HDRUK
Health Data Research UK

Improving our health
through data science

The Alan Turing Institute

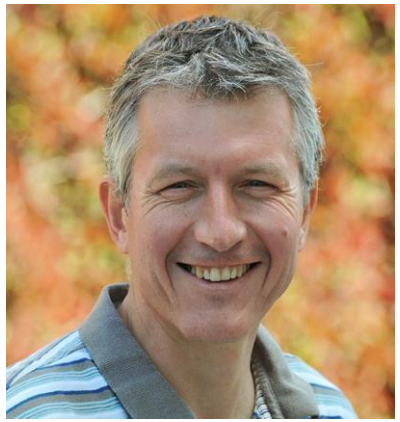
Data Science and AI: National Opportunities

7 November 2018

Prof Chris Holmes

About me

Chris Holmes



The Alan Turing Institute

HDRUK

- **Research Director for Health** at the **Alan Turing Institute**, joint with **HDR UK**
- Chair in Biostatistics, University of Oxford:
  - Department of Statistics, and Nuffield department of Medicine
- Novartis international advisory board for data-science
- NICE expert panel on real-world evidence

HDR UK: A new national Institute for health data science

HDR UK
Health Data Research UK

Launched in April 2018, bringing together a UK team of experts to develop and apply cutting-edge data science approaches to clinical, biological, genomic and other multi-dimensional health data to address the most pressing health research challenges facing the public.

Our mission is to make game-changing improvements in the health of patients and populations through data intensive research and innovation.

Professor Andrew Morris CBE FRSE FMedSci
Director Health Data Research UK

We have 10 public and charitable funders:

MRC Medical Research Council
British Heart Foundation
Chief Scientist Office
EPSRC Engineering and Physical Sciences Research Council
E·S·R·C Economic & Social Research Council
Ymchwil Iechyd a Gofal Cymru Health and Care Research Wales
HSC Public Health Agency Research and Development
NHS National Institute for Health Research
wellcome
Innovate UK

Why now? Complex environment

HDRUK
Health Data Research UK

Establishing processes for large-scale health outcome phenotyping

Interoperability: to work across systems with no additional effort

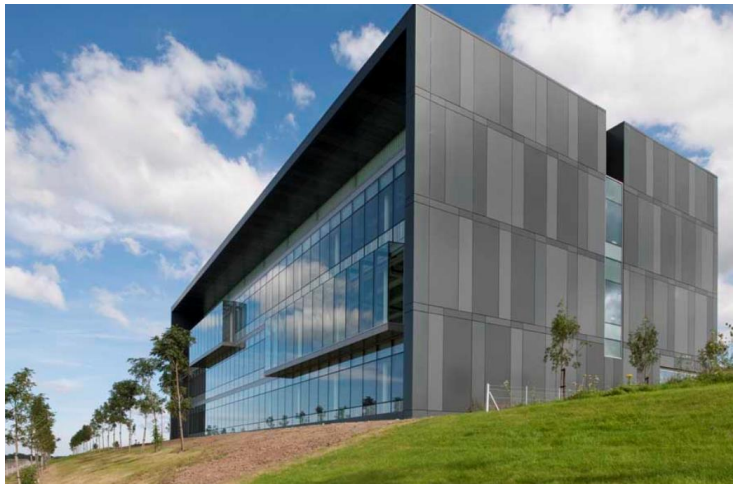
A unique partnership

HDRUK
Health Data Research UK

Our initial investment supports six Sites. Each has world-class expertise; a track record in using health data to derive new knowledge, scientific discovery and insight; and works in close partnership with NHS bodies, industry and the public to translate research findings into benefits for patients and populations.

1. Wales and Northern Ireland (Swansea and Queen's University Belfast)
2. Midlands (Birmingham, Leicester, Nottingham, Warwick)
3. Scotland (Glasgow, Edinburgh, Dundee, Aberdeen, Strathclyde, St Andrews)
4. London (Imperial, Kings, London School of Hygiene and Tropical Medicine, Queen Mary, UCL)
5. Oxford
6. Cambridge (EBI, Sanger, Cambridge University)

OXFORD



SCOTLAND

CAMBRIDGE

UK

WALES

LONDON

MIDLANDS

“Breathing the Same Air”

Health Data Research (HDR) UK's vision

HDRUK
Health Data Research UK

To create a thriving, high-energy UK-wide network of **inter-disciplinary research expertise** that will:

- Disrupt traditional science by enabling **new scientific discovery** from large multi-dimensional datasets
- Apply **cutting-edge technologies** to **enhance science, innovation and decision making**
- **Improve healthcare** for a **population of 65 million people**

The Alan Turing Institute

- "We will found The Alan Turing Institute to ensure Britain leads the way again in the use of big data and algorithm research"

– George Osborne, Chancellor of the Exchequer
Budget Speech, March 2014

The Alan Turing Institute

EPSRC
Engineering and Physical Sciences Research Council

Network of industry, charity, government partners

Network of university members

Strategic government investment

The goals of the Alan Turing Institute

Innovate and develop world-class research in data science and artificial intelligence

Apply our data science research to real-world problems, supporting the creation of new products, services and jobs

Train the next generation of data science and artificial intelligence leaders

Thought leadership: advising policy-makers and shaping the public conversation around data

The Alan Turing Institute: the national institute for AI and data-science

- Located in the British Library
- Desk space for around 250 researchers
- Bringing together the UK's leading researchers in AI and affiliated disciplines {maths, stats, CS, inf-eng}
  - 145 **Faculty Fellows**
  - 19 **Research Fellows**
  - 47 **PhD students**
  - 30 **Interns** (12 week programme)
  - 50+ **Visiting Researchers** from academia, industry, govt
  - 12 **Research software team**

The Turing's University partners

UNIVERSITY OF CAMBRIDGE

THE UNIVERSITY of EDINBURGH

UNIVERSITY OF OXFORD

UCL

WARWICK
THE UNIVERSITY OF WARWICK

UNIVERSITY OF BIRMINGHAM

UNIVERSITY OF EXETER

University of BRISTOL

MANCHESTER 1824
The University of Manchester

Queen Mary University of London

UNIVERSITY OF LEEDS

Newcastle University
UK | Malaysia | Singapore

UNIVERSITY OF Southampton

Things are moving at a pace…

Health Data Research UK

Speech

My vision for a more tech-driven NHS

Secretary of State for Health and Social Care Matt Hancock's speech at NHS Expo 2018.

Published 6 September 2018
From: Department of Health and Social Care and The Rt Hon Matt Hancock MP

Delivered on: **6 September 2018 (Transcript of the speech, exactly as it was delivered)**

All around us, a new generation of technology is changing all of our lives. From the mundane but useful, like the ubiquity of satnavs that stop family arguments and warn us of traffic jams, to the profound and extraordinary, like the ability of genomics to design drugs for each individual.

Digital, Culture, Media & Sport

Closed consultation

Centre for Data Ethics and Innovation Consultation

Published 13 June 2018

Contents

Ministerial Foreword

I am thrilled to launch this consultation on the new Centre for Data Ethics and Innovation.

Advances in how data is used, and the technologies that lie behind it, are transforming the world as we know it. We have already seen some fantastic progress, including how we diagnose illness, deliver public services and tackle social challenges like climate change.

The Centre will make sure our society can keep pace with these dramatic changes and maximise the benefits they bring. From helping us deal with the novel ethical issues raised by rapidly-developing technologies such as artificial intelligence, agreeing best practice around data use to identifying potential new regulations, the Centre will set out the measures needed to build trust and enable innovation in data-driven technologies. Trust underpins a strong economy, and trust in data underpins a strong digital economy.

House of Commons
Science and Technology Committee

Algorithms in decision-making: Government Response to the Committee's Fourth Report

Sixth Special Report of Session 2017–19

Ordered by the House of Commons to be printed 5 September 2018

Infrastructure investment
Digital Innovation Hub Programme

HDRUK
Health Data Research UK

A UK-wide initiative to enable the safe and responsible use of health-related data at scale for research and innovation

NHS Digital

NHS England

CHIEF SCIENTIST OFFICE

HSC Public Health Agency
Research and Development

NHS National Institute for Health Research

Part of a Broader Strategy
Industrial Strategy Challenge Fund

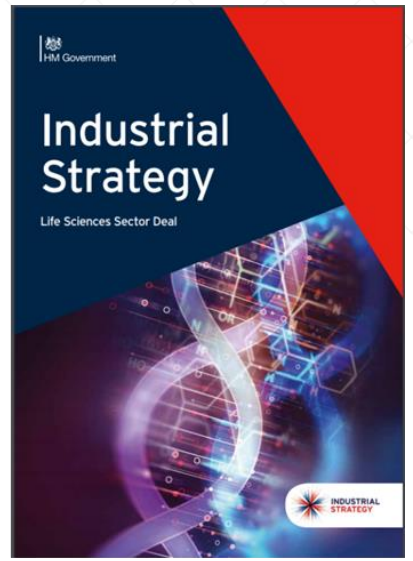
UK Research and Innovation

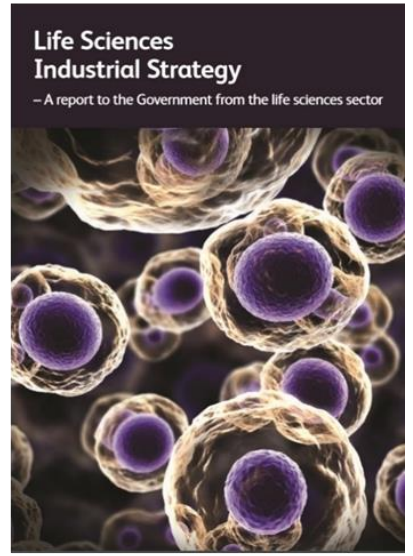
HDRUK
Health Data Research UK

Turning health data into early diagnostics and precision treatments

Three complementary strands:

- **Genomics** - whole genome sequencing and associated informatics infrastructure, **£100m**
- **Digital Innovation Hubs -** linking routine NHS data with rich data from R&D programmes, providing analytic tools and informatics support for businesses alongside local access to integrated UK-wide data, **£38m**
- **Digital pathology, radiology/imaging and diagnosis– centres of excellence in digital pathology and radiology/imaging with AI and machine learning** and investment in CR&D to advance diagnostic tools for early diagnosis, **£72m (£50m for centres, £22m CR&D)**

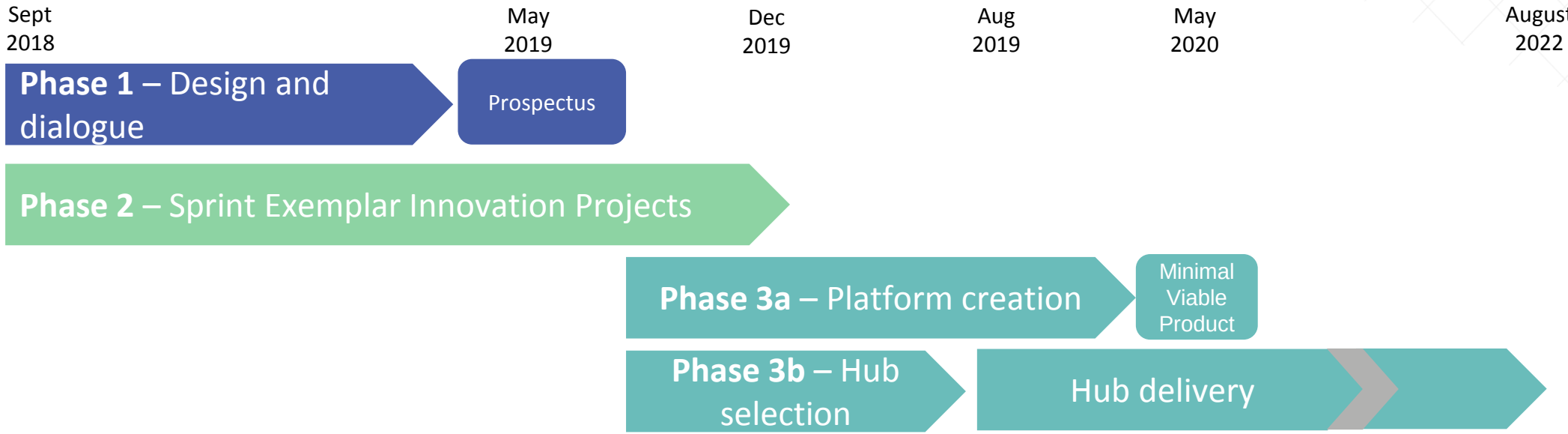




30 August 2017

Current timeline

Our three phase delivery plan



Phase 1: DESIGN AND DIALOGUE PHASE September 2018-April 2019
Creating a UK Health Data Research Alliance: Prospectus to define the specification for the architecture; data and technical standards and governance frameworks required to build a UK-wide health research data platform

Phase 2: DIGITAL INNOVATION HUB PILOTS: SPRINT EXEMPLAR INNOVATION PROJECTS September 2018 - December 2019
Proof of readiness for industry uses: Delivery of approx. 6 industry relevant partnership demonstrator projects within 12 months

Phase 3: DELIVERY AND IMPLEMENTATION May 2019-June 2022
UK Health Research Data Platform Delivery: 3-5 hubs with complementary research and innovation use cases, industry partnerships and clear benefits to the health and social care system, within an interoperable, trusted and secure governance framework

Phase 2
£3M Sprint Exemplar Innovation Projects

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- **Closing date 5th December**
- **Panel 14th December**
- **Build upon best practice** to develop the processes, technical solutions, knowledge and skills needed to deliver robust, secure and scalable solutions.
- Projects to demonstrate **confidence of concept** of both the functions of an interoperable infrastructure and research and innovation relevant use cases.
- Successful projects **£100k-£400k** - last approximately 6 to 10 months
- Must be delivered by **industry/academic and NHS consortia**
- Each Sprint Exemplar Innovation Project must have:
  - Close working partnerships with their regional NHS organisations
  - Advanced health data science capabilities
  - Clinical knowhow needed to deliver novel and scalable sprint projects
- This is an **open competition** judged by **independent expert panel** on behalf of the UK Research and Innovation (UKRI) Industrial Strategy Challenge Fund

NOTE: Receipt of funding for a Sprint Exemplar Innovation Project will NOT be a requirement for future involvement in the Digital Innovation Hub delivery programme

HDRUK-Turing: helping to learn faster, fail quickly

Health Data Research UK

Key opportunities for working together

- How can we **create a federated learning base at scale** across the UK?
  - Capturing real-world heterogeneity
  - Interoperable across major resources
  - Adhering to the highest levels of data governance and ethics
  - Linking medical imaging with other modalities
  - Promoting robust, reproducible, analytics
  - Faster learning, quickly failing: preempt barriers, and promote acceleration

- How can we reward collaboration?

- How can we tap into and engage with the UK talent pool of AI researchers, and SME innovation?

THE WALL STREET JOURNAL.

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Pepper...and Salt

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LIFE

The New Einsteins Will Be Scientists Who Share

From cancer to cosmology, researchers could race ahead by working together—online and in the open

By Michael Nielsen

October 29, 2011