

BioImagingUK: Mapping a Strategy for Imaging in the UK BioSciences

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Imaging in the UK

Imaging is now the dominant form of analysis of molecules, cells, and tissues across the Life Sciences. The methodology is used in basic research for biological discovery, in biotech and pharmaceutical research for drug discovery, lead characterisation and development, and preclinical and clinical studies for diagnosis and treatment.

Imaging by its very nature depends on advanced hardware and expert personnel. Significant investments by UK Research Councils and charities have built a number of world-class imaging facilities in academic departments and institutes across the UK. Critically, the facilities at any one institution are usually defined by its experiment priorities. In most cases, UK life scientists have access to the imaging infrastructures necessary to support their immediate work. However, ***over the last decade enormous leaps have been made in imaging technology with advances in resolution, speed and signal processing.*** The expense and technical sophistication of these systems is increasing, ***making it impractical to build and run these new technologies at every site in the UK.*** The result is that any one site will have specific sets of expertise, and rarely does one site have all the capabilities necessary in modern biological and biomedical sciences. For this reason, ***there is a critical need to define the hardware and personnel imaging infrastructure, the access policies, and the sustainable mechanisms*** that underpin much of UK science now and in the future.

We have built BioImagingUK (<http://bioimaginguk.org>), a grassroots initiative to define strategic priorities, access policies, and sustainable practices for UK imaging science. That effort has built an aligned, committed consortium of imaging scientists and technologists who have contributed to a clear, public statement of strategy and policy for bioimaging in the UK.

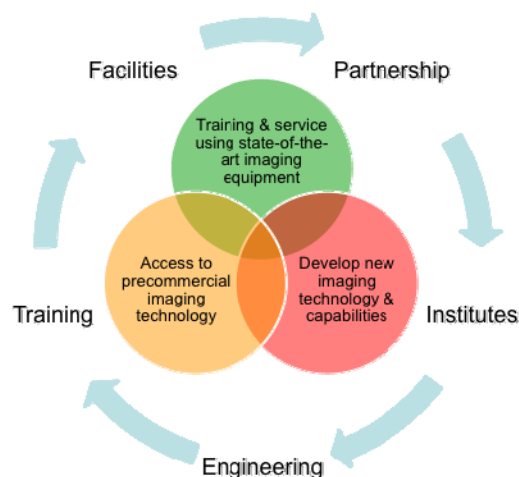
The scale of this challenge is immense. The technologies are expensive, sophisticated and in many cases still in development. Using the systems properly and effectively takes trained personnel. Many produce enormous datasets that stretch current abilities to store, and process and understand digital data. ***The UK bioimaging community strongly agrees that solutions for building and staffing the infrastructures, enabling access to them, and processing the data they produce are urgently needed and will be the foundation for maintaining the UK's research competitiveness.***

This is a global issue for research and is being addressed in Europe by the ***EuroBioImaging*** ESFRI project (<http://www.eurobioimaging.eu>), which aims to interact with ***national imaging communities*** rather than individual institutions.

Strategic Roadmap for Imaging in the UK

In BioImagingUK, our imaging strategy ***Working Groups***, panels of interested scientists with expertise in different domains, have produced a series of strategy statements. Some of the highlights of these documents are:

- The development of ***regional and/or national imaging facilities*** should consider the needs of the ***whole community*** and balance the appropriateness of central facilities with the scientific need for access to those facilities. Mechanisms to ***distribute*** world-leading expertise within UK (and European) institutions ***outside*** regional/national centres should be developed – perhaps through a network of fellowships linked to regional/national centres.
- Demand for these resources is demonstrated by the ongoing EuroBioImaging Proof of Concept studies. ***The UK had the most applications submitted, and UK facilities were in very high demand by applicants from across Europe.***
- Training efforts to develop new personnel skilled in standard imaging technology are well established in many UK institutions but there is an unmet need to provide experts in ***emerging advanced imaging modalities*** to permit them to be applied to biomedical applications. There needs to be an ***appropriate career structure*** in place for such imaging experts.
- All centres and participants highlight the ***need for better software tools for data analysis management and access*** in order to deliver the full benefit of data collected on the UK's imaging platforms
- Identifying points of overlap and ***synergy*** between ***medical imaging*** and ***cell and tissue biology imaging communities*** ***remains a challenge.*** Both EuroBioImaging and BioImagingUK have identified points of overlap where these two normally separated communities can collaborate. Both highlight the need for ***improved probe development*** and ***data management*** and ***analysis tools*** and see significant convergence between preclinical imaging and studying (cell) biology in live disease models.
- The newest techniques for ***super-resolution, in vivo, high-throughput and simultaneous multi-modal image sensing (e.g. PET/MRI, MRI/optical, optical/ultrasound, etc.)*** are ***critical resources*** that must be made widely available to retain the competitiveness of UK Sciences. The costs of these systems demands award mechanisms that balance the research priorities of an awardee with access by the community to these resources.



BioImagingUK Imaging Strategy Meeting

The UK's imaging scientific community and science funding organizations must develop a roadmap for the development, management and access to advanced imaging capabilities and expertise. This should be achieved through a defined dialogue between funders and leading UK scientists. We recommend a two-day by-invitation-only meeting, where representatives of the biological and medical imaging facilities and sciences and of funding bodies can discuss and define principles for the purchase, usage, and shared access of the UK's life sciences imaging infrastructure.

We estimate ~40 representatives from each of the bioimaging and medical imaging communities, 10 representatives from UK funding organizations. Participants will receive strategic summaries of the major discussion points ahead of time. A representative from EuroBioImaging should be invited to present its goals, status and progress. Representatives from BioImagingUK can alternate as chairs of the meeting and summarise activities of BioImagingUK to date. Input and feedback from outside the meeting participants could be posted on the BioImagingUK mailing list, the BioImagingUK Wiki, etc.

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