

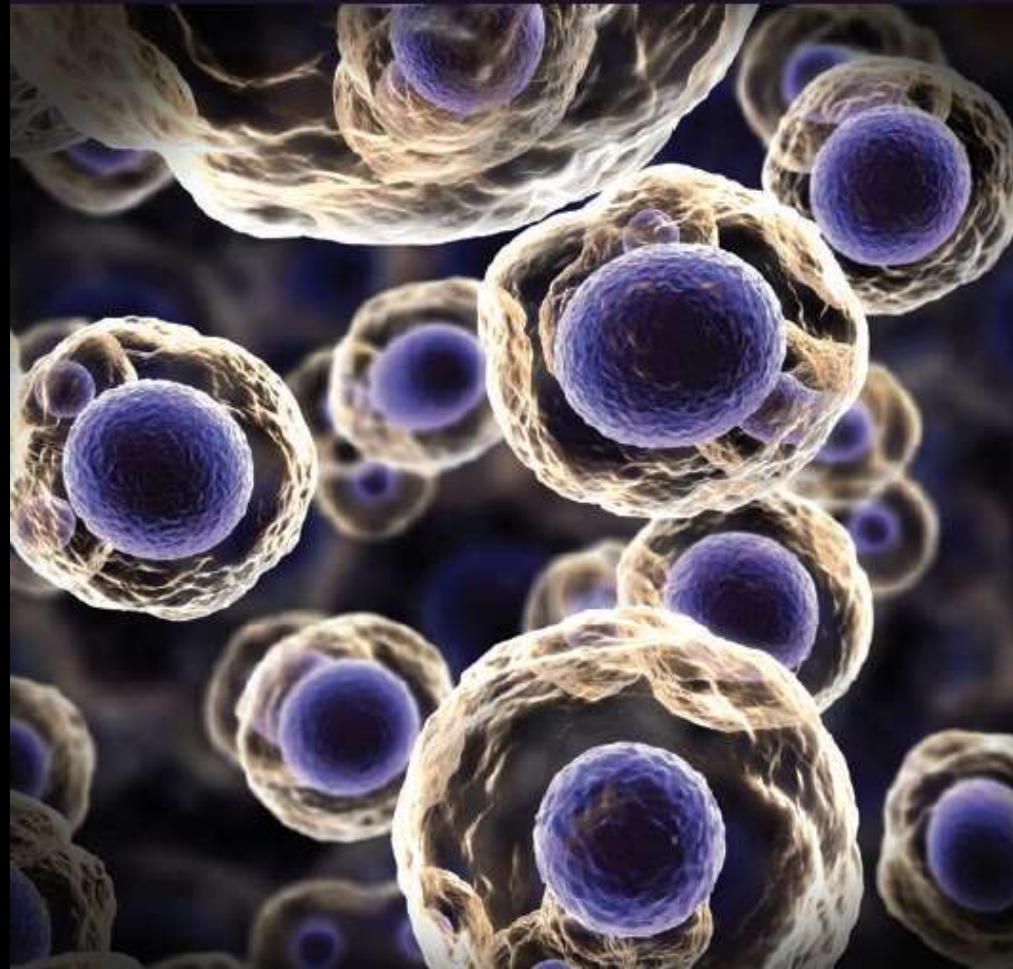


Life Sciences in the UK: Building on the UK
Biobank Experience

John Bell

Life Sciences Industrial Strategy

– A report to the Government from the life sciences sector



Highlights of the Life Sciences Strategy

- **Strengthen Science base, support higher risk science**
- **Enhance Clinical trials and translational science**
- **Facilitate the scaling of innovative companies**
- **Establish capacity for discovery and manufacturing new generation of therapeutics (cells, viral vectors, nucleic acid based therapy)**
- **Resolve the adoption problem in the NHS**
- **Create three new industries in Life Sciences in the UK**

‘ Establish the basis for three new Life Science Industries in the UK’

GENOMICS:

Sequencing Technology

Precision medicine

Target Discovery

Genotype ; Phenotype

Public Health

Investment £600m

‘ establish the basis for three new Life Science Industries in the UK’

GENOMICS:

Sequencing Technology

Precision medicine

Target Discovery

Genotype ; Phenotype

Public Health

Investment £

DIGITAL HEALTH:

Large Scale clinical datasets optimised for applications in clinical trials RWD, AI and algorithms for drug discovery, improved diagnostics and increasing efficiency of health care

Investments: £2billion for further enabling health data sets

‘ establish the basis for three new Life Science Industries in the UK’

GENOMICS:

Sequencing Technology
Precision medicine
Target Discovery
Genotype ; Phenotype
Public Health

Investment £600m

DIGITAL HEALTH:

Large Scale clinical datasets optimised for applications in clinical trials RWD, AI and algorithm for drug discovery, improved diagnostics and increasing efficiency of health care

Investments: £2billion for further enabling health data sets

EARLY DIAGNOSIS

New approach to medicine enabled by new technology and completely new care pathways. Relevant to Diagnostics, Digital and Pharma. Can only be developed in a single payer environment. Enabled by range of new technologies

Investments: £300m to create infrastructure.

Genomics

- Sequencing 500,000 genomes in UKB
- Commissioned sequencing of 100,000 rare disease genomes pa by Gel each year for NHS
- Modernizing Microbiology to convert PHE microbiology to sequencing,
- Neonatal screening
- Cancer sequencing 50,000 genomes pa
- Expand platforms to BGI and Oxford Nanopore
- Obtain polygenic risk scores on 5 million people.

Large Scale Genomics

UK Biobank 500,000
SNPS 820k completed
Exomes; 2 years
Genomes 2 years

Consented and
linked to routine
health care data

GeL
100,000 genomes in
cancer and rare
disease completed
100,000 rare disease
pa for 5 years

Early diagnostic Cohort 5 million
participants
SNP panel in all for Polygenic risk
score followed by sequencing,
Repeated sampling of high risk
populations

Big Data Driving AI enabled clinical decisions



Digital Pathology
Imaging
Therapies
Clinical Phenotype
Lab tests
Digital monitoring
Genomics

*Algorithms for diagnosis,
therapeutic responses,
natural history, clinical
decision support*

Creating a Unique Digital Environment for Health

- **Data assets on 65 million people**
- **Complete GP records for 15 years for all 65 million**
- **Coded hospital admission data**
- **Registries and cohorts**
- **Genomic enrichment in 5 million**
- **Hospital data improving**
- **Networks for Digital pathology and Radiology AI**
- **Strong Machine learning community: Turing Institute and BDI**
- **Novel approach for raising capital for curation and structuring 'FLATIRON in a healthcare system'**
- **National standards**
- **NHS Digital**
- **Digital Hubs**

Early Diagnostic Cohort

- **Create 5 million person cohort**
- **Enable the testing of new diagnostic tools for early diagnosis**
- **Create high risk subcohorts using Polygenic Risk scores and environmental data for most common diseases**
- **Recruit and test new therapeutic interventions for early disease**
- **Enable digitally enabled behaviour change and public health interventions.**

This proposal looks to harness new early diagnostics and enhanced risk stratification to enable research into interventions in early disease, especially in pre-symptomatic stage.

