# Digital Health Technology & Artificial Intelligence in the NHS
Future Leaders Programme

What is Digital Health Tech & AI?

- Digital transformation of health and social care is a top priority for NHS England and the systems long term sustainability depends on it.
- AI is considered as the use of technology to create systems capable of performing tasks commonly thought to require human intelligence. It involves creating algorithms that allow computers to learn from and make decisions or predictions based on data, rather than only following explicitly programmed instructions.
- AI tools are already widely used, such as in facial recognition and voice assistants. Currently, AI tools are task-specific and cannot understand context outside of their specific programming.
- Innovation Collaborative for digital health podcast series - Technology for the NHS - NHS Transformation Directorate (england.nhs.uk)

DIGITISE - CONNECT - TRANSFORM

- Electronic records and other critical systems, fast connectivity, resilience to cyber attacks, building digital skills and utilising AI.
- Connected, supported, personalised care at home.

Digital Inequalities
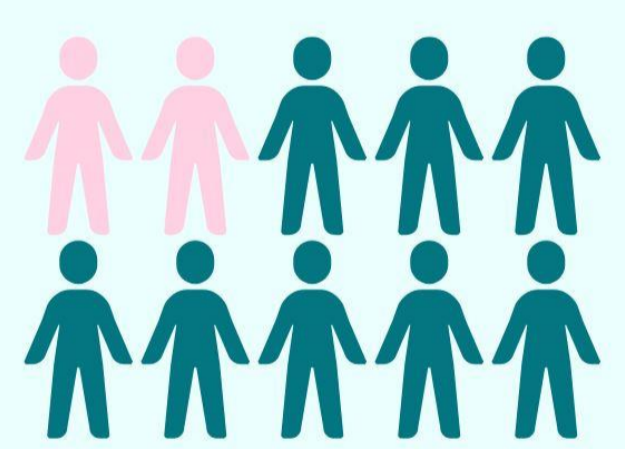
Over 2 in 10 people in the UK do not have the digital skills needed for everyday life.

4.8 million people in the UK never go online at all.

35%
People with a disability are 35% less likely to have essential digital skills for life.

- Digital literacy and skills of the workforce as well as the population must be considered.
- Socio-economic and demographic considerations, and barriers in access to digital healthcare are all contributing factors to digital inequalities.
- Patients may be experiencing data poverty so are unable to use digital health tech at home.

Ensuring Equality

- Frameworks are required to ensure AI is statistically accurate and avoids discrimination, and patient data is anonymous where possible.
- Organisations should complete and comply with an Equality Impact Assessment.
- Organisations must be transparent about their use of AI.
- Programmes are in place across some Local Authorities to tackle data poverty, e.g. Providing data SIMs.
- Aims to improve access, skills and confidence in populations at risk of exclusion, e.g. digital inclusion initiatives.
- Ensuring user friendly design, improving awareness of digital services and providing training to improve staff capability and capacity as well as their knowledge of digital services/products.

HOW CAN AI BE USED IN HEALTHCARE?

Task Automation
AI tools can aid in speeding up or performing tasks that often may be repetitive and boring. They have sometimes been shown to be more accurate than humans performing the same task. The clinician then has more time for other important tasks.

Confident Early Detection
AI tools can be used to identify disease at an earlier stage, or with more confidence. A tool could e.g. give a confidence score of a test being abnormal which the clinician can use to guide their report or decide follow-on tests.

Improved Scan Quality
AI reconstruction methods can improve scan image quality. These could also make scans quicker, increasing throughput and improving the patient experience.
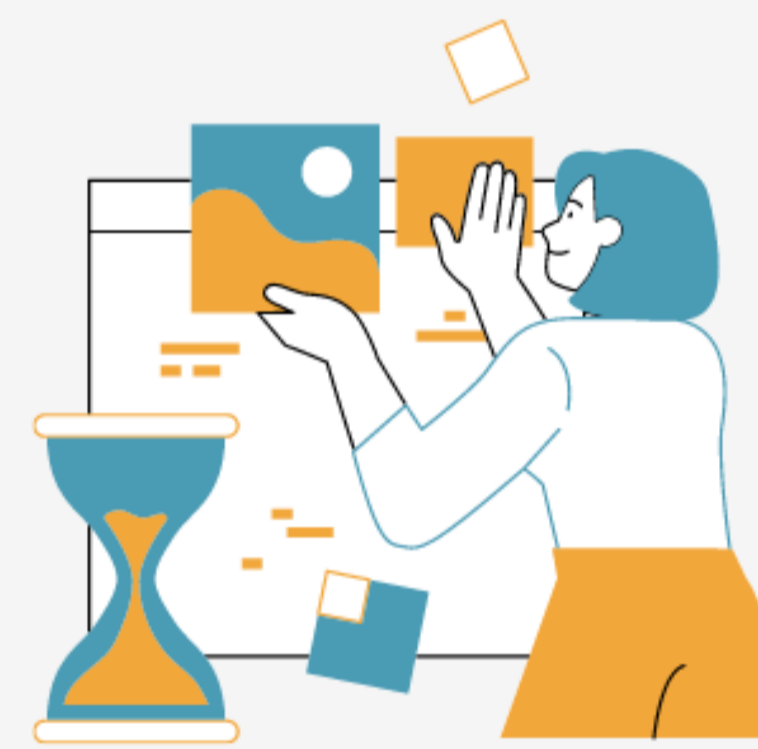
Predict Disease Progression
AI tools can also predict the progression of disease based on patients' tests, more accurately than experienced clinicians. This can be used to do earlier interventions and therefore improve patient outcomes.

Patient Apps
AI apps and technology that patients can use to help them manage their health outside of the hospital setting. E.g. wearable tech, smartphone apps, symptom checker chatbots.
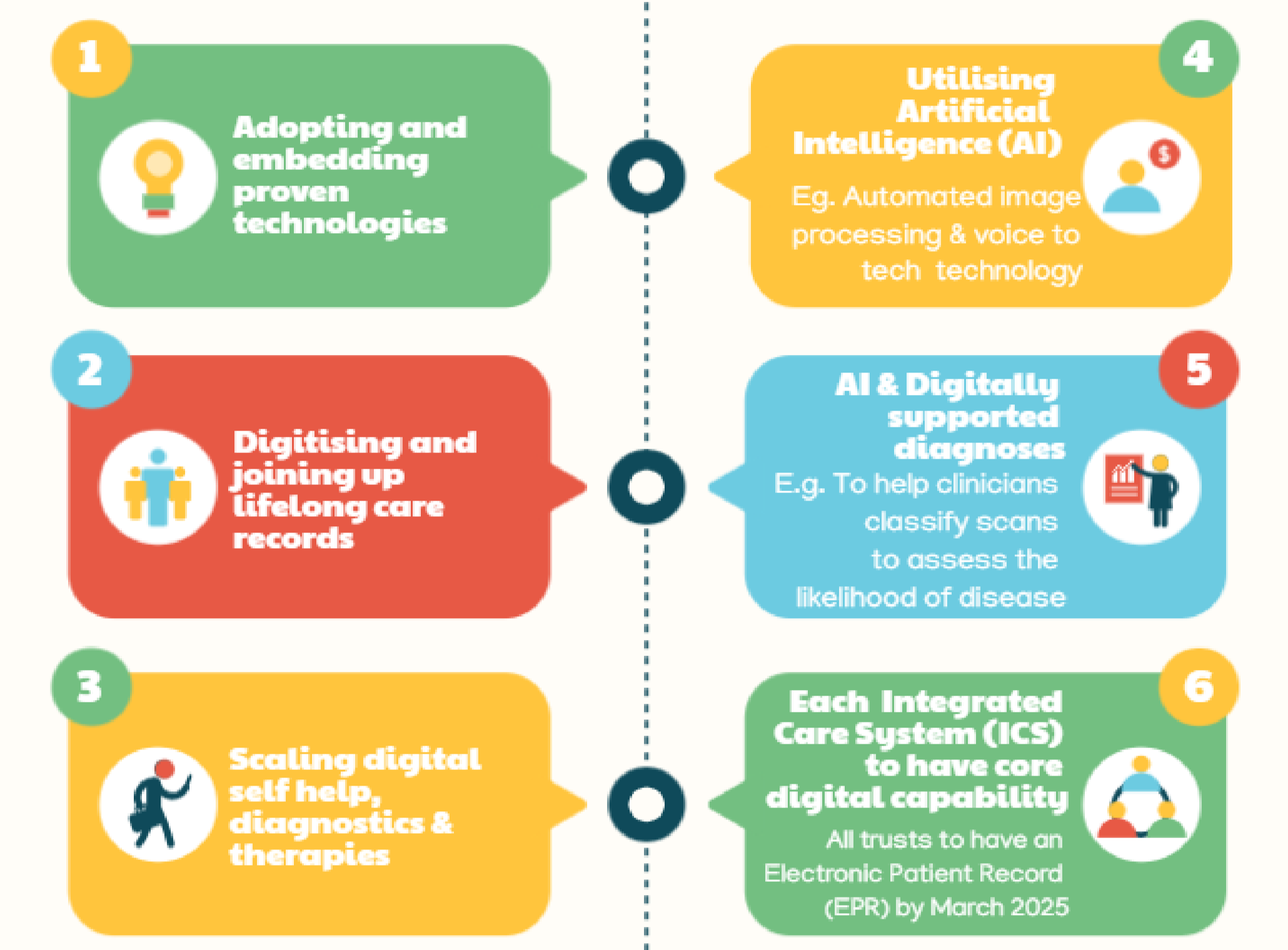
Why is it Important?

- A virtuous cycle – digital technologies help improve quality of care and prevention services, improved efficiencies in time and cost, frees up staff to provide human care.
- Benefits over 10 years of billions of £s in efficiencies, economic growth and investment.
- Person centred – digital services give people more control, autonomy and choice.

What does tech in healthcare look like?

'The long-term sustainability of health and social care is dependent on having the right digital foundations in place, and so digital transformation must be the linchpin upon which all of these reforms are based'

1. Adopting and embedding proven technologies
2. Digitising and joining up lifelong care records
3. Scaling digital self help, diagnostics & therapies
4. Utilising Artificial Intelligence (AI) Eg. Automated image processing & voice to tech technology
5. AI & Digitally supported diagnoses E.g. To help clinicians classify scans to assess the likelihood of disease
6. Each Integrated Care System (ICS) to have core digital capability All trusts to have an Electronic Patient Record (EPR) by March 2025

Things to Consider For AI

- Ethics and Legality.
- Issues surrounding how data is used and for what purpose, there is a lack of regulation and ethical guidance for constantly evolving technology.
- Consent from patients or healthcare providers may cover only specific areas but AI may utilise more data than was initially consented for.
- Bias or inaccuracies can occur if a limited data sample size or poor-quality data is used for AI tool training.
- Benefits of AI may not be evenly distributed as populations and geographies that are less data-rich may see the development of fewer AI technologies designed specifically for them. Decisions made by AI technologies may be part based on existing societal inequalities, thus further widening health inequalities or introduce new inequalities.
- Complexity of staff in raising concerns or detecting inaccuracies generated by AI systems.
- Clinicians may not understand how the AI tool comes to its decision: 'Black-box phenomenon'.
- Data security – implementation of AI should be conducted securely and there is a need for new guidelines, regulations and frameworks.
- Data and documents should be stored safely.
- Integration of an AI tool with existing IT infrastructure may be complex.
- Lack of knowledge of which parties may hold the information / intellectual property.
- Automated decision making – clinicians currently make the final decision, however more autonomy may be given to AI, raising questions on regulations/liability.
- AI is developing rapidly and regulations are slow to catch up. NHS England is working to improve this.
- AI tools should be validated and results tested for accuracy before being used on 'live' patient data.

Useful Links
- A plan for digital health and social care - GOV.UK (www.gov.uk)
- Putting data, digital and tech at the heart of transforming the NHS - GOV.UK (www.gov.uk)
- NHS Long Term Plan » Chapter 5: Digitally-enabled care will go mainstream across the NHS
- Understand AI - NHS Transformation Directorate (england.nhs.uk)
- A buyer's guide to AI in health care - NHS Transformation Directorate (england.nhs.uk)
- Guidelines for AI procurement - GOV.UK (www.gov.uk)
- Assessing if artificial intelligence is the right solution - GOV.UK (www.gov.uk)
- Artificial intelligence: 10 promising interventions for healthcare (nihr.ac.uk)
- What we mean by digital inclusion - NHS Digital
- Artificial Intelligence - NHS Transformation Directorate (england.nhs.uk)
- Developing healthcare workers confidence in AI | Digital Transformation (hee.nhs.uk)

Jargon Buster
Machine Learning: This is a subset of AI, which involves systems that can "learn" from data. These algorithms improve their performance as the number of datasets they learn from increases.
Deep learning: a subset of machine learning, uses artificial neural networks to make decisions and predictions. It is designed to mimic how a human brain learns.
Natural language processing deals with the interaction between computers and humans using natural language. The ability of machines to understand, generate, and respond to human language is crucial for many AI applications, like virtual assistants and AI chatbots.
Black Box: a complex system or device whose internal workings are hidden or not readily understood.
Data Poverty: The inability to afford a private and secure internet connection to meet essential needs.
Digital Literacy: is an individual's ability to find, evaluate, and communicate information by utilising typing or digital media platforms.