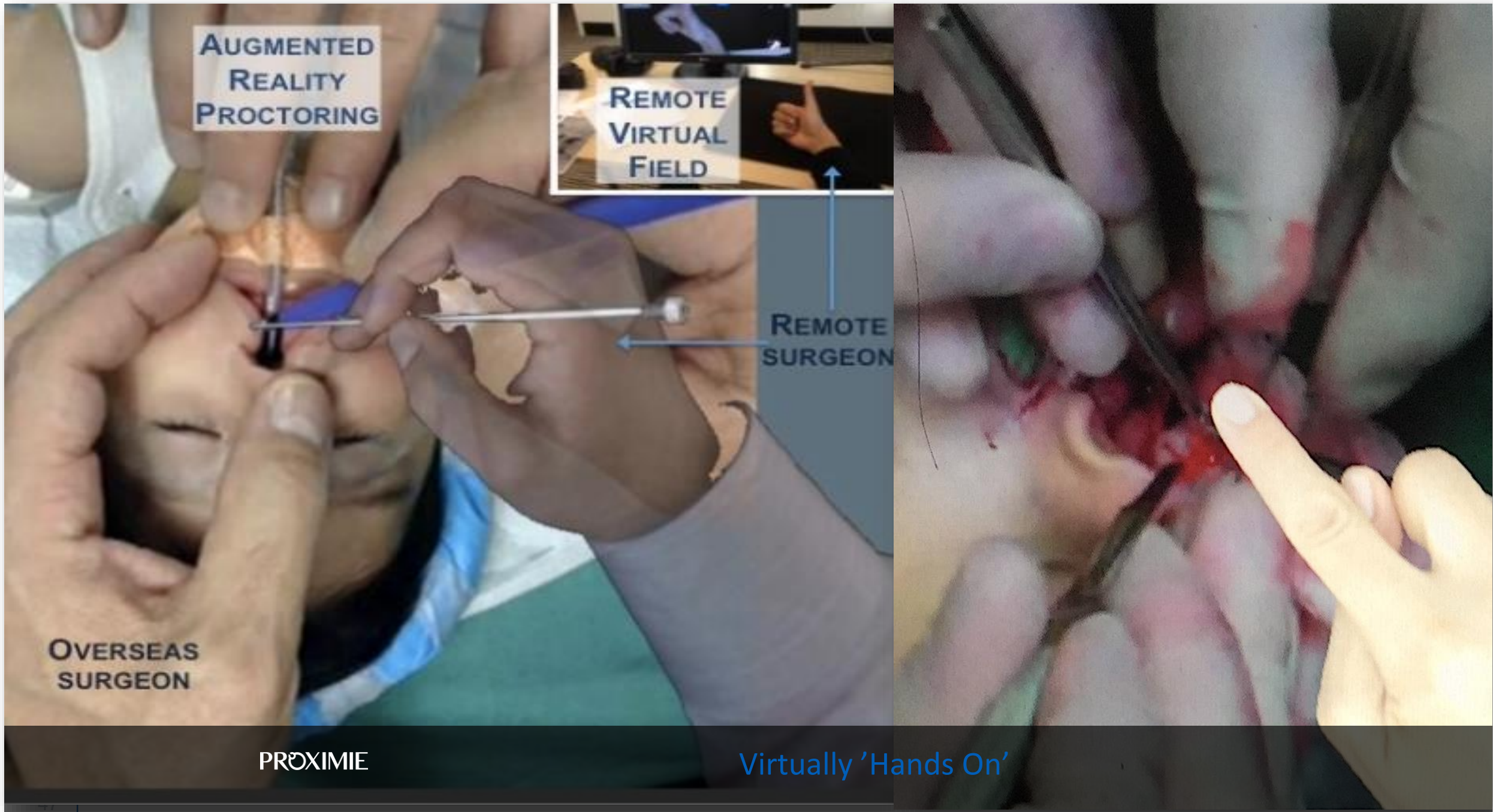
REMOTE
VIRTUAL
FIELD

REMOTE
SURGEON

OVERSEAS
SURGEON

PROXIMIE

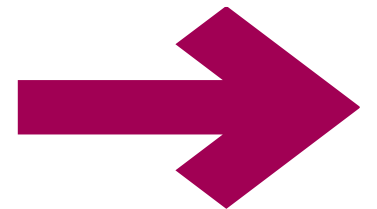
Virtually 'Hands On'



ROBOTIC RADICAL PROSTATECTOMY GUYS HOSPITAL

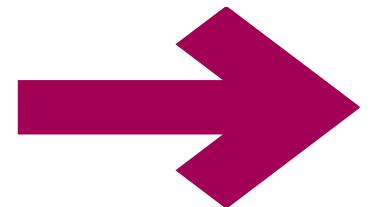


REMOTE ASSISTANCE
FROM PROFESSOR
PROKAR DASGUPTA





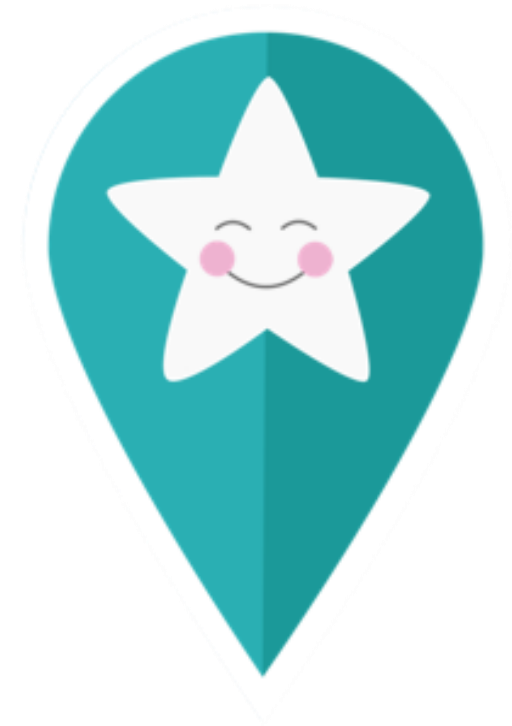
- Linked to falls, depression, dementia, social isolation
- Will overtake Diabetes and cataracts as top disease burden by 2030
- Most common treatable cause of hearing loss
- 500m have hearing loss globally







Little Journey app



Dr Chris Evans

Anaesthetic Trainee
UCL PhD Candidate

NHS England Clinical Entrepreneur Fellow
Founder of Little Sparks Hospital



HAMPSHIRE AND
ISLE OF WIGHT
AIR AMBULANCE

LOG OUT

My account

Events

Support

News

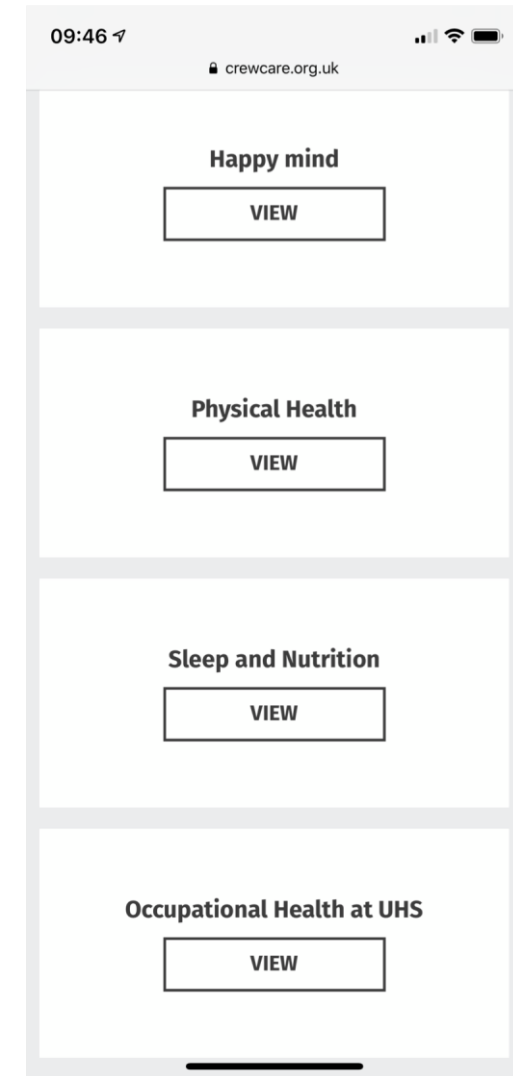
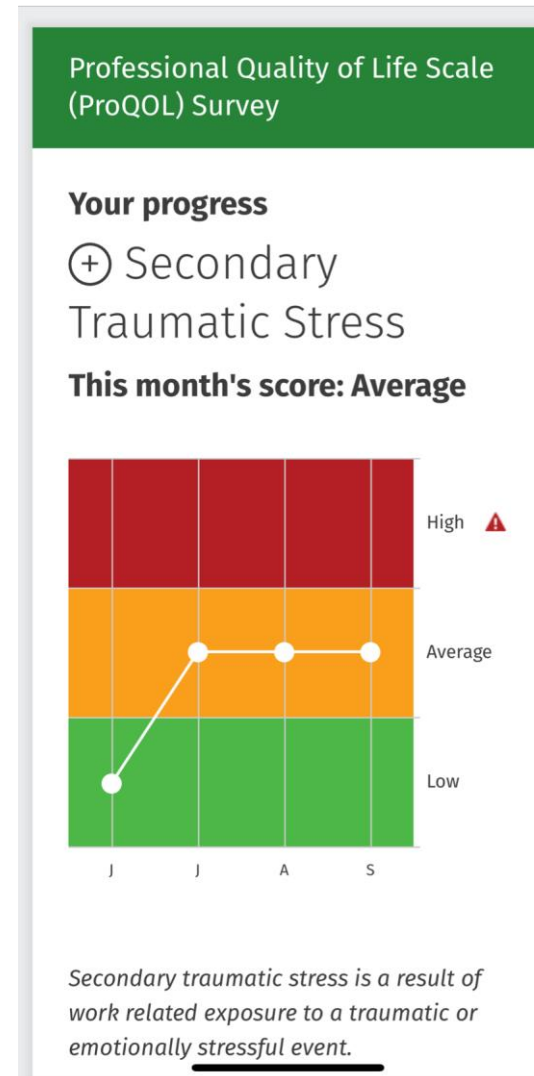
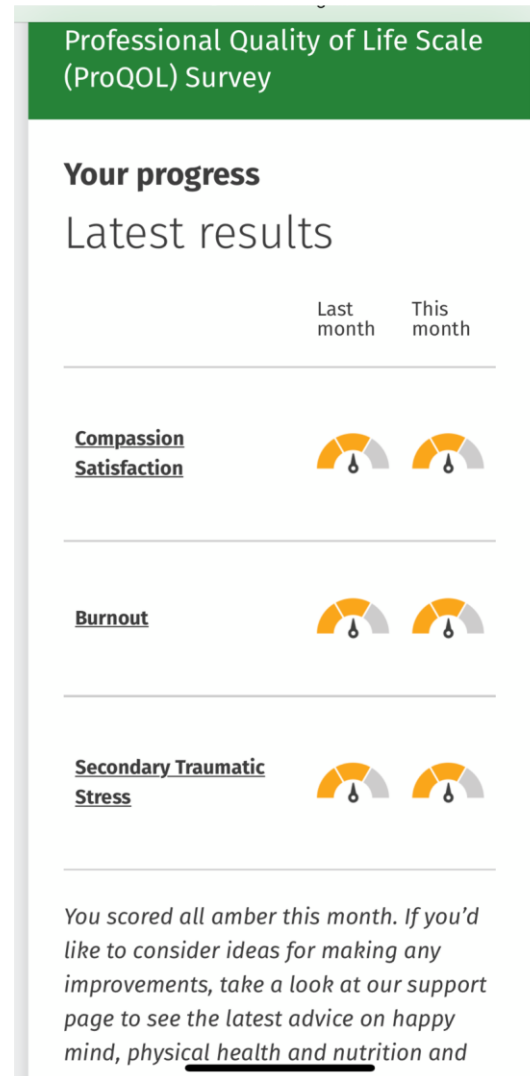
Offers

Welcome to Crew Care

The place for Hampshire and Isle of Wight Air Ambulance crew to reflect on mental health and wellbeing.

LEARN MORE

Self monitoring





Events – Wellbeing days



Team Day: Bright Bricks Lego!

DECEMBER 5 @ 10:00 AM - 2:00 PM

Bright Bricks are based in Bordon, Hampshire but they are internationally renowned for their incredible creations! They have built a world-record-breaking bridge using just...

[VIEW EVENT](#)

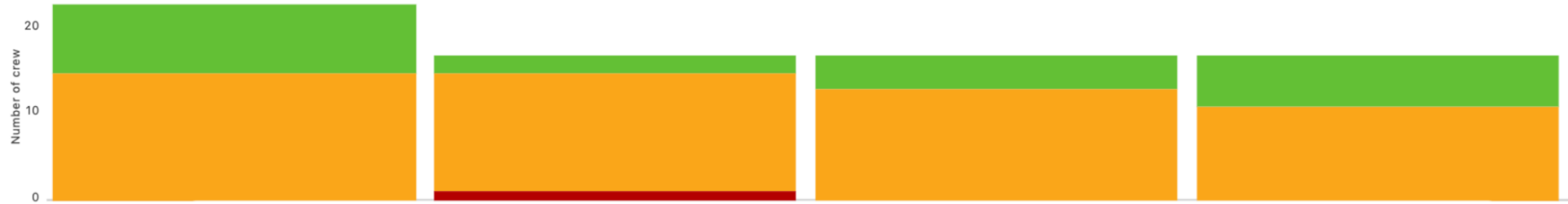
Wellbeing days bring the Critical Care Team together outside of work

- Quarterly away days
- Reflective practice
- Team building events
- Reduce stigma

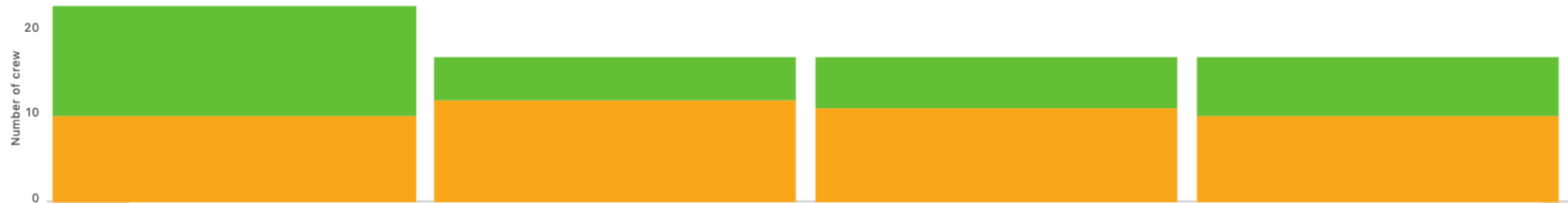


Staff Monitoring

Overall Compassion of crew

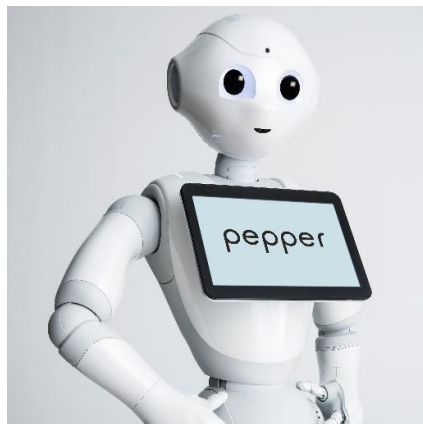
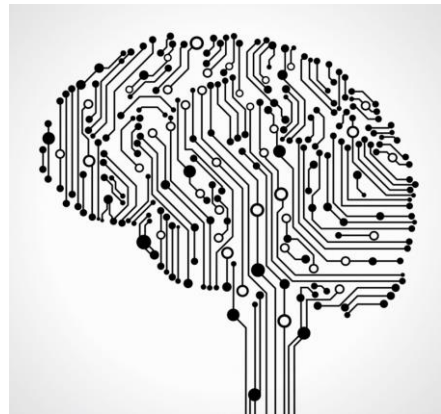
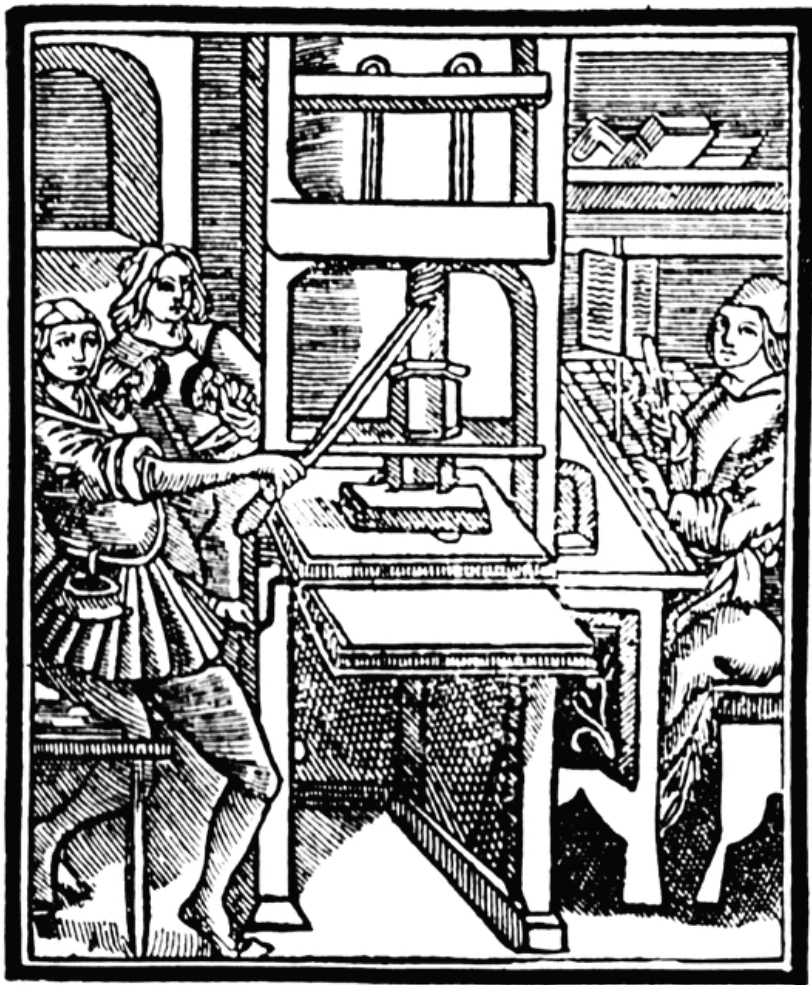


Overall Burnout of crew



Overall Secondary Traumatic Stress of crew





**How do we get people to
buy more insurance?**

I've learned that people will forget what you said,
people will forget what you did, but people will
never forget **how you made them feel**

Maya Angelou



LUCID

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