Meeting the challenges in Medical Bioinformatics and Health Informatics in the UK

Report from the MRC strategic meeting held on 29 and 30 January 2015
Executive summary

MRC’s strategy is to enable a dramatic change in the use of large patient and research data sets, leading to better treatments, the identification of health risks and a greater understanding of the causes of disease. Informatics and computation are at the heart of achieving this aim and MRC has invested over £100m in the last 2 years in informatics capabilities and infrastructure, in addition to on-going support for quantitative skills development and capacity building.

In January 2015, MRC brought together leading scientists from MRC’s largest investments in informatics research – the Farr Institute, the Medical Bioinformatics Awards and Genomics England. The main aims of the meeting were to: encourage greater collaboration between these awards; and identify potential gaps and opportunities that MRC should address in the future.

A number of factors that present barriers/challenges to informatics research were identified. These were broadly associated with: training, skills and capacity; sustainability and funding mechanisms to support diverse inter-disciplinary, multi-disciplinary collaborations; information governance, policy and regulation; and access to data and analytical tools/methods.

To increase the informatics research base and encourage greater collaboration and sharing of resources and expertise, a number of opportunities were identified and a series of recommendations were developed. These included ‘quick-wins’ and key areas for longer-term investment that would help establish the UK as a world leader in informatics research.

The key recommendations resulting from these discussions were:

- **Expand and sustain current MRC informatics research investments by creating a National Institute**
  
  Explore opportunities to create a core-funded, national informatics institute to: drive defragmentation across the breadth of biomedical and health data research from genomics to health and social care services; build new collaborative opportunities to demonstrate the value of data science to medical innovation; provide training; build capacity and stability; and influence with a common voice.

- **Defragment data, analytical methods and expertise**
  
  Work with the research community to shape common ways of working that may require innovative, multi-disciplinary approaches. For example, supporting data ‘sandpits’/environments for rapid access to datasets for analytical tool development and research hypotheses generation.

- **Develop fit-for-purpose training, skills and career paths**
  
  Establish improved career pathways for data scientists and increase quantitative skills capacity through flexible training opportunities – for example short-term, bespoke, discipline hopping sabbaticals.
1. **Introduction**

This document provides a summary of the MRC informatics strategy meeting held on 29 and 30 January 2015. The meeting was attended by some of the leading scientists from the UK’s largest informatics research investments - the Farr Institute of Health Informatics Research, the MRC Medical Bioinformatics Awards, UK Biobank, the NIHR Health Informatics Collaborative, Genomics England Ltd - and MRC head office staff. A full list of the attendees is provided in the Appendix.

The event provided an opportunity for participants to gain a shared understanding of common challenges in UK informatics research; and to explore opportunities for collaboration and more joined up working, in particular between investigators at the Farr Institute and the Medical Bioinformatics Awards.

At the same time, ideas and suggestions resulting from the meeting’s discussions will shape MRC’s informatics research strategy ahead of the Comprehensive Spending Review and will help identify priorities for potential future investments.

2. **Meeting overview**

2.1. **Background**

Professor Savill opened the meeting by informing the audience that informatics research was a key area of focus for MRC and that ‘big data’ was one of the eight great technologies that the Government has identified where UK could lead the world in their development.

He acknowledged that the UK research community needed to create its own ‘Information Commons’: a system that would link the different layers of data from ‘-omics’, clinical and health services data to environmental exposure and social care information at the individual patient level in order to create a dynamic knowledge network that would improve health care outcomes and biomedical research, while still protecting patient rights. Electronic health records were the glue to achieving this vision.

2.2. **MRC’s major investments in informatics research in the past two years**

Over last two years MRC has made over £100m investment (with partners) in health and biomedical informatics research. This included:

2.2.1. **MRC Medical Bioinformatics Awards**

These awards were established to support skills development, provide career opportunities and support tools, technologies and infrastructure for large-scale data use. They were allocated to the following institutions:

1. The Medical Bioinformatics partnership led by Imperial College London
2. MRC/UVRI Medical Informatics Centre at the MRC/UVRI Uganda Research Unit
3. University College London Partners, which includes the Francis Crick Institute
4. The MRC Consortium for Medical Microbial Bioinformatics led by Warwick
5. University of Oxford Big Data Institute
6. Leeds MRC Medical Bioinformatics Centre

2.2.2. The Farr Institute of Health Informatics Research

The Farr Institute of Health Informatics Research is a distributed institute comprising 24 UK academic organisations and two MRC units, coordinated through UCL, Swansea, Edinburgh/Dundee and Manchester which host the four eHealth Informatics Research Centres (eHIRC$s$). It was funded through a £20m MRC capital investment, building on an earlier £19m MRC investment in partnership with nine other funders to establish the four eHIRC$s$.

The vision of the Farr Institute is to harness health data for patient and public benefit by setting the international standard in trustworthy reuse of electronic patient records and related linkable data for large-scale research. This will help enhance the use of NHS records for research, strengthen partnerships with the NHS, industry and other UK academic research centres.

2.3. Objectives

The objectives of the MRC informatics strategy meeting were to explore the best ways to:

- achieve maximum connectivity between the MRC’s investments
- capitalise on opportunities for partnership working with investments from other organisations, including the NHS and industry
- align any future MRC informatics research activities with MRC’s skills, career and capital strategy
- identify future investments, appropriate delivery mechanisms and possible risks
- understand the current and future impact of research in this area for society

2.4. Presentations and breakout group sessions

After giving a brief introduction of the research programmes supported by MRC’s major informatics investments and their potential impact in improving capability and capacity in health and medical bioinformatics research in the UK, the lead investigators touched upon the key issues concerning the successful delivery of these programmes. It is noteworthy that the different investigators expressed very similar concerns, which have been summarised in the section 3 of this document.

---

1 All the presentations from this meeting can be accessed via the following link: http://bit.ly/1zrrB13
Please note that you would need to enter the password: peo48wffd
Experts from the wider UK informatics research community then presented their experience with data-intensive research programmes, including:

- European Bioinformatics Institute (EBI)
- UK Biobank
- NIHR Health Informatics Collaboratives
- 100,000 Genome Project of Genomics England Ltd

Finally, meeting attendees were split into four breakout groups and asked to consider four key data challenges:

1. Scaling data-intensive bio-health discovery and innovation
2. Analytical methodology that is needed to transform data to knowledge
3. Data storage and transfer/e-Infrastructure
4. Developing people to deliver 'team science'

The aim was for each group to come up with both tangible short-term ‘quick wins’ and longer-term opportunities for partnership, in order to address these important data challenges. Table discussions were followed by short presentations from each group and an open discussion with all participants.

Opportunities and recommendations resulting from the wider discussions during this meeting are outlined on section 4.
3. Concerns shared by the MRC’s informatics research award holders

Participants representing the Farr Institute and the MRC Medical Bioinformatics awards acknowledged that there were a number of challenges/issues that would need to be addressed and likely to require some long-term investment. The following common themes were identified:

3.1. Sustainability of resources and future funding

3.1.1. Shortage of skilled data talent

- The MRC informatics research award holders were concerned that mismatches between capital and revenue within these awards have created a vacuum in funds to support skilled people in data handling, analysis and interpretation across the career path - from senior research staff, who could respond to the many requests and opportunities, to core technical staff.

- An additional challenge to this was considered the wider shortage in data talent in the UK and beyond, leaving lead investigators struggling to find qualified and experienced data scientists with the right combination of expertise – a mix of coding skills, statistics and understanding of biomedicine – necessary to meet the growing demand of their data-intensive projects, and to engineer solutions for highly contextual information.

- It was agreed that there was a pressing need for further funding to: employ more skilled staff; put in place appropriate career structures and incentives to retain the expert staff; and also, support more training opportunities across the career path. These actions were considered critical if the current awards, and the UK in general, were to remain competitive in the informatics research arena.

3.1.2. Funding and rewarding ‘team science’ and hypothesis-free research

- It was acknowledged that currently, there was a lack of flexible and innovative funding mechanisms to support diverse inter-disciplinary, multi-institutional collaborations (often conducting hypothesis-free research) such as these needed for many data-intensive biomedical research programmes.

- In addition, assessment and recognition of research contributions (for individuals and institutions) participating in large collaborative research programmes were considered very important in order to allow researchers to gain maximum benefit and gratification from their participation in ‘team science’. Current recognition frameworks did not always adequately capture or celebrate individuals’ contributions to ‘team science’ projects.

3.1.3. Computational capacity

- Most projects supported by the MRC informatics awards were building on existing resources where possible, and were integrating new equipment into existing infrastructure. Thus far, designs of systems, procurement and
implementation have been supported by central IT teams working with researchers and had led to the success of the projects. However sustainability of resources and continued IT support for services and training was considered a challenge for institutions going forward.

- It was acknowledged that as IT kit depreciated over time, funding would be required to renew it. Furthermore, a large-scale hardware investment would be needed to accommodate the exponential data growth and to generate insight from the heterogeneous data types.

3.2. Access to personal data

Individual-level data were becoming increasingly more valuable in research studies as it allowed the linkage of multiple data sources, leading to insights that couldn’t otherwise be possible. At the same time, access to this valuable data was becoming increasingly more challenging for a number of reasons.

3.2.1. Privacy, security and public trust

- Participants agreed that data privacy and security was another huge concern in the context of large-scale data and data linkage of multiple sources where the potential of identifying an individual increased.

- Currently, there was still great public fear regarding the inappropriate use of personal data resulting from the lack of adequate public engagement and consultation, particularly during activities such as the care.data programme.

- Adding to this, the processes of the NHS Health and Social Care Information Centre (HSCIC)’s in releasing personal hospital data records have not been sufficiently transparent, raising risks and concerns.

3.2.2. Variable information governance and data access arrangements

- At present, the use of individual level data collected on individual users of NHS care was determined by several laws and governed by various interpretations of these laws as set out in guidelines issued by a number of statutory, regulatory and professional organisations. The situation was made even more complicated by changes over time in the responsibilities of these different bodies and their response to external influences – for example, the impact of the negative publicity of the controversial care.data programme.

- Participants agreed that when using patient-level data, it was paramount to balance private rights with patient and public benefit. However, they considered that the current “consent or anonymise” approach to information governance had some serious inadequacies, in particular in cases where researchers could not use fully anonymised data and seeking consent wasn’t a feasible option. The complexity of the current framework can lead to important research being delayed while rival interpretations of the law were debated.

- Adding to this, there were lack of clarity about HSCIC’s and other NHS data providers’ data access policies and procedures; and lack of a common, harmonised approach to the data access processes from these bodies.
Another major worry around data access was the new EU Data Protection Regulation, which was currently being drafted. It is noteworthy that whatever laws are introduced in England, they will be subject to this upcoming Regulation, which will be legally binding on member states and so override national laws.

Even though, information governance and security challenges could be overcome, there was agreement that access to data remained a cumbersome, bureaucratic and time-consuming process and there was broad agreement for a more open and balanced approach to data access.

3.2.3. NHS data collection, quality and culture shift

- There was a strong agreement that the lack of common data standards across the healthcare service resulted in variable quality of data collected in the NHS and also, impeded the integration of quality phenotypes and indicators back into clinical practice. The development of widely accepted common data standards and collection guidelines together with appropriate incentives for clinicians and NHS staff for their effective adoption were considered paramount. However the cultural barriers were thought to be higher than the technical/standards challenges at this point.

- In particular, participants agreed that the collection of high quality and timely (real-time) NHS data was essential in driving health service and outcome improvements. To do this, there was a need for complete involvement and buy-in from NHS staff at all levels. Currently, the limited resources, time pressures and evolving landscape of the NHS Trusts made this a real challenge.

- To overcome this challenge, it was agreed that NHS staff needed to understand the importance of collecting and using high quality and timely data. Researchers had a fundamental role to play in this and in particular, demonstrating how high-quality data can be used to improve care.

3.3. Data integration, linkage and analysis

3.3.1. From large-scale data to large-scale insight

- Attendees acknowledged that we were rapidly moving away from a world where the challenge has been the generation, transfer and storage of large-scale data towards a world where the bottleneck was increasingly the analysis and interpretation of data.

3.3.2. The complexity of modern biomedical and health data

- Many of the analytical challenges were arising from the nature of modern biomedical data: large, complex, diverse, dynamic, time-dependent and evolving. This was disruptive to traditional analytical approaches and increased the demand for more efficient and robust analytical pipelines to convert large-scale raw data into meaningful information.

- In particular, participants agreed that modern analytical challenges included developing rigorous and robust approaches for integrating highly heterogenous, multi-modal data types or data on the same object generated on different technological platforms, at different times.

- It was acknowledged that the problems started right away during data acquisition, when decisions needed to be made about what data to keep
and what to discard; how to store it and with which metadata to make most amendable to statistical analysis. Also, large-scale data had to be managed in context, which raised the need to track provenance and to handle uncertainty and error.

- Adding to all these challenges, participants noted that much data today was not natively in a structured format - for example, social media data. Transforming such content into a structured format for later analysis was considered to be a major challenge.

### 3.3.3. Access to analytical pipelines

- Currently, a major bottleneck for generating new hypotheses from diverse data sources was the small number of people empowered to ask questions of the data and to analyse it. Smarter systems and also better support for non-expert user interaction with analysis pipelines would be required to maximise the use and value of data. One option could be to develop outreach sandpits for statisticians and machine learners to come and “play with the data”.

- At the same time a number of participants were concerned that there were still some hurdles around discoverability and open access to analytical pipelines, scripts and programs; and support for open source software development. This could potentially lead to duplication of effort and hinder the rapid validation, dissemination and uptake of novel methodologies.

### 3.4. Reaching out - Engagement and Partnerships

#### 3.4.1. Managing expectations

- Participants acknowledged that the MRC informatics investments had ambitious goals while operating in a fast evolving environment. Managing expectations while achieving both the national and the regional recognition that these MRC investments were set out to achieve was expressed as a concern.

#### 3.4.2. Effective partnerships

- Expanding current partnerships, including the NHS and industry, and working with others were considered paramount in order to overcome all of the challenges that these initiatives were facing and to ensure the successful outcomes of these investments.
4. **Potential opportunities, key recommendations and next steps**

Participants were asked to identify potential gaps in the investments to date and suggest both short and long-term opportunities for more collaborative working to address these gaps in the future. The key recommendations resulting from these discussions were:

4.1. **Expand and sustain current MRC informatics research investments by creating a National Institute**

Explore the opportunities to create a core-funded, National Informatics Research Institute to: drive defragmentation across the breadth of biomedical and health data research from genomics to health and social care services; build new collaborative opportunities to demonstrate the value of data science to medical innovation; provide training; build capacity and stability; and influence with a common voice. More specifically the National Institute would:

- capitalise on the momentum created by the Farr Institute and Medical Bioinformatics awards and join up their activities to cover the full breadth of health and biomedical data
- create an environment of openness and sharing similar to the one that the EBI has created in the bio-molecular space and learn from its experience and expertise
- incorporate and be significantly augmented by collaborative projects, programmes and initiatives funded by MRC and its partners but also, engage with the wider academic community, such as the MRC Biostatistics Unit
- use its national position to strengthen inter-disciplinary partnerships with the computer and mathematical science communities; and create an international leading platform for data analytics. Foster links with the Alan Turing Institute and ensure that the engineering and physical sciences are fully integrated to deliver potential solutions
- establish more effective engagement and collaborations with the NHS and in particular, liaise closely with the data providers to streamline access to high quality data
- develop more appropriate and relevant tools for clinicians at the point-of-care; and demonstrate to clinicians and the NHS staff tangible benefits from the data they collect
- foster close interactions with both the pharmaceutical and digital technology industries to drive medical innovation and to provide an unrivalled ecosystem that brings together industry, researchers, clinicians and patients. This will help translate innovation back to the NHS and establish the UK as the location of choice for investment by these sectors.
Next steps (over the next year):

MRC Head Office together with the Farr Institute and Medical Bioinformatics Directors will:

- explore the remit, strategy and operational model of a National Biomedical and Health Informatics Research Institute
- engage with NHS data providers and deliver a step change in the data collection and access, information governance and linkage processes
- work towards increasing the visibility of resources and expertise from these two MRC informatics investments in order to start creating an environment of openness, sharing and collaboration.

4.2. Defragment data and analytical methods

Work with the research community to shape common ways of working that may require innovative, multi-disciplinary approaches. Suggested actions included but were not limited to:

4.2.1. Data and analytical sandpits

- Consider supporting data and analytics ‘sandpits’ – i.e. environments for rapid access to datasets and/or analytical tools/pipelines. This would help researchers to:
  - rekindle ability to ‘play’ with data - this could be either existing curated de-identified datasets or new open access benchmark datasets
  - attract scientists from a diverse range of disciplines, and in particular from the mathematics and information technology communities, in a creative, free-thinking environment and immerse them in a collaborative process around important health/biomedical data challenges
  - deepen and gain a shared understanding of common data challenges and redefine problems
  - develop and test novel analytical methodologies, algorithms and pipelines
  - generate novel scientific hypotheses that could potentially lead to innovative multi-disciplinary research proposals

4.2.2. Best practice and guidance in big data analytics

To prevent duplication and facilitate data research at scale:

- Develop and publicise community-driven best practice and guidance on development, evaluation and implementation of big data analytics.
- Help researchers establish a community-agreed framework in order to assist them in choosing appropriate methodologies for analysing and interpreting big data and understand their constraints – developing something similar to the MRC Framework for complex interventions could be a possible way forward.

4.2.3. Funding mechanisms

- Explore the possibility of launching themed methodology research funding calls in areas of unmet analytical need.
Similarly, explore the possibility of themed initiatives in partnership with industry via for example, Innovate UK’s Small Business Research Initiative.

Consider development of “Challenge Prizes” (similar to the Nesta Longitude Prize) that will bring together the country’s leading biomedical and data scientists, clinicians, engineers, government officials policy makers and the public to create inspiring and innovative solutions to some of the most pressing ‘big data’ problems in the health and social sectors.

Consider novel forms of support encouraging knowledge exchange and multi-disciplinarity. This could involve providing researchers with opportunities to pursue an immersive experience in other disciplines/sectors that would help them develop new skills and collaborations and ultimately, bring a different perspective to their own discipline/sector.

4.2.4. From ‘big data’ to ‘big insights’

- Develop point-of-care analytics to deliver timely, reliable and valid results to solve a key challenge that many hospitals are facing today: the high cost of readmissions.
- Generate ‘big insights’ to enable learning health systems, where clinicians, patients, commissioners have access to actionable results without needing to see and understand the ‘big data’ itself.

**Next steps (over the next year):**

*The MRC Head Office to explore:*

- different options to deliver data and/or analytics 'sandpits', within trusted environments that will provide access to: curated de-identified datasets that will give the opportunity to multi-disciplinary teams to explore these data together and generate new research questions and hypotheses
- the possibility of establishing multidisciplinary post-doctoral fellowship awards that will bring together for example, a clinician and data scientist to work on a common challenge; and encourage knowledge exchange and multidisciplinarity

4.3. Develop fit-for-purpose training, skills and career paths

Explore the development of improved career pathways for data scientists and increase quantitative skills capacity through flexible training opportunities. Suggested actions included but were not limited to:

- address the gap in analytical skills to keep pace with increasing demand and fulfil the potential of ‘big’ data research
- work together with others to identify the right career structures and support mechanisms to give data scientists and technical service/support staff the opportunity to progress
- help establish a culture that values and rewards talented data scientists and provides appropriate incentives, including competitive salaries
- consider novel forms of support encouraging knowledge exchange and multi-disciplinarity to fully leverage the e-infrastructure. This could involve
providing researchers with opportunities to pursue an immersive experience in other disciplines/sectors that would help them develop new skills and collaborations and ultimately, bring a different perspective to their own discipline/sector

- enthuse the next generation of data scientists – school and undergrad internships, target maths and stats and summer schools.

**Next steps (over the next year):**

*The MRC Head Office will:*

- explore establishing short-term (6-12 month) discipline hopping sabbaticals – allowing individuals to have a taste of working with health and biomedical data, without having to commit to a long-term career change

- consider appropriate options as part of it strategic skills review and work closely with others, including Higher Education Institutes and the Academy of Medical Sciences to address the issue of career progression in interdisciplinary science and identify solutions

---

5. **Conclusions**

Declan Mulkeen summed-up the workshop and thanked participants for their constructive contributions. It was noted that there was:

- Clear overlap and agreement of common challenges and opportunities to deliver against the promise of “big” data for health.

- An increasing need to work together to reduce complexity and prevent unnecessary duplication.

- Capacity building and partnerships will be vital to delivering against the ambition of harnessing the power of UK data resources for patient and public benefit.
## Appendix - Attendees

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Ainsworth</td>
<td>Deputy Director, Farr Institute @ HeRC</td>
</tr>
<tr>
<td>Mike Barnes</td>
<td>Director of Bioinformatics at the William Harvey, Queen Mary, University of London</td>
</tr>
<tr>
<td>Ekaterini Blaveri</td>
<td>Programme Manager, MRC Headoffice</td>
</tr>
<tr>
<td>Sophie Broster-James</td>
<td>Public Affairs Manager, MRC Headoffice</td>
</tr>
<tr>
<td>Iain Buchan</td>
<td>Director, Farr Institute @ HeRC</td>
</tr>
<tr>
<td>Mark Caulfield</td>
<td>Co-Director, Genomics England Ltd</td>
</tr>
<tr>
<td>Keith Channon</td>
<td>Director of the National Institute for Health Research Biomedical Research Centre, University of Oxford</td>
</tr>
<tr>
<td>Ed Conley</td>
<td>Chief Scientific Office, UK Health Informatics Research Network</td>
</tr>
<tr>
<td>Anne-Marie Coriat</td>
<td>Director of Capacity, Skills and Infrastructure, MRC Headoffice</td>
</tr>
<tr>
<td>Adnan Custovic</td>
<td>Professor of Allergy, Farr Institute @ HeRC</td>
</tr>
<tr>
<td>Jim Davies</td>
<td>Director, Software Engineering Programme, University of Oxford</td>
</tr>
<tr>
<td>Peter Diggle</td>
<td>Head of CHICAS Research Group, Farr Institute @ HeRC</td>
</tr>
<tr>
<td>Gordon Dougan</td>
<td>Principal Investigator, Wellcome Trust Sanger Institute</td>
</tr>
<tr>
<td>Paul Elliott</td>
<td>Professor of Epidemiology and Public Health Medicine, Imperial College London</td>
</tr>
<tr>
<td>Georgina Evans</td>
<td>Industry Engagement Manager, UK Health Informatics Research Network</td>
</tr>
<tr>
<td>Jon Finstein</td>
<td>Clinical Programme Manager, MRC Headoffice</td>
</tr>
<tr>
<td>Catharine Goddard</td>
<td>UK Health Informatics Research Network Manager</td>
</tr>
<tr>
<td>Yike Guo</td>
<td>Professor of Computing Science, Imperial College London</td>
</tr>
<tr>
<td>Harry Hemingway</td>
<td>Director, Farr Institute @ London</td>
</tr>
<tr>
<td>Chris Holmes</td>
<td>Professor of Biostatistics, University of Oxford</td>
</tr>
<tr>
<td>Pontiano Kaleebu</td>
<td>Director, MRC/UVRI Uganda Research Unit</td>
</tr>
<tr>
<td>Martin J Landray</td>
<td>Professor of Medicine and Epidemiology, Deputy Director of the Big Data Institute, University of Oxford</td>
</tr>
</tbody>
</table>
David Lomas  Dean, Faculty of Medical Sciences, University College London
Nick Luscombe  Senior Group Leader, Cancer Research UK London Research Institute/University College London
Ronan Lyons  Director, Farr Institute @ CIPHER
John MacLeod  Chair in Clinical Epidemiology and Primary Care, Farr Institute @ CIPHER
Lauren Merritt  Administrator, MRC Headoffice
Andrew Morris  Director, Farr Institute @ Scotland
Declan Mulkeen  Chief Science Officer, MRC Headoffice
Jeremy Nicholson  Chair in Biological Chemistry, Imperial College London
Jacky Pallas  Director, Research Platforms, University College London
Colin Palmer  Chair of Pharmacogenomics, Farr Institute @ Scotland
Shantini Paranjothy  Senior Clinical Lecturer, Farr Institute @ CIPHER
Jonathan Pearce  Programme Manager, MRC Headoffice
Jill Pell  Deputy Director, Farr Institute @ Scotland
Mark Pitman  Programme Manager, MRC Headoffice
Sylvia Richardson  Director, MRC Biostatistics Unit
John Savill  Chief Executive, MRC Headoffice
Sam Sheppard  Professor of Microbiology and Infectious Diseases, University of Swansea
Liam Smeeth  Deputy Director, Farr Institute @ London
Jim Smith  Deputy Chief Executive and Chief of Strategy, MRC Headoffice
Rhoswyn Walker  Head of Informatics, MRC Headoffice
Tim Walsh  Professor of Medical Microbiology and Infectious Diseases, Cardiff University
David Westhead  Professor of Bioinformatics, University of Leeds
Jeremy Wyatt  Leadership chair in e-Health research, University of Leeds