hfma

Transforming healthcare with digital technologies

This webinar is part of the *Delivering value with digital technologies* programme that the HFMA is undertaking, supported by Health Education England. For more information visit hfma.to/valuewithdigital.

Digital Health Opportunities

For HFMA
Yinka Makinde, Head of Innovation, NHSX

Agenda

- Innovation yesterday
- Innovation tomorrow (plus Poll)
- Innovation today
- A look through the finance lens
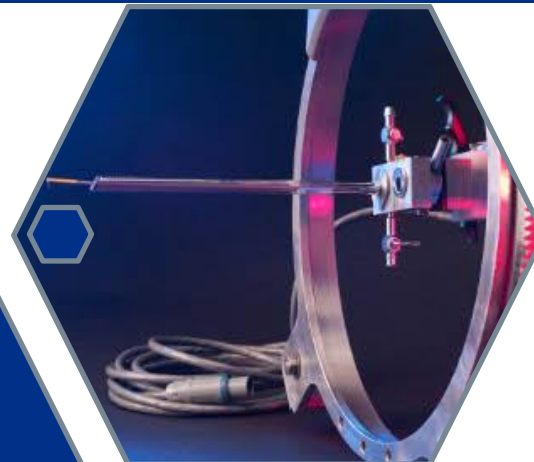- A whole pathway lens example (plus Poll)
- Q&A

Innovation Yesterday

30 years ago, in digital health...

NHS ^x

Robots

Paving the way for more advanced research and development

1991
PROBOT –medical robot for surgical use at Imperial College

Cellular Telemedicine

MDPhone was designed to remotely diagnose and treat patients requiring cardiac resuscitation involving 12 centres to receive and treat.

1990
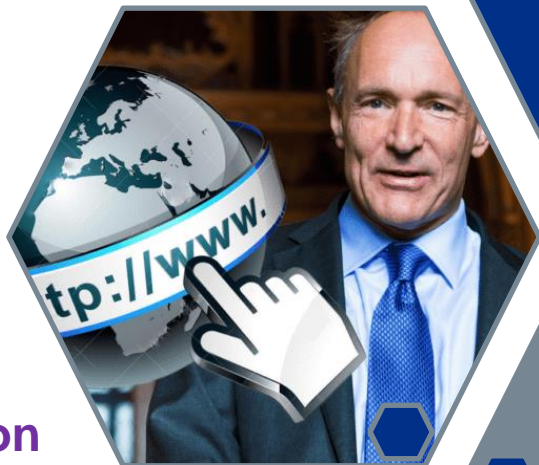MDPhone- Eric Wachtel launched the first cellular interactive telemedicine system

Information

Creating opportunity for the individuals to access information and learn more about their health
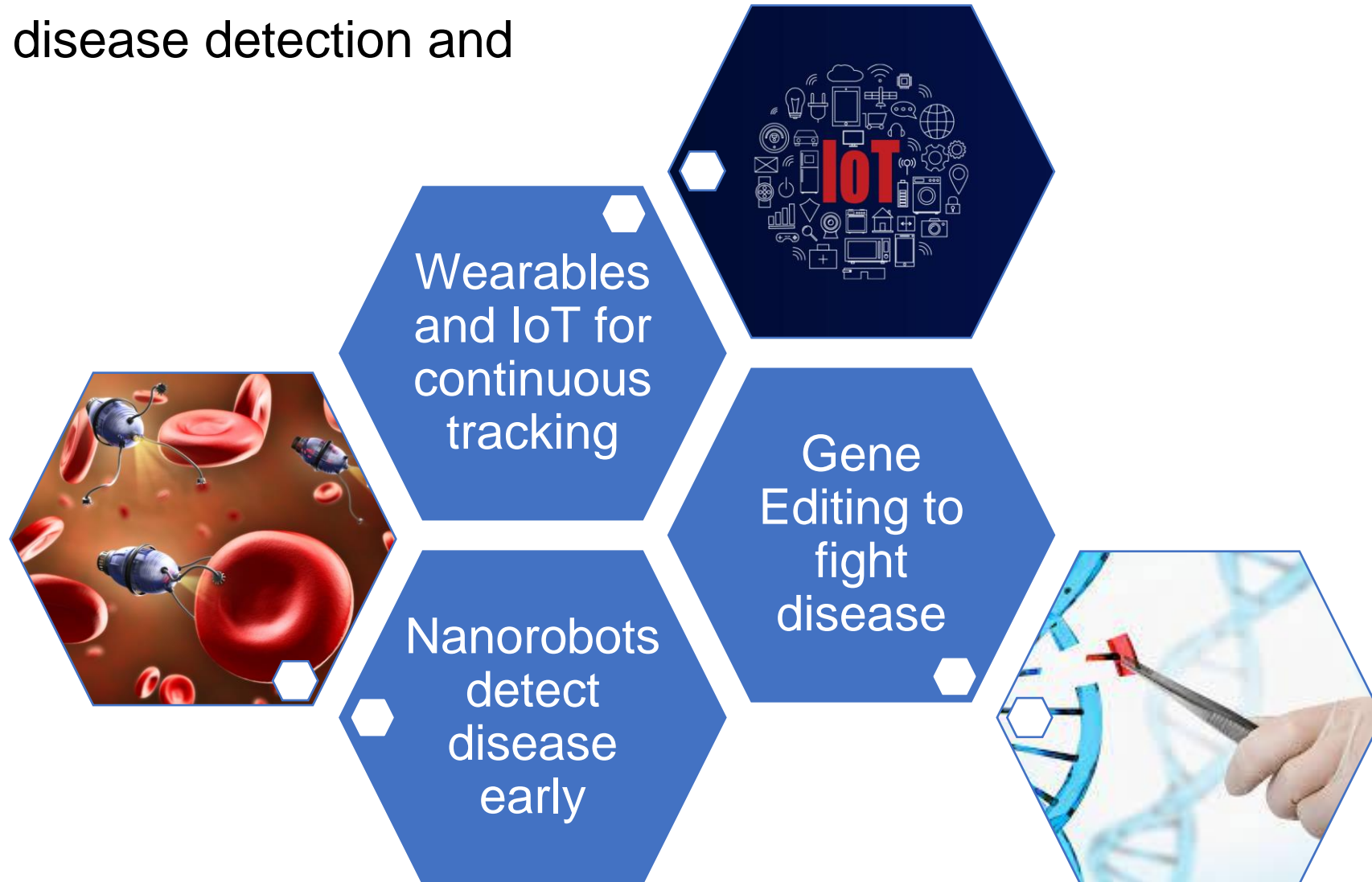
1990
World Wide Web was born
By Tim Berners-Lee

Innovation Tomorrow

30 years from now…

Personalised disease detection and treatment

Wearables and IoT for continuous tracking

Gene Editing to fight disease

Nanorobots detect disease early

Detecting disease early…

Early disease detection

Pre-birth scanning to create health blueprint for individual

Predisposition to disease and disorders identified and a 'healthy living' map created

Nanorobots injected to detect changes and early signs of disease
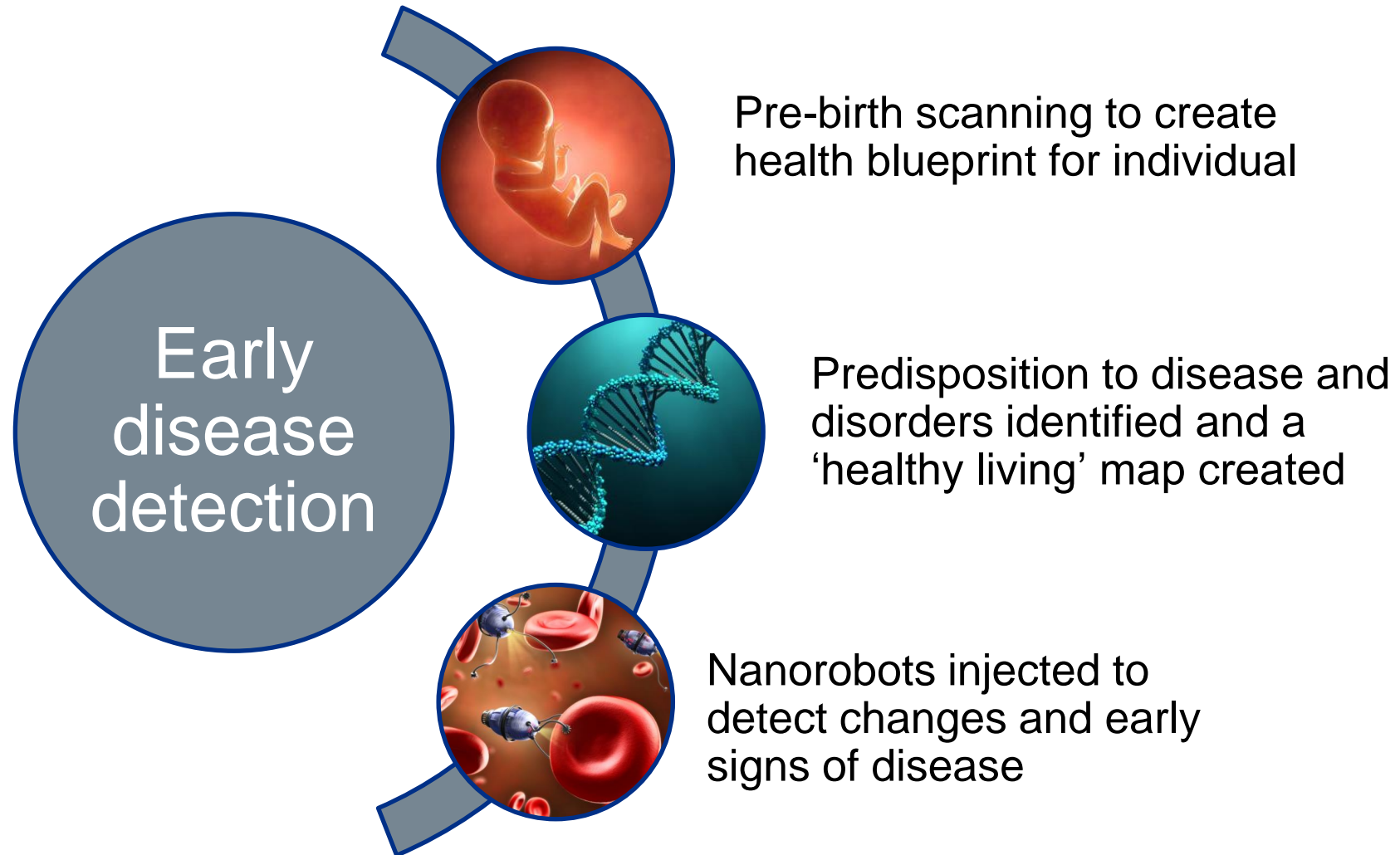
Continuous health monitoring…

NHS^x

Continuous, automated self-monitoring

Smart Homes

Full body 360 scans and breath samples to detect illness

Wearables
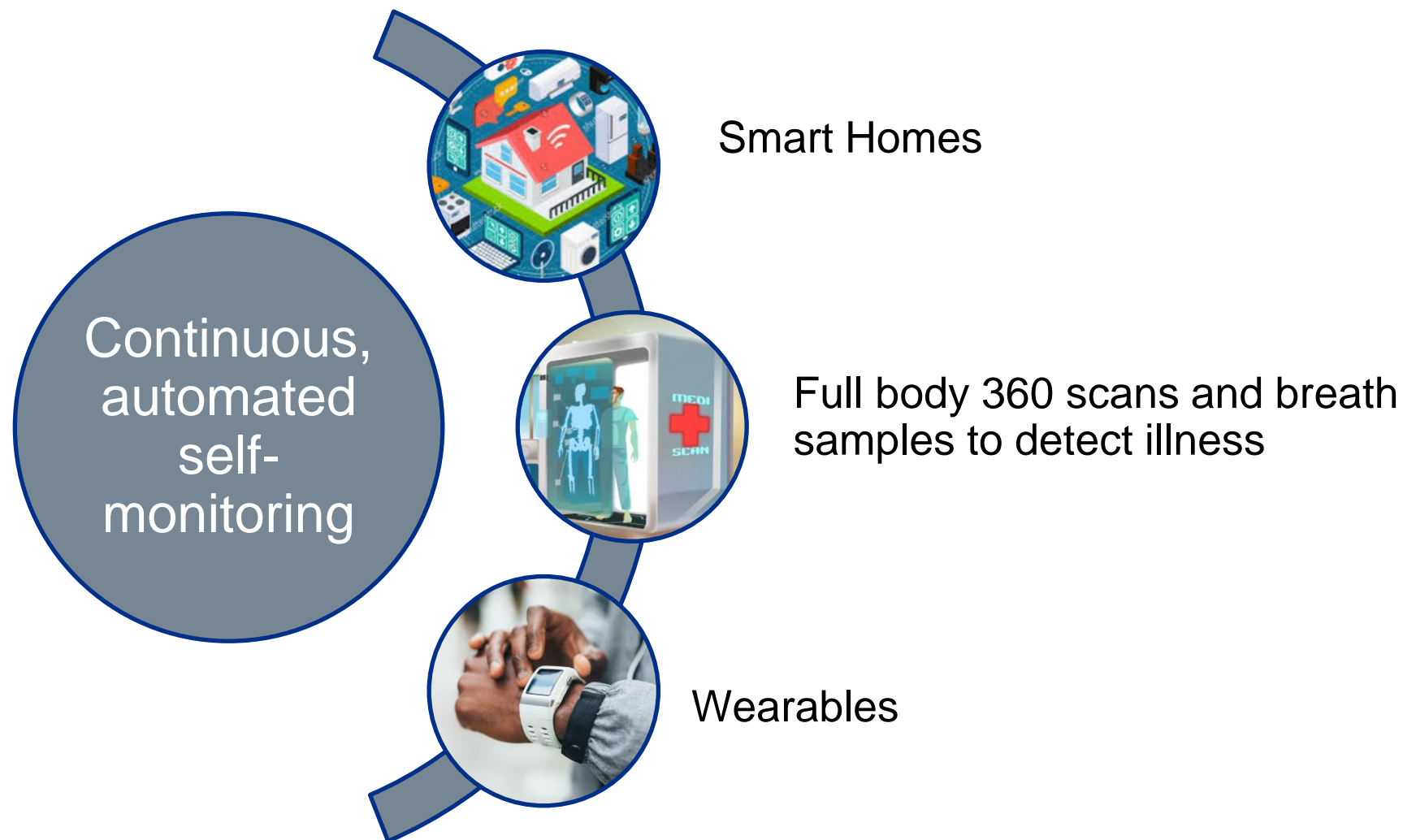
Fighting disease precisely…

NHS x

Nano technologies used to speed up treatment and healing time

Targeted and immediate treatment

Patients prescribed bespoke medicine developed by AI, based on healthcare record

Gene editing to repair and edit DNA in treating cancer and dementia, and other diseases
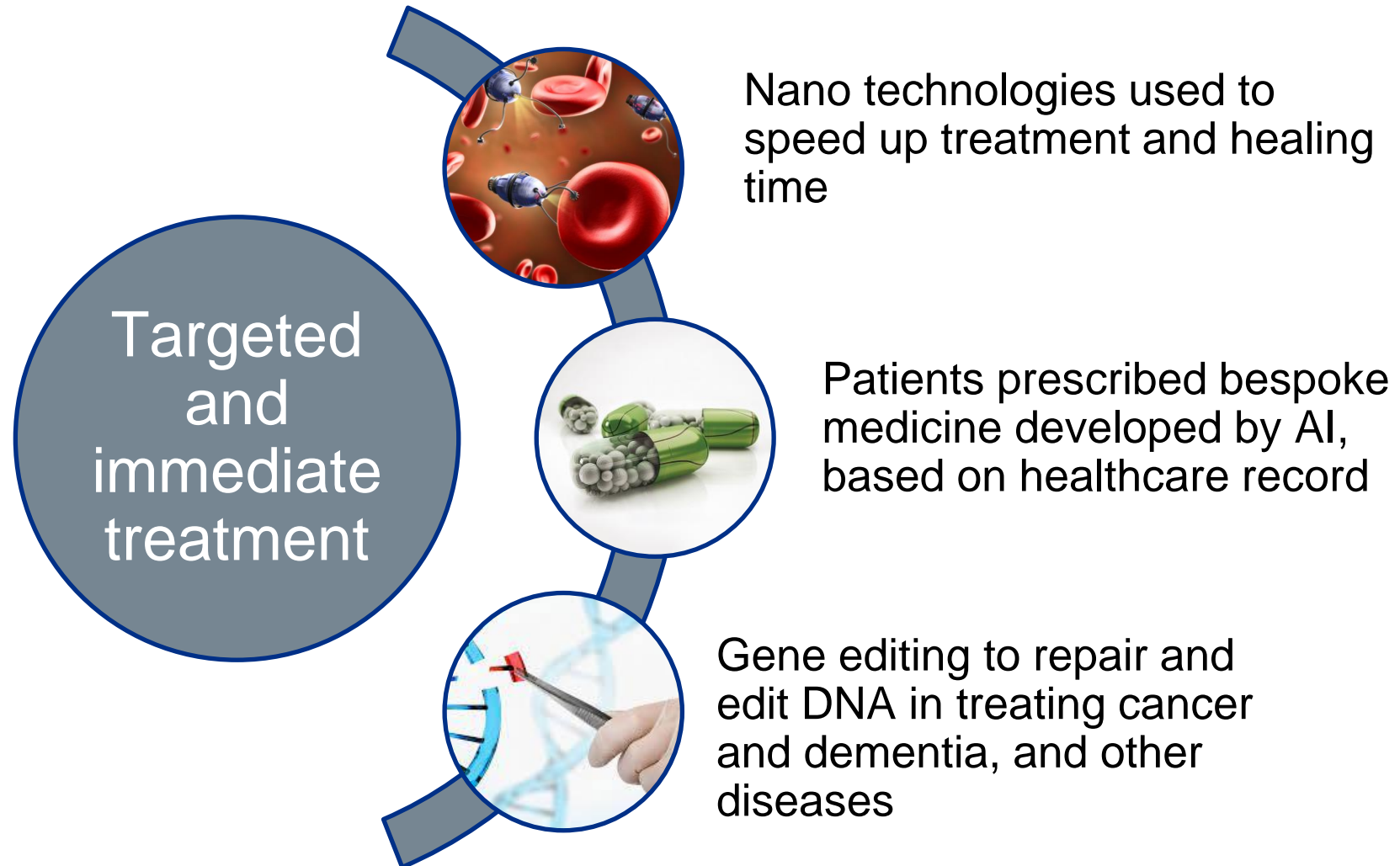
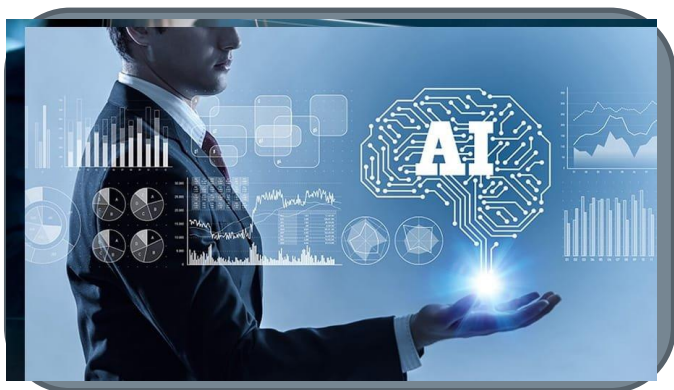How do you feel about the future that digital innovation can create?

A. Skeptical
B. Excited
C. Curious
D. Apprehensive
E. Unsure

Innovation Today

Control the noise………

NHS^x
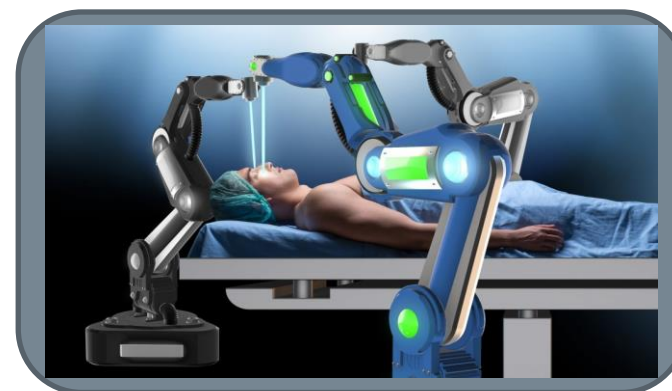
Artificial Intelligence

Virtual Realty

Internet of Things

Augmented Reality

Robotic Surgery

2020 – the year that defined the next 10 years in healthcare

NHS ^X

CAPACITY

Social distancing measures and the need to free up clinician time to care for those critically ill with COVID meant that the only way to ensure at least partial continuity in routine care, whilst limiting in-person contact, was to embrace and implement tools to support remote methods of care.

INVESTMENT

Digital technologies were already having an impact on healthcare pre-pandemic, but the investment in change wasn't hurried.

During the pandemic investment expedited change.
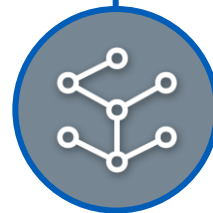
ACCEPTANCE

For the first time, digital was not a 'nice to have'. It was a need to have. Resistance to adoption was reduced, traditional barriers to adoption were overcome, and there was a general acceptance to move at pace.
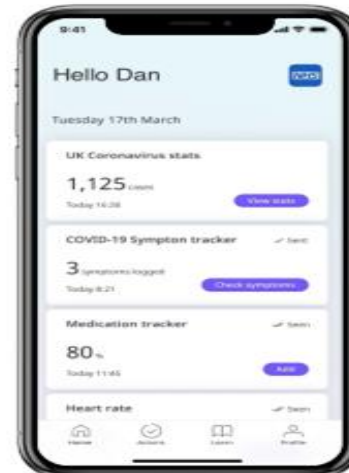
Remote monitoring for COVID patients ...

Patients like -

- Seeing the **double ticks** provides reassurance that clinicians are reviewing their results

- That they can **call or video consult** via the app if they have concerns

- **Recovering at home** rather than in hospital

Adherence levels

- Are **very high** at above **90%** for all ages (oldest user is 80)

https://vimeo.com/425857052

Clinician telemedicine portal features

|	
Alerts & Thresholds	Set alerts and thresholds to ensure COVID-19 patients are seen at the right time by the right clinician
Secure	Secure portal for ease of viewing on desktop or mobile.
Telemedicine	Telemedicine available to engage with patients easily
Data visualisation	Patient level data analysis & visualisation.
Rules-based triage	Opportunity for rules based triage to promote efficiency.

NHSˣ
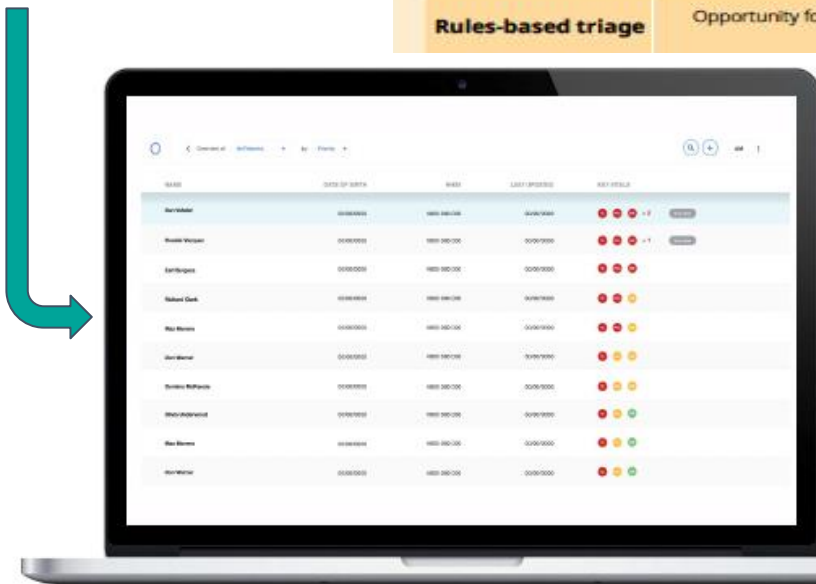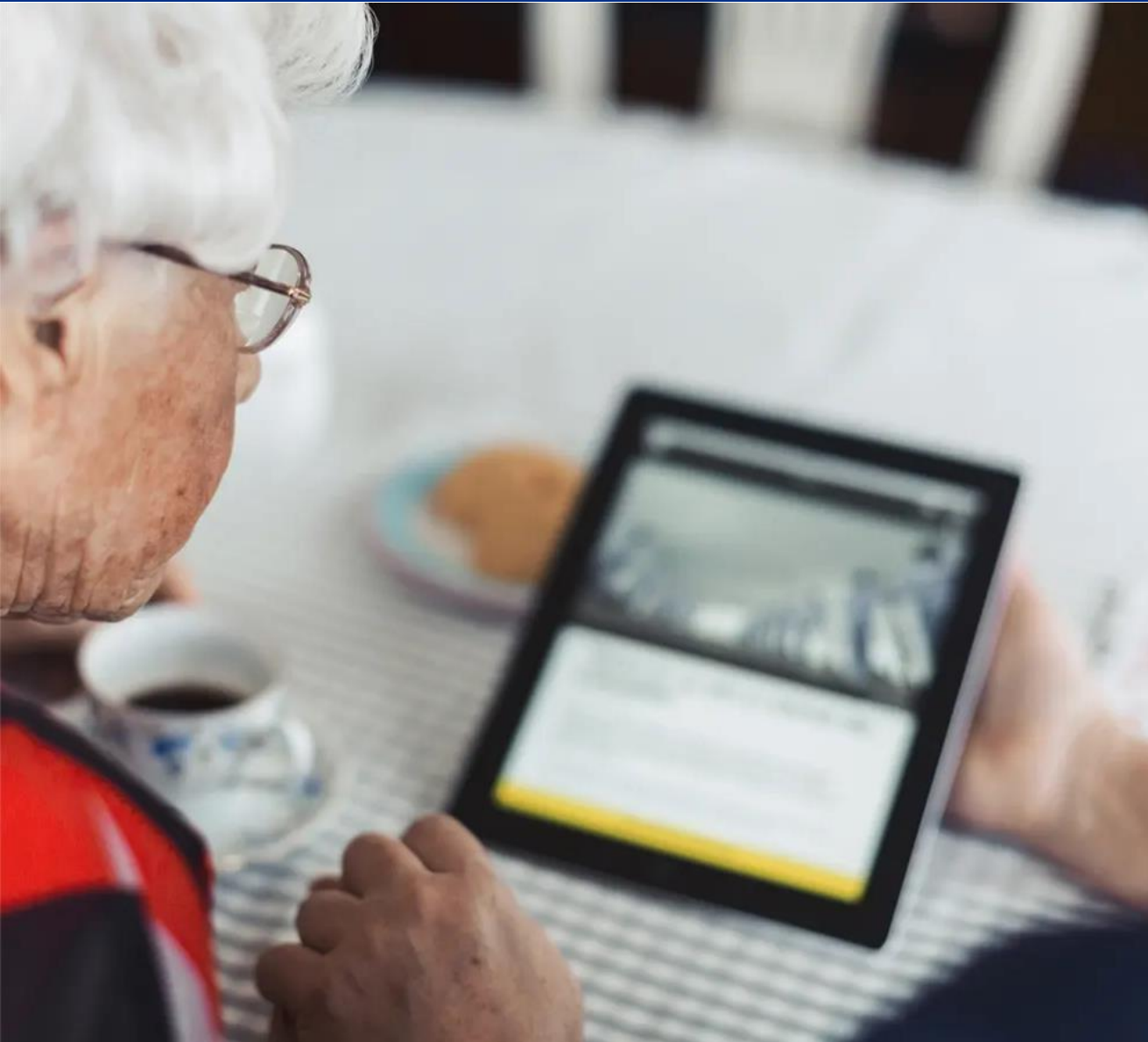
The home monitoring service:

- **Identifies rapidly deteriorating patients** who have COVID-19 symptoms
- **Enables clinicians to react faster**, avoid further complications and better manage system capacity
- **Improves patient experience**
- Provides more clinical support & oversight of **care at home**
- **Saves clinical time**

NHS
West Hertfordshire
Hospitals
NHS Trust

Patients and clinicians like using the tool. Patients like that they are notified when a clinician views their data.

Primary care Hot Hubs in **Hillingdon**, **Brent**, **Harrow**, **West London, NW Central & East Berkshire**

NHS
Whittington Health
NHS Trust

Challenges to recovery

NHS ˣ

- The Covid-19 pandemic has caused significant disruption to services and a reduction in many types of activity. Across all specialities, 4.7 million people were waiting to start treatment at the end of February 2021 according to figures from NHS England – the highest number since records began in August 2007

- There currently exist several blockers to recovery across the hospital service:
  - lack of Intensive Care Unit (ICU) capacity;
  - protective clothing and social distancing measures impact on the ability to maximise complete usage of space and beds within an organisation;
  - general bed availability;
  - competition for resources (staff), who are already stretched.

Against a context of ….

NHS^x

The pandemic exposed the capacity deficit in the NHS, although we know this was a growing problem long before C19 hit. It underlined how health and care staff often work under enormous strain as a result of workforce shortages. Kings Fund in Jan 2020 reported a 40,000 nurse shortage and a risk that 35% of GPs intended to quit.

Therefore the health and care service must achieve two things in order to thrive and remain safe and sustainable: **1) create efficiencies in the way it delivers services; and 2) prevent down stream costs associated with complex co-morbidity conditions, by investing in prevention and supporting patients to self-manage**.

Digital technology can be leveraged to enable innovation to help achieve the above.

Opportunities for innovation
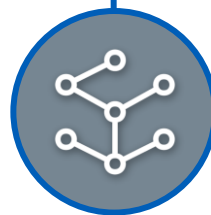
NHS ^x

BACKLOG

- Waiting for speciality treatment
- Waiting for surgery
- Waiting to see the GP

CAPACITY

- Pre-pandemic documented workforce deficit
- Staff illness and exhaustion absences
- Increased demand vs supply

BED AVAILABILTY

- Competing demands
- COVID bed allocations
- Ability to discharge back into the community faster

A look through the Finance lens

Work underway across health and social care

NHS^x

Partnership efficiencies

Shared Care Record, Pathology partnerships and Diagnostic networks, Workforce

Reducing risk

Automating risk checks, digital prescribing, audits, electronic health record.
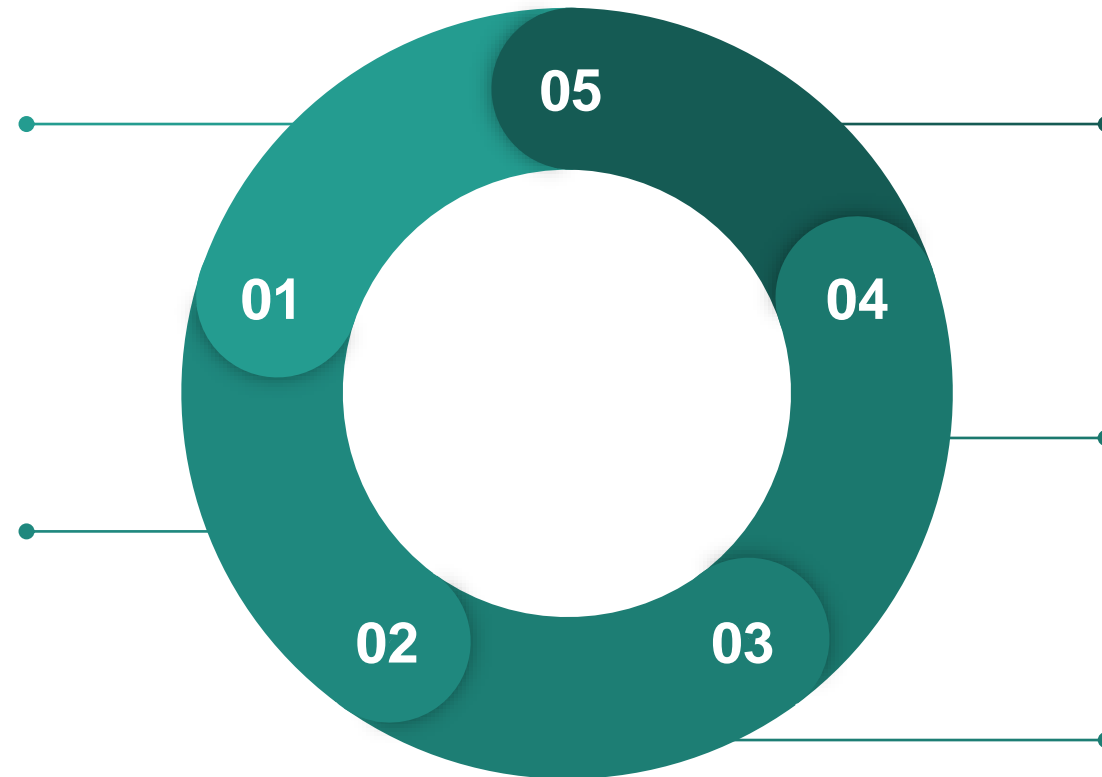
Clinical efficiencies

Using technology to transform clinical pathways reducing clinical time and streamlining the pathway.   Developments in Artificial Intelligence

Workforce efficiencies

Delivering benefits through the recruitment process in digital passports, bank staff and remote working

Process efficiencies

Using task management systems to transform a process, commonly called task management systems in outpatients, clinical audit. T*he rise of robotic process automation*

Workforce & Partnership Efficiencies

NHSˣ

Patchwork

Outcomes-based staffing

Providing a solution for workforce management (including rostering and bank)
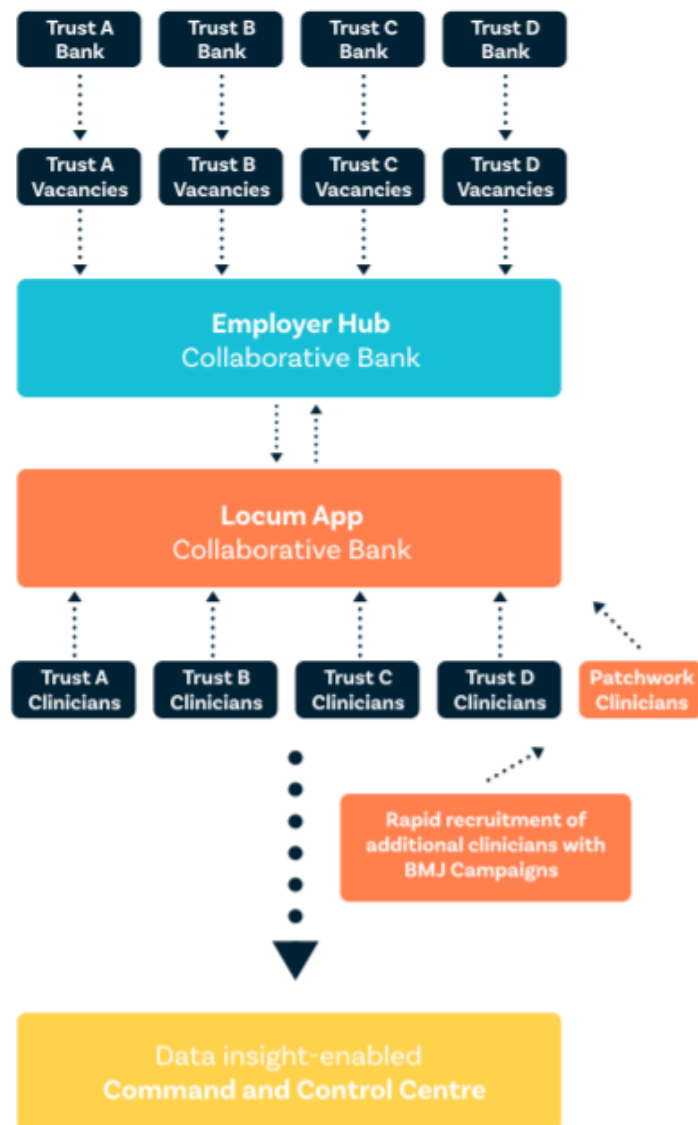
Patchwork supported the creation of the North West London (NWL) COVID Bank as part of the immediate pandemic response. This bank brings together thousands of NHS workers (currently being accessed by 14 hospitals) to fill clinical vacancies and ensure safe staffing levels.

Patchwork's two way interoperability with a major e-rostering system is live and has eliminated duplicate data entry and system data fragmentation.

Workforce & Partnership Efficiencies

NHSˣ

Patchwork

The Problem
With a shortage of healthcare workers and increasing demand, NHS organisations have become reliant on paying expensive recruitment agencies for temporary healthcare workers to fill vacant shifts. This costs the NHS billions. Since 2010, spending has increased from £2.2bn to £3.7bn.

By connecting organisations to a growing number of flexible bank workers, Patchwork helps to reduce the reliance on recruitment agencies and save the NHS millions each year.

1. Helped Chelsea and Westminster Hospital, West Midlands University Hospital and West London Trust achieve a bank fill rate of 85% equating to an annual saving of over £1m.

2. Helped York Teaching Hospital save 100 admin hours each month by digitising core functions such as timesheet management

3. Helped Hillingdon Hospitals NHS Foundation Trust grow the size of the medical bank by 300+ doctors within the first 6 months. This enables shifts to be advertised and filled at the standardised rate.

Process Efficiencies

NHS ^x

infinityhealth

The problem
Millions of porter requests are coordinated every year in Northwick Park Hospital's Emergency Department (ED), but delays in transferring patients to investigations or ongoing care was impacting on waiting times for patients who had not yet been seen or needed to be admitted.

- 100% of the requests were made on paper
- 39% of porter requests were being cancelled

Staff time

Unable to track

Missing information

Such as:
Who made the request
Patient's name
Equipment needed

Process Efficiencies

NHS ^X

infinityhealth

ePortering solution delivering:

✔ Real time activity
✔ Escalations for critical patients
✔ Notifications alerting staff of issues
✔ Reporting dashboard for operational insights

Portering tasks shared and accepted in real-time

Mobile requests from anywhere in the hospital

Urgent requests automatically escalated

Impact:

- 10,000 staff hours saved per year across 500 staff using the system

- 80% reduction in cancellations in transfers in emergency department

- 6 mins saved per request completion

A whole pathway lens example

The Pathway: Cethorpee Cardiology and Cardiac Surgery

Diagnostics

Outpatients / Inpatients

Pre-Op

Surgery

Post-Op, Community services and rehabilitation

Discharge and self care

Remote reporting on diagnostics via Cardiology

ECHOs
MRI scan
Cardiac CT scan
Nuclear scan

Book OP appointment

MDM plus potential decision to Operate by Cardiac Surgeon

Appointment with specialist (f2f)
Shared decision making

Pre- Operative

Tests
Pre-assessment
Patient Consent
Health related information

Theatre & ICU Planning

Surgery

Theatre optimisation
Close monitoring of patient to detect early deterioration (BP, Heart rate, Temperature, Oxygen saturation)

Discharged into Community + Ongoing monitoring

Monitoring of patient for deterioration
Rehab (diet and exercise)
PROMS
Wound mgt
Annual heart scan

Discharged from consultant

Health and well-being over seen by the patient with support from, GP, digital tools and easy access to advice when necessary.

Cardiology and Cardiac Surgery

A Problem

- For patients waiting for surgery, as of 31st March 2021 there were circa 303,000 patients on the waiting list - a 31% increase from FY20/21 figures.

- The NHS will need to deliver a 13% increase in outpatient, day case and inpatient activity compared to FY20/21 activity.

Digital Opportunities

NHS^x

| Diagnostics | Outpatient/ Inpatient | Pre-Op | Surgery | Post-Op, Community services and rehabilitation | Discharge and self care |

| **Remote reporting on diagnostics via Cardiology**

Shared care records to share images +

AI to support diagnosis | **Book OP appointment** | **MDM plus potential decision to Operate by Cardiac Surgeon**

Virtual consultations | **Pre- Operative**

E-Pre-assessment
E-Consent
Telehealth to detect early signs of deterioration
Online health portals | **Theatre & ICU Planning** | **Surgery**

Theatre optimisation tools,

E-Vitals & AI for predicting the patient deterioration | **Discharged into Community + Ongoing monitoring**

Telehealth
Digital- rehab
E- PROMS
Digital wound review | **Discharged from consultant**

Self care & Telehealth |

Digital Opportunities

NHS[x]

E-Pre-assessment

Phases of pathway:
Pre-operative

Category benefits:
Reductions in number of OP appointments and time savings per patient (In 6 mths, SWLEOC avoided 3,060 OP appointments and saved an average 1.92 hours per patient

Pathway application
Elective cardiac procedures
Elective Cardiothoracic Surgery

Example solutions
LifeBox Health ePOA
Synopsis
Recap health
Ortus - iHealth

E- Consent

Phases of pathway:
Pre-operative

Category benefits:
Reduction in time spent by healthcare professionals with cessation of hand-writing individual consent forms – saving clinician and clinic time

Pathway application
Elective cardiac procedures
Elective Cardiothoracic Surgery

Example solutions
Concentric
Ortus-iHealth

Telehealth

Phases of pathway:
Pre-operative | Post- operative | Discharge & self care

Category benefits:
Reduced unplanned admissions, Reduced OPAs & times. Earlier detection of deterioration, enhanced risk stratification & prioritisation

Pathway application
All pathways (see slide 9)

Example solutions
TriageHF Plus
Medopad, Current Health
Ortus-iHealth, Feebris,
Docobo, Healthcall,

Theatre optimisation

Phases of pathway:
Surgery Inpatient

Category benefits:
Improved theatre efficiency, reduce cancellations

Pathway application
Elective cardiac procedures
Elective Cardiothoracic Surgery

Example solutions
Shrewd Elective
Labyrinth software

Digital Opportunities

NHSˣ

E- PROMS

Phases of pathway:
Post-op

Category benefits
Improved data quality, faster completion time, decreased costs.

Pathway application
All pathways (see slide 9)

Example solutions
Docobo
MyClinicalOutcomes
Ortus - iHealth

E- Rehab

Phases of pathway:
Post-op | Discharge & self-care

Category benefits
Improved disease awareness and exercise capacity, increased uptake of cardiac rehab, reduced admissions, lower systolic BP, resting HR, lipid concentrations 12 mths after discharge. Better Meds adherence

Pathway application
All pathways (see slide 9)

Example solutions
Care4Today
Activate Your Heart
myHeart

E- Wound Review

Phases of pathway:
Post-op

Category benefits
Faster documentation time by up to 85%, reduced workload, reduced measurement error

Pathway application
Elective cardiac procedures (pacemaker)
Elective Cardiothoracic Surgery

Example solutions
MySkinSelfie
Healthy.io, Florence, Isla Care, Tissue Analytics SwiftMedical

Self Care

Phases of pathway:
Post-op | Discharge & self-care

Category benefits
Reduced morbidity, Improved patient activation

Pathway application
All pathways (see slide 9)

Example solutions
Elemental
Activate Your Heart
HCI videos, TickerFit
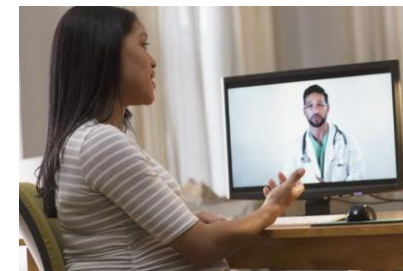myHeart, Recap Health

Telehealth

WHAT IS IT?

Use of digital communication technologies such as computers mobile phones and tablets to facilitate the delivery of health and care services.

WHY IT MATTERS

Telehealth can:
1. Expand health care access, including the medically vulnerable, specialist care and behavioural health
2. Increase convenience of receiving routine care
3. Drive better health outcomes
4. Support continuity of care
5. Reduce contact where a risk of infection spread is feared
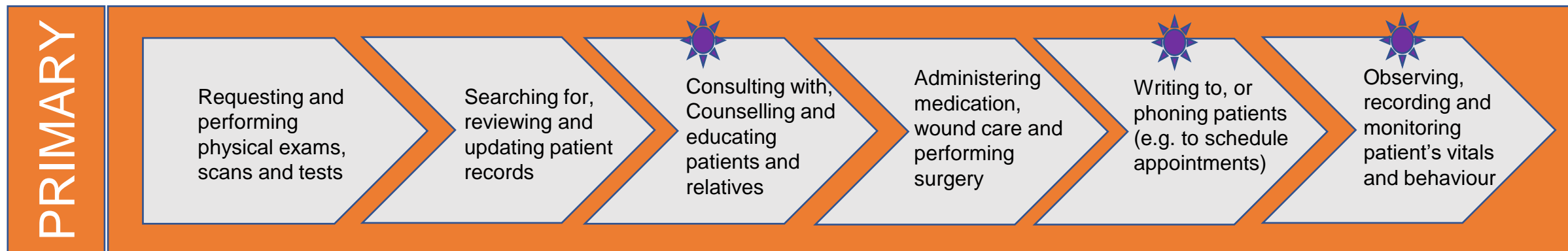
Asynchronous video
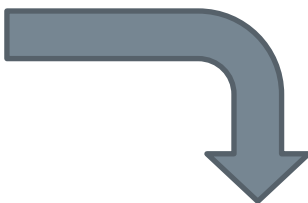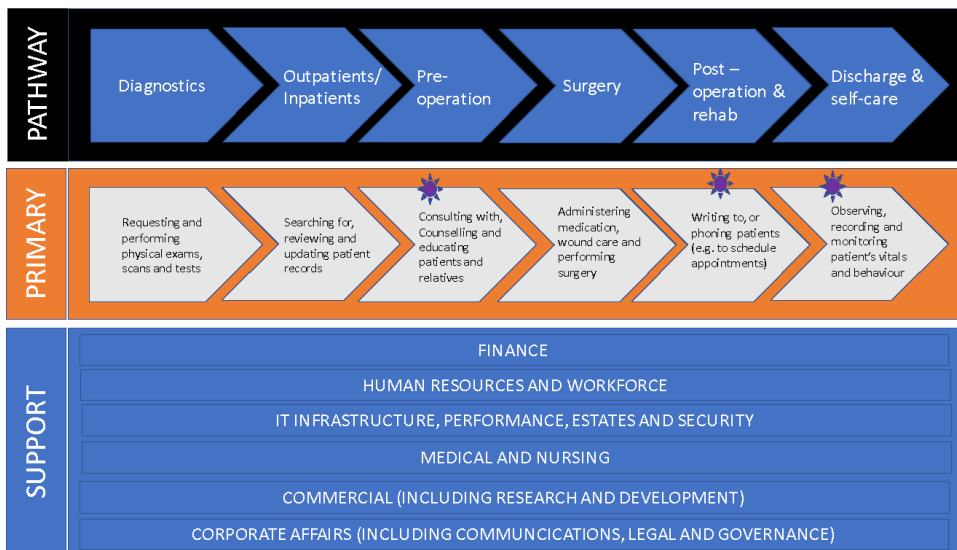
Live video

Remote monitoring

Current pathway activities

PATHWAY

Diagnostics → Outpatients / Inpatients → Pre-operation → Surgery → Post – operation & rehab → Discharge & self-care

PRIMARY

Requesting and performing physical exams, scans and tests → Searching for, reviewing and updating patient records → Consulting with, Counselling and educating patients and relatives → Administering medication, wound care and performing surgery → Writing to, or phoning patients (e.g. to schedule appointments) → Observing, recording and monitoring patient's vitals and behaviour

New activities | NHS Cardiac services

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NOW

PATHWAY

| Diagnostics | Outpatients/ Inpatients | Pre-operation | Surgery | Post – operation & rehab | Discharge & self-care |

PRIMARY

| Requesting and performing physical exams, scans and tests | Searching for, reviewing and updating patient records | Consulting with, Counselling and educating patients and relatives | Administering medication, wound care and performing surgery | Writing to, or phoning patients (e.g. to schedule appointments) | Observing, recording and monitoring patient's vitals and behaviour |

SUPPORT

FINANCE

HUMAN RESOURCES AND WORKFORCE

IT INFRASTRUCTURE, PERFORMANCE, ESTATES AND SECURITY

MEDICAL AND NURSING

COMMERCIAL (INCLUDING RESEARCH AND DEVELOPMENT)

CORPORATE AFFAIRS (INCLUDING COMMUNICATIONS, LEGAL AND GOVERNANCE)

Change created through the application and adoption of Telehealth technologies

AFTER

PATHWAY

| Pre-operation | Inpatient | Surgery | Post-operation | Outpatients | Discharge & self-care |

PRIMARY

| Observing patients condition remotely through telehealth monitoring of vital signs & symptoms | Searching for, reviewing and updating patient records | Consulting with, patient and performing surgery. | Administering medication, wound care and other care | Remotely monitoring patient recovery and early signs of deterioration. Managing the increase in incoming data: review, prioritisation, triage and action. |

SUPPORT

FINANCE

HUMAN RESOURCES AND WORKFORCE

NEW DATA MANAGEMENT & INSIGHTS, IT INFRASTRUCTURE, PERFORMANCE, ESTATES AND SECURITY

MEDICAL AND NURSING

COMMERCIAL (INCLUDING RESEARCH AND DEVELOPMENT)

CORPORATE AFFAIRS (INCLUDING COMMUNICATIONS, LEGAL AND GOVERNANCE)

The purple stars indicate the best places for the application of telehealth.

Telehealth

NHS ^x

Increased costs

- Upfront cost of the software licenses
- Annual recurring costs for the licenses
- Infrastructure to support the use of telehealth
- Staff training to get it off the ground
- Opportunity cost associated with having to run a procurement in order to select a solution using due process

Costs associated with new Activities:
- Additional clinician time needed to 'educate and upskill' (on-board) the patients to use the new devices and apps, and comply with the new remote care approach
- Allocating resource to review the new incoming data, manage the 'noise' and determine priority data, and hence patients to contact
- Analyse insights and trends from the now increased volumes of data being received
- Potentially hospitals or locality 'centres' setting up teams, units and processes to receive the data from patients remote devices and apps, into the hospital
- Admin time to feed the data back into the master patient record (where there is no direct interface between the Telehealth platform and the

Decreased costs

- Improve staff productivity in terms of time savings relating to consultation time, and scheduling appointments per patient
- Reduce the demand on the A&E (ED) department for the hospital (of patients deteriorating and needing urgent attention)
- Improve outcome of the surgery – where severe deterioration of the condition is avoided and surgery takes place before condition worsens
- Reduce patient morbidity
- Reduce the number of blue light calls to the Ambulance service from patients suddenly deteriorating
- Reduce the number of strokes and heart attacks

NB. It is not possible to accurately quantify all of these. However, as an illustrative example, a study in the European Stroke Journal, (Nov 2017), concluded the cost of stroke per patient ranged from £19,101 to £107,336 at year 5, with a single stroke event costing £12,000, which includes the costs for inpatient bed, surgery, critical care, specialists, diagnostics, outpatients, medication etc. There are more than 100,000 strokes in the UK each year causing 38,000 deaths. High blood pressure and Diabetes are major risk factors for Stroke. Ensuring better control of Blood Pressure and blood glucose can help prevent strokes . Telemonitoring can be used to monitor uncontrolled blood pressure and blood glucose, therefore enabling more rapid clinical intervention.

Value creation through Telehealth

Target Value Creation

The target value creation is attributed to reducing:

1. The frequency of the clinician telephone and face to face check-in and follow-ups with a Cardiology patient
2. The time required by Admin staff to schedule these appointments.
3. The time spent having to manually input patient readings into the EHR system.
4. The time spent and cost incurred by the patient in having to attend a face to face outpatient appointment

The Value Proposition is 'channel shifting' pre-procedure, post-operative, and outpatient health monitoring activities to the patient's home through the use of Telehealth.

WTB
Price
Cost
RC
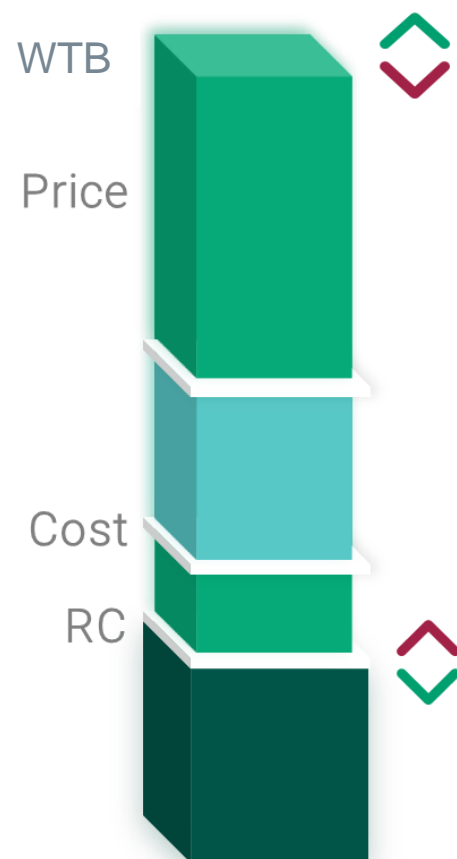
Reasons for increased WTB
- Opportunity to improve staff productivity
- Opportunity to improve outcome of the surgery and treatment
- Opportunity to improve patient experience

Reasons for decreased WTB
- No sure way of generating benefits in-year
- Cannot identify suitable funding pot for revenue funding (vs capital funding).

Pricing - NHS organisations are price sensitive, especially when It comes to spending on software licenses, as traditionally the ROI is not always evident, and they need to see some ROI in year one.

Software costs – reduced by leveraging a digital solution already in use in the Hospital, OR, by expanding the scope of use of the platform with another speciality so that the cost of the software is spread.
Staff training cost – reduced by leveraging a central resource.
Procurement costs –existing license agreements can be tweaked through a contract variation.
Clinician time to educate patients – There may be an opportunity to create 'patient champions' which would cost nothing after the first cohort of champions were taught.

Example: Recently NHSX invested £1.5m each in multiple geographies to spend on software licenses and implementation capacity for remote care projects. Total investment ranged from £1.9m - £3.5 m including the local NHS [near] match funding contributions made.

License costs vary hugely and can range from £1.50 - £50 per patient per month, or £40 - £500 per patient per year

Please see the next slide for details of the reasons for:
Decreased resource costs (RC)
Increased resource costs (RC)

WTB = willingness to buy

How confident do you feel about supporting your organisation to invest more in digital innovation?

A. Fully supportive / lead the way
B. Proceed with pragmatism
C. Neutral
D. Proceed with caution
E. Need more information

Thank you
Any questions?

Will we achieve the future?

Pre-birth scanning

Healthy living map

Diseasee detection

Smart & Wearables

360 scans

Gene-editing

Ethics
Can we do this? Will knowing pre-dispositions before birth, have negative social impacts?
Data
How and where will the data be managed and who will own it?

Deviation and penalties
What happens if the individual fails to follow their 'health plan' will this impact their eligibility to access certain health and care services?

Ethics
Social implications
Cost and Equity of access
Ill the cost of them prohibit widespread use?
Safety
What are the safety concerns?

Connectivity
Issues relating to 4G and 5G access, access to hardware and cost
Inclusion & Skills
How do ensure no-one is left behind?
Data
How to manage?

Data
How and where will the data be managed and who will own it?
Standards
Supporting free flow of data into patient record

Ethics
At which point in life will it be used? Fears around 'designer babies',
Societal
Social contract with state, will it be used in negative ways, will it create a two tier society?

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Bespoke medicine

We're already making headway with digital medicines.

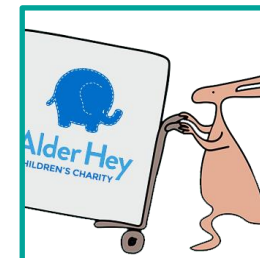Still a way to go before we get to 'bespoke at the point of need'

Camera in a pill to spot bowel cancer

'Polypill'

Pills with sensors

3D pills

Could we have ever imagined…

In the mid 1980s that:

- In 5 years, billions of people would be connected digitally across the globe.

- In 10 years, computers would start taking over everything that we had been used to for decades, for shopping, dating, banking.

- In 20 years, a vast proportion of us would be carrying around hand held devices more powerful than a standard computer.

We didn't think it would happen, but it did!

**Think what we, and the generations behind us will be saying in 2050.**

Appendix

References & Case studies

Florence – for wound management **–** *Case study*
Florence – for remote monitoring of hypertension – *Case study*
Florence – multiple remote monitoring – *Case studies*
TriageHF Plus – HF remote monitoring - *Study*
Isla Care – for wound management – *Article*
My Clinical Outcomes – PROMS – *Case study*
Synopsis IQ – E-pre-assessment – *Case study*
LifeBox Health – E-pre-assessment – *Case study*
Concentric – E-consent – *short Case study* + *Article*
Ortus-iHealth – Remote follow-up – *Case study*
Recap Health – Self care/ patient education – *Article*
HCI videos – Self care/ patient education - *Case study*
E-cardiac rehab - *Study*

High level digital pathway - *Telehealth* **NHS**^x
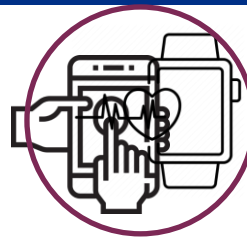
2-way SMS based tools

- Online consultation or virtual consultation
- Refer patient to pathway
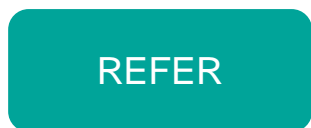- Send follow up SMS
- Patient responds 'yes' or 'no'

- Register the patient into SMS service if new
- Capture patient consent via SMS
- Send a welcome text

- Provide instructions in a leaflet/ email to patient or over the phone, or
- In 'welcome pack'

- Schedule regular SMS messages to be sent to patient to remind them to measure BP & when to send back

- Agree who, when and how frequently someone will review the data inflow
- Process for receiving data implemented
- Readings prioritised

- Prioritisation of which patients to contact and when
- Transfer of, or manual recording of readings into GP system
- Scheduling of next review period
- Pause the sending of SMS messages/ exit

REFER	ONBOARD	INSTRUCT	DATA INPUT	REVIEW	MANAGE

- Online consultation or virtual consultation
- Refer patient to pathway
- Send follow up SMS
- Patient responds 'yes' or 'no
- OR send an email

- Register the patient into platform if new
- Ask patient to download app/ access web portal
- Capture patient consent via patient facing app
- Patient completes initial questionnaire

- Provide user instructions in a leaflet/ email to patient or over the phone, or
- In 'welcome pack'

- Schedule regular reminder SMS messages to be sent to patient.
- Patient records readings directly into app/ web portal

- Agree who, when and how frequently someone will review the dashboard
- Process for receiving the data implemented
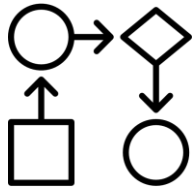- Readings displayed and prioritised

- Prioritisation of which patients to contact and when
- Transfer of, or manual recording of readings into GP system
- Scheduling of next review period
- Asking patient to pause sending, delete the app/, or exit pathway

Smartphone App-based tools/ Web based tools

Successful Implementation | Considerations

NHSˣ

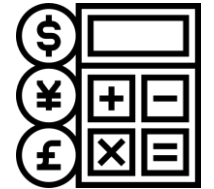| Use case	Workflow design	Digital enablers	Training & Comms	Inclusivity and Accessibility	Onboarding patients	Tracking & Measurement	Ongoing costs

| **What is the use case?** Support staff e.g. reduce clinician/ admin time, or support for patients, e.g. to increase meds adherence, to spot early signs of deterioration, disease awareness | **What is the workflow design?** What triggers the digital pathway, how is incoming data prioritised? SOPs, clinical protocols, Patient onboarding, consent, how will data get into the EHR? | **The right Digital enablers** If buying: what type of license, what are the upfront costs, what is the business model, what are the recurring costs, what are the additional costs/ | **Good training & Comms plan** Support for both patients and clinical/ non clinical staff. Training model and materials, timing. | **Inclusivity and accessibility** What alternative arrangements will be put in place for the less digitally literate, those with poor wifi and connectivity, those with disabilities etc? | **Onboarding plan and approach** How are patients onboarded? Consent, device logistics, inequalities, accessibility, device management, support, | **Tracking and measurement of uptake and success** Provide resource to support the regular tracking & measurement of uptake, experience, engagement and outcomes | **Funding recurring costs** What are the recurring annual costs, business cases to support multi-year funding, who pays |

Successful Implementation | Considerations

Onboarding patients

Training & Comms

Tech support

Inclusivity and Accessibility

Tracking & Measurement

On the ground resource

Onboarding plan and approach
Consent, device logistics, inequalities, accessibility, device management, support,

Good training & Comms plan
Support for both patients and clinical/ non clinical staff. Training model and materials, timing.

Tech support plan and contingency
What level of tech support is needed for staff and patients? In-house or provided by the software & device suppliers?

Inclusivity and accessibility
What alternative arrangements will be put in place for the less digitally literate, those with poor wifi and connectivity, those with disabilities etc?

Tracking and measurement of uptake and success
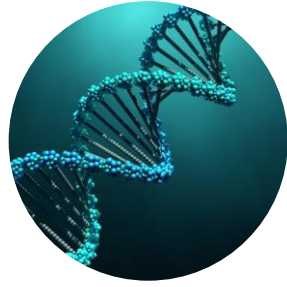What is the plan for measurement of uptake, engagement and outcomes?

On the ground support
To implement the changes, and a resourced he workforce model to perform the actual work as part of the new clinical workflow
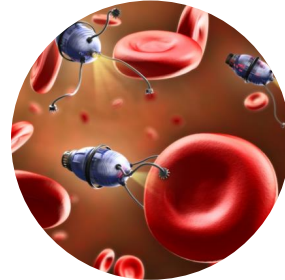
Will we reach the future vision?| Critical considerations…

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Pre-birth scanning

Healthy living map

Diseasee detection

Smart & Wearables

360 scans

Gene-editing

Ethics
Can we do this? Will knowing pre-dispositions before birth, have negative social impacts?
Data
How and where will the data be managed and who will own it?

Deviation and penalties
What happens if the individual fails to follow their 'health plan' will this impact their eligibility to access certain health and care services?

Ethics
Social implications
Cost and Equity of access
Ill the cost of them prohibit widespread use?
Safety
What are the safety concerns?

Connectivity
Issues relating to 4G and 5G access, access to hardware and cost
Inclusion & Skills
How do ensure no-one is left behind?
Data
How to manage?

Data
How and where will the data be managed and who will own it?
Standards
Supporting free flow of data into patient record

Ethics
At which point in life will it be used? Fears around 'designer babies',
Societal
Social contract with state, will it be used in negative ways, will it create a two tier society?

Thank you