

BMHP6026_BIRM

Week 1

Introduction to the module and digital innovation in health and social care

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Transforming Education, Transforming Lives

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During the session...



Welcome to BMHP6026_BIRM

Module Aim:

- To evaluate the impact and implications of the digital transformation of services within health and care for professionals, service users and, providers.

Learning Outcomes:

Upon successful completion of this module you should be able to:

- Evaluate contemporary digital transformations for professionals and service users within the health and care.
- Investigate innovation digital technologies and devices and the impact upon communities and populations.

Module Title: Digital Transformation in the Health and Care professionals	
Week 1	Introduction to the module and digital innovation in health and social care
Week 2	The Health and Social Care Digital Strategy
Week 3	Information Governance and ethical use of data
Week 4	The health and wellbeing of the individual - Overview of recent digital developments and innovations
Week 5	Public Health - Overview of recent digital developments and innovations
Week 6	Revision and Review - Digital Innovation - Barriers and Benefits
Week 7	Innovations - a focused session on case studies
Week 8	Developing critical analysis of digital innovation. Component 1 Workshop - structured support session
Week 9	Component 2 Preparation Session - Summarising your research and findings
Week 10 & 11	Component 2 - Viva Voca - Individual assessments

Assessments

Component	Task Overview	% of module	Submission Week
Component 1	Written Report– 2000 words	50	Week 8
Component 2	Viva (Oral Presentation) 10mins + 5 min questions	50	Week 10

There will be time allocated within class to develop each piece of work, you must show your lecturer progress during class sessions.

All details will be shared in the assignment briefs and time to develop each piece of work will be provided in class when completing class activities.

Navigating our Module Moodle Page

Panopto

The Panopto tile at the top of the page will show you the links to all available lecture recording for this module.

Lecture materials

Each week, you will find the 'lecture materials' this will include the slides and resources used in your class sessions.

Independent Study Materials

Each week, you will find additional resources for your independent studies, you will need to be proactive with your reading and note taking.

Quick Activity



Which area of health and care are you most interested in?

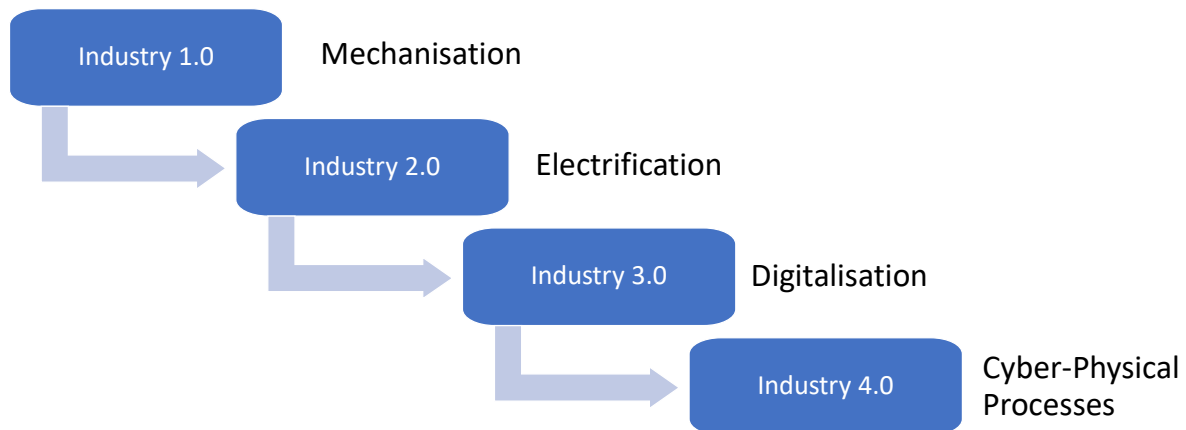
Complete the choice activity in week 1.

How diverse or similar are our areas of interest?

Introduction to Industry 4.0



What is meant by Industrial Revolutions?



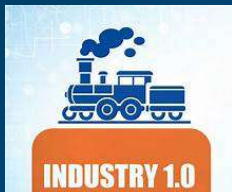
Notes taken from the LinkedIn Learning Course signposted on the Moodle Page.

How the fourth Industrial Revolution is changing the world

- Today we're experiencing rapid disruptive change in just about every aspect of life. The 4th Industrial Revolution, often referred to as Industry 4.0, looks likely to transform our world and impact how we live, work, and make things. This will be a future enabled by the convergence of emerging technologies, macro trends, and the consequences and opportunities of a hyperconnected planet. This course will provide you with insights and ideas that can help you achieve a better sense of what the 4th Industrial Revolution may mean to you, your organization, and for society in general. I'm delighted to go on this exploratory journey with you.
- What is meant by Industrial Revolutions?
- In the 13 billion years that the universe has existed, us humans, or Homo sapiens, have occupied a really short period of that time. It's around 200 to 300,000 years in total. Through that time, we discovered how to make fire. We invented mathematics and money, created the written word, built cities, cured diseases, went to war many times, and ended the 20th century sending and returning humans to another world. For most of our history, human populations remained small and lived in tight and largely disconnected communities. Barely 200 years ago, the entire population of our planet was less than one billion people. Today, we have just surpassed eight billion,

and we will likely reach 11 billion by the end of this century with the majority living in an urban context. In the 21st century, we expect access to electricity, schools for our children, a system of law and order, efficient transportation systems, and economic opportunity from factory jobs to office occupations. Today, few of us in the developed world have any appreciation for a pre-industrial world. It's as unrecognizable as the 21st century would look to someone who lived 200 years ago. The modern world, as we know it, is barely a few hundred years old. For over 99% of the time humans have existed, progress was painfully slow, then everything suddenly changed. The significant transformation of the human experience in just a brief few centuries is a consequence of a series of monumental revolutions. In this course, we'll narrowly focus on the industrial revolutions. The world that entered each revolution looked and behaved differently on the tail-end of that revolution. Change occurred particularly from the perspective of technologies, socioeconomics, and culture. Each resulted in massive disruption. The emergence of mass production factories, for example, resulted in a whole range of remarkable outcomes from leaps in the standard of living and the adoption of the 40-hour work week to trade unions and cheaper goods. We are still struggling with the negative impacts of these revolutions, too. For example, the first industrial revolution, which originated in Britain in the late 1700s, saw the beginning of widespread use of coal. Today's scientists believe coal has contributed significantly towards human-caused climate change, and it continues to do so. These revolutions also produced an even distribution of winners, and unfortunately, a large number of losers. Some nations and continents benefited early while others only began to prosper in the late 20th century. A few remaining nations have yet to see the socioeconomic benefits. Each of the three industrial revolutions have been periods of notable consequence. The emergence of a fourth revolution must be seen through the same lens. The world that enters this revolution will look different on the other end. Its effects may be unevenly distributed, and yes, there will be winners and losers. We must proceed with caution. It may be a mistake to believe that most fundamentals will remain intact, to believe that core human experiences will be, perhaps, only marginally altered. Nobody can say with any certainty what will happen next. However, I'm making a bet that the scope, impact, and velocity of change ahead will far exceed what most expect.

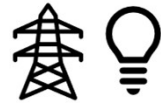
Industry 1.0 - Mechanisation



- The development of increasingly complex machines.
- Large structures made.
- Factory machines created.
- Rapid socio-economic change.
- Improvements in public health.

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Industry 2.0 - Electrification



Industry 2.0

- Introduction of electricity.
- Development of telephone.
- Combustion engines for cars, planes, lorries.
- Increased travel and communication.
- Rapid sharing of knowledge.

Notes taken from the LinkedIn Learning Course signposted on the Moodle Page.

The first and second Industrial Revolutions

- Just over 300 years ago, the global population was small, with limited trade existing between different peoples. There were no factories and no mass production. Things were crafted by hand and most people lived off the land. In the mid 1700s, major changes began in Britain. The invention of a steam-powered motor enabled all manner of mechanization. The mass production of low-cost iron and steel led to the building of large, strong, and complex machines for manufacturing and structures. The automation of textile manufacturing was pioneered using inventions such as the spinning jenny. This shift, the First Industrial Revolution, or now sometimes referred to as Industry 1.0, ushered in the first factories, which resulted in significant socioeconomic change. Houses were built around factories to keep labor close. Mass production was born. Unions emerged to support worker rights. Formal large-scale primary education systems were established to educate children who were once captive to a farm or factory floor. Farm workers seeking better economic circumstances flocked to these new urban centers, creating rapidly growing cities. Within just a few decades, Britain and many other nations were being transformed. During this time, science prospered. Big diseases such as smallpox began to be conquered. For the first time, large numbers of people had more free time and

discretionary income. Mainstream banking emerged. Significant positive change occurred, but so did challenges. With few safety nets, many people in the environment began to suffer in this new industrial landscape. New industrial nations began to compete with one another and growing wealth, power, and differing political structures would eventually lead some decades later to two World Wars.

- In the mid to late 1800s, another pattern of industrial change began to emerge. A Second Industrial Revolution, or Industry 2.0, was underway. Central to this revolution was the widespread deployment of electricity. It's hard to overstate the difference between a world with and without electricity. For example, electricity enabled the invention of the telephone, transforming how humans communicated. What appeared first as magic allowed people to speak to each other over great distances, including vast oceans. Within 150 years, 90% of the planet was electrified, a remarkable achievement that was reshaping the world entirely. Worth noting though is that as of the third decade of the 21st century, still around 700 million people have no access to electricity. This project still isn't finished. The Second Industrial Revolution also introduced the gas power combustion engine, which led to the emergence of the automobile and the airplane. Transportation would never be the same. Highways and airports were built connecting communities and countries. Better technology also allowed railways to greatly expand and become more efficient. From the mid 1800s to the mid 1900s, major regions of the world progressed in stunning ways. Billions of humans were experiencing life in a whole new way, but the greatest changes were still ahead. By the late 1940s, the stage was set for another transformation, a Third Industrial Revolution.

Industry 3.0 - Digitalisation

Invention of the Transistor (1947)

- The invention of the transistor marked the start of the Third Industrial Revolution (Industry 3.0), leading to innovations in small radios, calculators, and later, modern computers through the miniaturisation of transistors into silicon chips.

Digitalization and Computer Networks

- Unlike earlier revolutions that mechanized processes, Industry 3.0 is defined by digitalisation, where computers process information, leading to the creation of computer networks and the sharing of data and resources.

Development of the World Wide Web

- The World Wide Web emerged in the early 1990s, enabling widespread access to information and leading to the development of the global internet, which transformed communication and information sharing.

Evolution to Web 2.0

- By the early 2000s, the web evolved into Web 2.0, characterised by interactive experiences rather than static webpages, turning the web into a global platform that transcended geographic and time constraints.

Impact of the Internet on Society

- The internet, coupled with new devices and hyperconnectivity, revolutionised many aspects of life, work, and play, with 5 billion people now connected and several billion more expected to join.

Transition to Industry 4.0

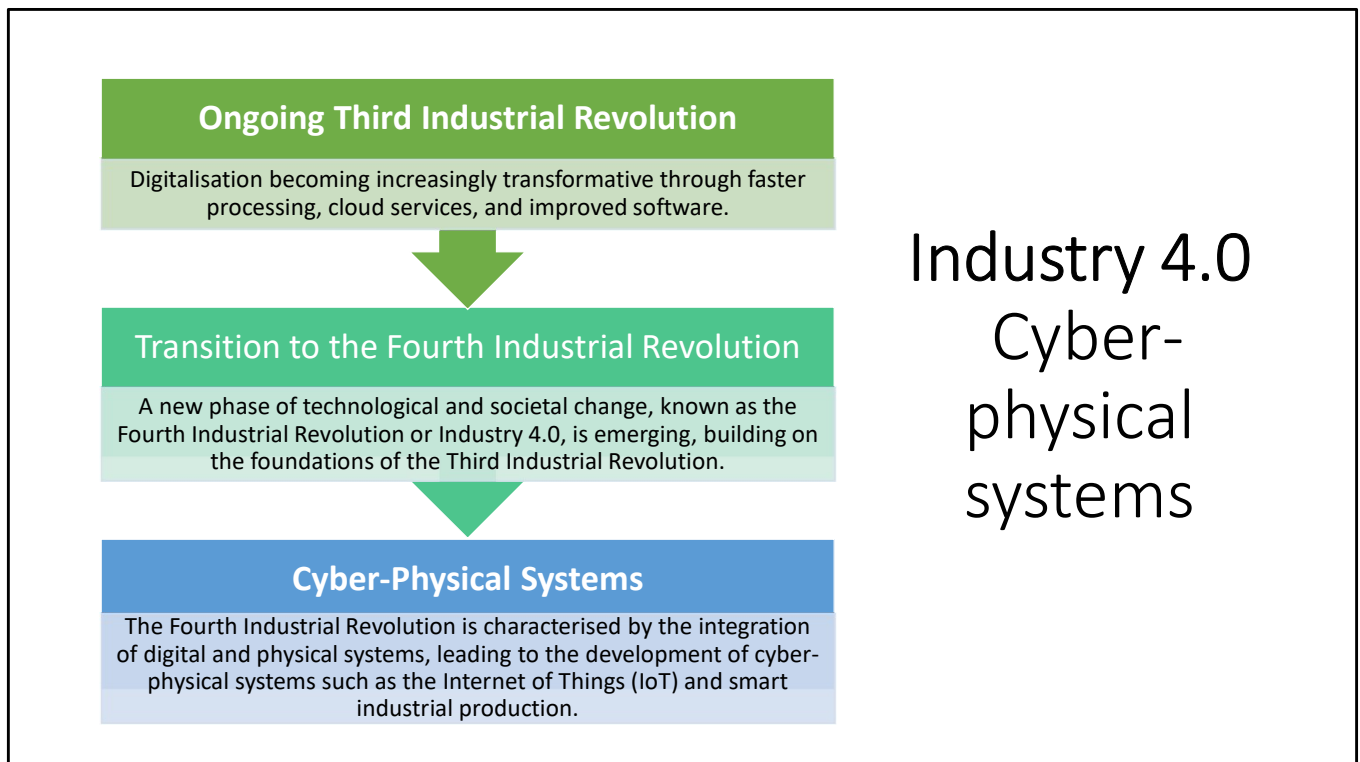
- The Third Industrial Revolution laid the groundwork for Industry 4.0

Notes taken from the LinkedIn Learning Course signposted on the Moodle Page.

The third Industrial Revolution

- In 1947, the transistor was invented. Many point to this moment as the trigger of a Third Industrial Revolution, or Industry 3.0. The breakthrough was the ability for a transistor to use semiconducting material to manage the flow of electrons passing through it. This gave way to a completely new world of innovation. Early on, transistors enabled small radios and low-cost calculators, Then both military and space ambitions in the United States, accelerated rapid transistor innovation in the 1950s. Later, when the semiconductor material used was largely silicon, miniaturization of the transistors into tiny silicon chips enabled the development of modern computers. Low-cost mass production of silicon chips enabled the development of computers as we know them today. Unlike the First and Second Industrial Revolutions, which mechanized manual processes, the Third Revolution is characterized by digitalization. This is the process by which computers process information. It wasn't long before these computers began to be connected together. Computer networks were born. This meant that data and other resources, such as printers, could be shared. In the early 1990s, a way to easily link and share documents emerge called the World Wide Web. Now, with a computer and a telephone connection, millions could access an abundance of information that knew few barriers. The World Wide Web would find its home on a new, open, global network

called the internet. Almost immediately, individuals and businesses began creating a wide range of applications. By the early 2000s, a new phase of the web had begun that would become known as Web 2.0. This was defined by the use of interactive experiences between the user and the system, rather than just the provision of static webpages. Soon, the web became a multi-trillion dollar global platform that removed the constraints of geography and time. The web and the internet coupled with new devices and hyperconnectivity have gone on to revolutionize so much of how we work, live, and play today. The Third Industrial Revolution, the Information Age, has certainly been transformational, and this is while still several billion have yet to get online. With 5 billion connected, adding between 2 and 3 billion more people to the internet over the next few years will no doubt be consequential. While this revolution has been largely defined by the creation of an online and digitally transforming planet, it also provides the conditions for a deeper integration between the digital and physical world. The opportunities created by this so-called cyber-physical intersection is the basis for the foundations of a Fourth Industrial Revolution, also referred to as Industry 4.0.



Industry 4.0 is also known as the 4th Industrial Revolution (4IR) in some literature.

Notes taken from the LinkedIn Learning Course signposted on the Moodle Page.

The fourth Industrial Revolution

- In describing the third Industrial Revolution, it's clear that this period is far from over. In fact, it seems like innovation in digitalization is becoming even more transformative. Consider, for example, the new features of your favourite app or the digital tools that are being introduced to your industry. Faster processing cloud services and improved software are driving change at a staggering rate. But as we experience digitalization in our work, home, cities and more, it's becoming apparent that a new pattern of technological and societal change is upon us. In many ways, the change builds on top of the third Industrial Revolution, and in doing so, provides a platform for remarkable disruption. As I'll now describe, this period, which has just become more defined in just the last few years, is being called the fourth Industrial Revolution, or by the term, Industry 4.0. Unlike the third Industrial Revolution, which was largely a period of digital transformation, the fourth Industrial Revolution combines and innovates the digital with the physical, the interception of bits and atoms, so to speak, to form cyber physical systems. Some even suggest there's a growing intersection of the biological sciences too. Scientific leaps in physics, chemistry, and biology will certainly play a larger role as

this revolution progresses. These cyber physical systems, such as the Internet of Things and a new era of smart industrial production called Industry 4.0, which I discuss in a later video, are emerging too at a time when the world is experiencing a number of macro transitions. These include shifts in demographics, economics, supply chain, consumer expectations and behaviors, and new approaches to work. In addition, the combination of all these technological and societal shifts together with greater scope, impact and rate of change are indicative of a revolutionary time. This course is all about these changes and what they may mean to you and your organization. The fourth Industrial Revolution is synonymous with Industry 4.0, the emergence of a next generation of manufacturing and other industrial segments. The use of the Internet of Things, artificial intelligence, robotics, data and analytics for example, are all components of a new Industrial Revolution, and they are being used to produce higher quality products in smart factories. It's also enabling a reinvention of what we can build and how we build it. That said, we need to recognize though, that the fourth Industrial Revolution, while embodying Industry 4.0, stretches beyond industrial production into almost every aspect of life, the way we live, work, and play. In this way, we can better appreciate its vast impact on our world. It's still early in the fourth Industrial Revolution and a good definition is elusive. We could see through the early evidence though, that the implications will be significant. It will be time for thinking big and taking bolder risks. It will also be a time for disruption that results in industries being destroyed and new ones being created. What work we do, how we do it and even our role in the world as humans will be challenged. For example, what are the implications for all of us of a near future that includes automation and artificial intelligence at scale? Perhaps one of the most important outcomes of understanding the fourth Industrial Revolution is to understand our role in the world.

Industry 4.0

Cyber-physical systems

Influence of Scientific Advances:

- Innovations in physics, chemistry, and biology are playing a growing role in this revolution, potentially intersecting with the biological sciences as part of the ongoing transformation

Broader Impact Beyond Industry:

- While Industry 4.0 focuses on manufacturing, the Fourth Industrial Revolution is affecting almost every aspect of life, including work, lifestyle, and society as a whole

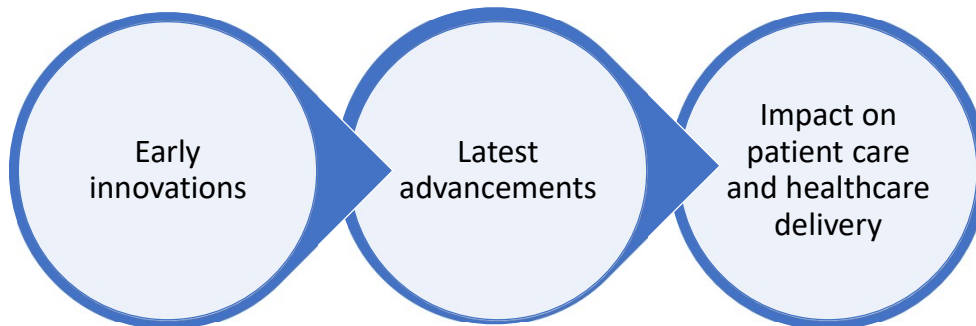
Significance and Challenges

- Although the Fourth Industrial Revolution is still in its early stages, it promises significant implications, challenging existing industries, work practices, and the role of humans in the world, especially with the rise of automation and AI.

Technological Innovation: A Historical Overview

Technological Innovation: A Historical Overview

We will explore the evolution of health technology and informatics within the UK health and social care systems.



Today, we will explore the evolution of health technology and informatics within the UK health and social care systems. We'll trace the developments from early innovations to the latest advancements and consider how these changes have impacted patient care and healthcare delivery.

Health Technology and Informatics



Health technology and informatics refer to the use of digital tools and data management systems to enhance healthcare delivery.



There have been key milestones in the development of these technologies in the UK, with significant innovations leading to profound implications for the NHS and social care system .

Early Developments (Pre-1948)



Before the establishment of the NHS, healthcare technology was relatively primitive.



Innovations included basic diagnostic tools like the stethoscope and early imaging technologies such as X-rays. These early developments laid the groundwork for modern medical technology.

Health technology and informatics refer to the use of digital tools and data management systems to enhance healthcare delivery. This presentation will cover key milestones in the development of these technologies in the UK, highlighting significant innovations and their implications for the healthcare system.

Bynum, W.F. (2008) *The history of medicine: A very short introduction*. Oxford University Press.

999 Service

First established in 1937 in response to a number of preventable deaths that were blamed on people being unable to connect to emergency services.

Ease of Use

- The number "999" was chosen because it was easy to remember and could be quickly dialled on rotary phones, especially in low-light or smoke-filled conditions.
- It also avoided being accidentally dialled, unlike some other sequences of numbers.

Technological Advancements

- Technological advancements in the 1930s made it possible to create a dedicated emergency line.
- The service was designed so that calls made to 999 would bypass normal switchboards and connect directly to a specialised operator who could then dispatch the appropriate emergency service.

The West Midlands 999 Emergency Service takes approx. 4000 calls per day (1 every 20 seconds)

The 999 emergency telephone service was first introduced in the UK on June 30, 1937. However, the dedicated ambulance service that responded specifically to emergency calls through the 999 system began to take shape more significantly in the years following World War II. By the 1970s, the ambulance service had become more organised and professionalised, with better training and equipment to provide emergency medical care.

The main reason for establishing the 999 service was to ensure a prompt response to emergencies. Before 999, there was no standardised way for the public to contact emergency services, leading to delays in receiving critical assistance.

The catalyst for creating the 999 service was a tragic fire in a house on Wimpole Street, London, in 1935, where five women died. During this incident, a neighbour tried to call the fire brigade but was delayed because he couldn't connect directly with emergency services. This highlighted the need for a rapid and direct line to emergency responders.

Formation of the NHS (1948)



The NHS was founded in 1948 with the aim of providing universal healthcare to all UK residents.

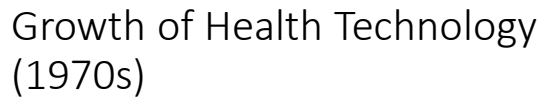


Early technology use was limited, focusing on basic diagnostic and record-keeping tools.



The NHS marked the beginning of a more structured approach to healthcare delivery in the UK.

NHS (2020) *The history of the NHS*. [online] Available at: <https://www.nhs.uk/nhs-history> (Accessed: 28 August 2024).



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The first MRI (Magnetic Resonance Imaging) scanner was installed in the NHS in 1983. It

was installed at the Hammersmith Hospital in London, and the first MRI scans were performed there shortly after installation.

MRI technology was introduced due to its ability to produce highly detailed images of the body's soft tissues without the use of ionizing radiation (unlike X-rays or CT scans). MRI scans are particularly useful for imaging the brain, spinal cord, muscles, joints, and internal organs. The technology provides exceptional contrast between different soft tissues, making it invaluable for diagnosing a wide range of conditions, such as neurological disorders, musculoskeletal injuries, and cardiovascular diseases.

Shortliffe, E.H., and Cimino, J.J. (2014) *Biomedical Informatics: Computer Applications in Health Care and Biomedicine*. Springer.

1980s Innovations

Health Informatics

- Early care management systems

Assistive Technologies

- Mobility aids and communication devices



During the 1980s, health informatics began to gain traction with the development of early care management systems. Assistive technologies, such as mobility aids and communication devices, became more widespread, improving the quality of life for many patients.

The 1980s were a formative decade for health informatics in the NHS, characterized by the introduction of early electronic systems and a growing recognition of the potential of digital technologies to improve healthcare delivery. Although many of these innovations were in their infancy, they set the stage for the more widespread adoption and integration of advanced health informatics systems in the following decades.

General practitioners (GPs) began to adopt computer systems to manage patient records more efficiently. These systems enabled GPs to maintain patient histories, prescriptions, and referral information electronically.

The use of computers in general practice helped improve administrative efficiency by reducing paperwork and streamlining routine tasks such as appointment scheduling and repeat prescriptions.

In the late 1980s, the NHS began to see the introduction of basic clinical decision support systems (CDSS). These tools provided healthcare professionals with computer-

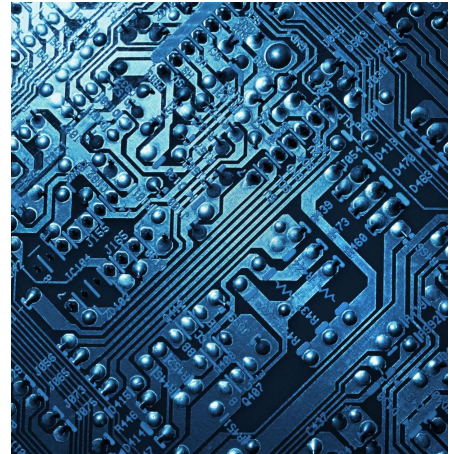
based assistance for making clinical decisions, particularly in drug prescribing and managing chronic conditions.

Coiera, E. (2003) *Guide to Health Informatics*. Arnold.

Health Informatics in the NHS – 1990's

The Information Management and Technology (IM&T) Strategy (1992)

- The 1992 IM&T strategy was one of the first comprehensive plans aimed at modernizing NHS information systems. It emphasized the need for electronic patient records (EPRs) and standardized data systems across NHS organizations.
- The strategy aimed to improve data accuracy, availability, and the integration of health records to enhance patient care and healthcare planning.



Gillies, D., and Pollock, A.M. (2009) *The NHS National Programme for IT: A Good Idea Gone Wrong*. *British Medical Journal*, 338, b85

Early 2000s Developments

NHS Digital

- focusing on the integration of digital technologies into healthcare.

Telecare services

- providing remote monitoring and support for patients, especially the elderly and those with chronic conditions.

NHS Digital was created to serve as the central organization responsible for collecting, analysing, and sharing health and social care data across England. By centralising these functions, the NHS aimed to improve data quality and accessibility, enabling better decision-making at both clinical and administrative levels.

The establishment of NHS Digital was part of a broader effort to modernize the NHS's IT infrastructure. This included the development and management of national IT systems and services, such as electronic patient records, data-sharing platforms, and digital health services. The goal was to ensure a more integrated and efficient healthcare system.

The use of telecare in the UK can be traced back to the 1990s when basic technology, such as personal alarms and pendant alarms for the elderly, was first implemented. These devices were designed to support independent living by enabling users to call for help in emergencies.

In the early 2000s, telecare services expanded to include more sophisticated devices like fall detectors, bed occupancy sensors, and smoke detectors that could automatically alert carers or monitoring centres. The UK government and local authorities started to recognize the potential of telecare to support aging populations and individuals with long-term health conditions, promoting independent living while reducing the strain on

social services.

By the 2010s, telecare had become a more established part of social care services in the UK. Many local authorities integrated telecare into their care packages, offering a range of devices and monitoring services to help individuals live independently for longer periods.

The 2000s saw a growth in telehealth pilot projects, especially for managing chronic diseases such as diabetes, chronic obstructive pulmonary disease (COPD), and heart failure. These pilots used remote monitoring technology to track patients' vital signs (e.g., blood pressure, blood glucose levels) and transmit data to healthcare professionals for ongoing management.

NHS Digital (2021) *NHS Digital Overview*. [online] Available at: <https://digital.nhs.uk/about-nhs-digital> (Accessed: 28 August 2024).

2010s Advancements

Integrated Care Systems (ICS)

- Digital solutions and coordination
- Collaborative Working
- Integrated Care Pathways
- Shared Resources and Budgets
- Focus on Preventative Care and Population Health
- Technology and Digital Integration

Mobile Health Apps

- Use and impact
- “My Health” pilot app in 2012
- “Patient Access” app in 2016

During the 2010s, the NHS and social care system in England moved towards greater integration of services through the establishment of Integrated Care Systems. ICSs aimed to improve patient outcomes, enhance efficiency, and provide more holistic care by fostering collaboration between healthcare providers, local authorities, and social care organizations. Despite challenges, the shift towards ICSs marked a significant step towards a more integrated and patient-centred approach to health and social care in the UK.

The 2010s were characterised by the expansion of Integrated Care Systems (ICS), which aimed to enhance coordination between different healthcare providers. The rise of mobile health apps allowed patients to track their health metrics and access healthcare services more conveniently.

Collaborative Working: ICSs encouraged collaborative working across different healthcare settings (primary, secondary, and community care) and with social care providers. This collaboration aimed to provide more coordinated and holistic care, particularly for patients with complex needs, such as the elderly and those with multiple long-term conditions.

Integrated Care Pathways: ICSs worked on developing integrated care pathways that spanned multiple services and settings, ensuring that patients received continuous and coordinated care across different stages of their health journey. This included smoother

transitions between hospital care and community-based services.

Shared Resources and Budgets: Some ICSs piloted shared financial arrangements and pooled budgets between the NHS and local authorities to facilitate joint planning and decision-making. This helped reduce duplication of services and directed funds toward areas of greatest need.

Focus on Preventative Care and Population Health: ICSs placed a strong emphasis on preventative care, promoting health and well-being, and addressing the broader determinants of health. By focusing on population health management, ICSs aimed to reduce the demand for acute care services and manage health more proactively.

Technology and Digital Integration: The 2010s saw increasing use of digital technologies to support integrated care. ICSs leveraged health information exchanges, shared electronic patient records, and telehealth services to improve communication between different providers and enhance care coordination.

Throughout the 2010s, the NHS increasingly utilized mobile health apps as part of its efforts to enhance patient engagement, improve access to care, support the self-management of chronic conditions, and drive digital transformation. These apps played a significant role in the NHS's strategy to modernize healthcare delivery, improve efficiency, and meet the needs of a digital-savvy population.

In the early 2010s, mobile health apps began to emerge as a new tool for healthcare management. The NHS started experimenting with various apps designed to provide information, facilitate communication between patients and providers, and promote health and wellness. These apps were mainly informational, offering guidance on conditions, symptoms, and self-care tips. The NHS piloted several mobile health apps to test their effectiveness in managing chronic conditions and supporting patients. One of the notable projects was the launch of the "MyHealth" app by NHS Direct in 2012, which provided health advice and symptom checkers.

By the mid-2010s, mobile health apps began to integrate more closely with NHS services. The NHS encouraged the use of apps for remote monitoring of chronic conditions, booking appointments, accessing medical records, and managing medications. Apps like "Patient Access" allowed users to book GP appointments, request repeat prescriptions, and view their medical records directly from their smartphones.

Majeed, A., and Coster, J. (2018) *The role of mobile health apps in healthcare*. *BMJ Innovations*, 4(1), pp. 12-18.

Ongoing and Future Developments

AI and Machine Learning:

- Continued exploration of AI technologies for enhancing diagnostic accuracy, predicting patient outcomes, and personalising treatment plans.

Blockchain for Health Records:

- Research into using blockchain technology to secure and streamline health records and patient data.

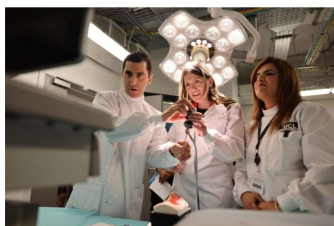
Wearable Health Technology:

- Increasing integration of wearable devices for monitoring health metrics and managing chronic conditions.

£13 million for 22 AI for health research projects

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£13 million for 22 AI for health research projects



10 August 2023

Projects aim to transform health using artificial intelligence (AI) to assist and refine diagnostics and procedures.

Today, August 10, the Secretary of State for Science and Technology, Michelle Donelan,

Related content

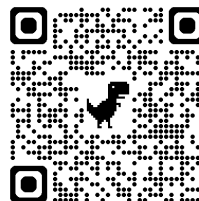
- Experts to lead AI Safety Summit preparations as new funding announced to modernise healthcare
- UK Science and Technology Framework

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<https://www.ukri.org/news/13-million-for-22-ai-for-health-research-projects/>

Projects aim to transform health using artificial intelligence (AI) to assist and refine diagnostics and procedures.

Today, August 10, the Secretary of State for Science and Technology, Michelle Donelan, announced 22 projects that will explore how to develop and use AI in health.

The announcement comes on the same day that the government appointed two leading experts to spearhead preparations for the UK to host the first major international summit on the safe use of AI.

Matt Clifford and Jonathan Black will be charged with rallying leading AI nations, companies and experts, ahead of the event in the UK this autumn.

Matt is the CEO of Entrepreneur First and Chair of the Advanced Research and Invention Agency. Jonathan is a Heywood Fellow at the Blavatnik School of Government at the University of Oxford and former UK G7 and G20 Sherpa and Deputy National Security Adviser.

Funding from the £250m UKRI Technology Missions Fund

The projects will involve universities stretching from Edinburgh to Surrey.

They will be supported by £13 million from UK Research and Innovation's (UKRI) Technology Missions Fund, previously announced in the Science and Technology Framework, to support AI innovation to accelerate health research.

Unveiling projects during visit to UCL

This includes more than £500,000 for University College London's (UCL) Centre for Interventional and Surgical Sciences.

The Secretary of State visited it yesterday to observe the early development of technology that could revolutionise surgery for one of the most common types of brain tumour.

The project will develop a real-time AI 'assisted decision support framework' to improve surgical outcomes, including avoiding complications following surgery and shortening recovery time for patients.

Funded projects

Other funded projects include those led by:

- University of Sheffield: £463,000 to carry out an external validation of an approach that could lead to much wider, effective treatment of chronic nerve pain. This affects one in 10 adults over 30 to better detect early signs of inflammatory arthritis that could mean earlier, more effective treatment
- University of Oxford: £640,000 to accelerate research into a foundation AI model for clinical risk prediction that could determine the likelihood of future health problems based on an individual's existing conditions
- Heriot-Watt University in Edinburgh: £644,000 to develop a system that assists trainee surgeons to practice laparoscopy procedures, commonly known as keyhole surgery, with real-time feedback on their movements
- University of Surrey: £456,000 will see them work closely with radiologists to develop AI that improves the mammogram analysis process. This could allow radiologists to join the clinical force earlier in their careers, boosting the numbers of cancer specialists

Home of safe innovation

Technology Secretary Donelan said:

The UK has a proud history of demonstrating diplomatic leadership on the most important issues of the day and Matt and Jonathan's experience and expertise means that they are perfectly placed to lay the groundwork ahead of talks this year on safe and responsible AI.

We're already a leading nation when it comes to artificial intelligence – and this summit will help cement our position as the home of safe innovation.

By leading on the international stage, we will improve lives at home. AI will revolutionise the way we live, including our healthcare system. That's why we're backing the UK's fantastic innovators to save lives by boosting the frontline of our NHS and tackling the major health challenges of our time.

Improving health diagnostics and outcomes

Dr Kedar Pandya, Executive Director, Cross-Council Programmes at UKRI, said:

The potential for AI to accelerate and improve all aspects of our health is vast. The UK is in a strong position in this field but with a range of challenges across many aspects of society, including the healthcare system, novel solutions are needed. That is why UKRI is investing in these projects in order to advance our research and improve health diagnostics and outcomes.

Further information

Full list of projects

Advancing machine learning to achieve real-world early detection and

personalised disease outcome prediction of inflammatory arthritis

Professor Weizi Li, University of Reading

Grant: £600,000

The project uses AI to improve detection and personalised disease outcome prediction of inflammatory arthritis.

INDICATE: AI-enabled data curation, quality and fact-checking for medical documents

Dr James Kinross, Imperial College London

Grant: £567,000

The project uses AI for real time analysis of healthcare infodemics to autonomously create clinical guidance and identify misinformation.

Autonomous and intelligent laparoscopy trainer with real-time feedback

Dr Mustafa Suphi Erden, Heriot-Watt University

Grant: £600,000

The project is developing an AI-based self-training platform for laparoscopic surgery.

AI for personalised respiratory health and pollution (AI-Respire)

Professor Kian Fan Chung, Imperial College London

Grant: £600,000

The project uses AI to develop a predictive tool for the impact of pollution on health.

Privacy-preserving artificial intelligence for fibrosis progression prediction for patients with neovascular AMD

Professor Daniel Rueckert, Imperial College London

Grant: £600,000

The project is developing privacy-preserving AI for the diagnosis and treatment of age-related macular degeneration.

Clinical prediction foundation models for individuals with multiple long-term conditions

Professor Christopher Yau, University of Oxford

Grant: £596,000

The project uses foundation AI models to develop clinical risk prediction models for multiple long-term conditions.

Artificial intelligence methods applied to genomic data for improved health (AGENDA)

Professor Sarah Ennis, University of Southampton

Grant: £596,000

The project uses AI to determine clinical impact of newly discovered variations in the genome.

From 2 million to 20 million: scaling and validating a foundation model for ophthalmology

Dr Pearse Keane, UCL

Grant: £453,000

The project uses foundation AI models for ophthalmic imaging and diagnosing retinal diseases.

AI-based diagnosis for improving classification of bone and soft tissue tumours across the UK

Dr Charles-Antoine Collins-Fekete, UCL

Grant: £593,000

The project uses AI to develop novel cancer diagnosis techniques using soft tissue tumours as a use case

RELOAD: REspiratory disease progression through LOngitudinal Audio Data machine learning

Professor Cecilia Mascolo, University of Cambridge

Grant: £590,000

The project uses AI to analyse breathing and speech to identify patient at risk of developing severe respiratory tract infections.

Optimisation of natural language processing for real-time structured clinical data capture in electronic health records

Dr Anoop Shah, UCL

Grant: £592,000

The project uses AI to improve the recording of structured clinical data at the point of care.

AI-enabled targeting of public health interventions through dynamic characterisation of the environment

Dr Soren Brage, University of Cambridge

Grant: £600,000

The project uses AI to determine how location and environment factors affect behaviours towards diet and physical activity.

AID-PitSurg: AI-enabled Decision support in Pituitary Surgery to reduce complications

Professor Dr Sophia Bano, UCL

Grant: £540,000

The project is developing an AI-assisted decision support framework to improve surgical outcomes.

Artificial Intelligence for Pollen and Spore Detection, Forecasting and Human Health (AIPS)

Professor Francis Pope, University of Birmingham

Grant: £513,000

The project combines IoT sensors and AI to detect and forecast allergenic and toxic bioaerosols.

A novel artificial intelligence powered neuroimaging biomarker for chronic pain

Dr Dinesh Selvarajah, The University of Sheffield

Grant: £431,000

The project uses AI to identify new biomarkers and developing therapeutics for neuropathic pain.

Infection-AID: AI assisted genomic profiling to inform the diagnosis, personalised treatment and control of infections

Professor Taane Clark, London School of Hygiene and Tropic Medicine

Grant: £502,000

The project uses AI to reveal drug resistance mutations and transmission patterns in infectious diseases.

Leveraging universal fractal geometry to develop new AI for neuroimaging

Dr Yujiang Wang, Newcastle University

Grant: £600,000

The project develops novel AI-based non-invasive neuroimaging.

Self-learning AI-based digital twins for accelerating clinical care in respiratory emergency admissions (SLAIDER)

Professor Lu Lui, University of Leicester

Grant: £600,000

The project develops a digital twin for enhancing clinical care in respiratory emergency conditions.

Efficient AI tools for equitable handling of missing values in population-wide e-health records to advance prevention of chronic diseases

Dr Angela Wood, University of Cambridge

Grant: £599,000

The project uses AI to handle missing data in electronic health records multiple long-term conditions risk prediction.

Sample Size guidance for developing and validating reliable and fair AI PREDICTion models in healthcare (SS-PREDICT)

Professor Richard Riley, University of Birmingham

Grant: £526,000

The project develops new guidance and methods to generate reliable and fair AI prediction models for use in healthcare.

People-centered mammogram analysis

Professor Gustavo Carneiro, University of Surrey

Grant: £425,000

The project is developing AI models for mammogram analysis with focus on co-creation with radiologists.

IDERT: Intelligent Deimmunization for Enzyme Replacement Therapies

Dr Giovanni Stracquadanio, The University of Edinburgh

Grant: £599,000

The project uses AI to design new therapies for rare inherited diseases.

Reflect

- What innovation and changes in health and care have you observed, experienced or used during your lifetime?
- What innovations do you *imagine* could be developed in the future?

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Spotlight Innovation

Oxevision

How **oxevision** supports staff
to keep patients safe

Cooperated with patients and carers requests

Oxevision

- What benefits do you feel Oxevision would have for a patient?
- What benefits do you feel Oxevision could have for support staff?



During this session we have...



Remember UWTSD Resources



UWTSD Library Support

Academic and InfoSkills

Our Skills programme is designed to create opportunities for students to develop their transferable academic and information skills, facilitating both their academic success and employability. The curriculum covers a wide range of topics – from finding library resources to fake news to managing your online presence. Our team of Academic Liaison Librarians have developed a series of online Units that allow you to develop your skills anywhere, anytime, to suit you. Click the tiles below to get started:



The UWTSD Library team have provided additional support to help you to develop your research skills. These are available for you to work through at your own pace.

The UWTSD library have info skills course to help you to develop



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