SCIENCE AND INDUSTRY ENDOWMENT FUND

CASE STUDY OF IMPACT
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Supporting Synchrotron Science

The Synchrotron provides a state of the art facility which is accelerating our scientific research

The challenge

The Australian Synchrotron is one of Australia's landmark research facilities, providing a platform for leading edge experimental techniques. Previously, Australian researchers used overseas synchrotrons however were often faced with low-availability of beam time, and the high cost of international travel. Similarly the demand for beam time has outweighed availability in recent years. The SIEF Special Research Program filled a gap in the National Innovation System by providing access to the Australian Synchrotron for Australian Publicly Funded Research Agencies (PFRAs), based on merit-based beam time allocation. Without this access PFRAs had limited access to the facility.

The response

The Australian Synchrotron is a highly intense source of light which ranges from infrared to hard x-rays supplied at the end-stations of beamlines. The unique properties of Synchrotron light offer several advantages over conventional techniques.

The results are far superior in terms of accuracy, quality, robustness and level of detail that can be seen; and can be collected much faster than traditional laboratory tools. Different techniques can generate images, elemental, structural, and chemical information from a diverse range of sample materials. Both theoretical and applied research conducted in the national facility, benefits both a diverse range of industries and the community.

Synchrotron operations serve the needs of the wider research community, providing a platform for leading edge research and development. Synchrotron techniques are used in many important research areas, including advanced materials, agriculture, biomedics, defence, environmental sustainability, food technology, forensics, oil and gas, mining and nanotechnology.

In the four-year period 2012-16 SIEF funding has supported 243 PFRA-lead Synchrotron projects. The majority of these projects have involved research collaboration partners from universities, medical research institutes and other research organisations. PFRA researchers have also participated in many other synchrotron projects, led by other collaboration partners.

SIEF has fostered collaboration and innovation through its support of 243 Synchrotron projects, resulting in more than 1750 publications.

The impact

Three of the projects undertaken as a result of SIEF's support for the Synchrotron have been examined and the following potential benefits identified:

- Researchers have used the innovative Maia detector for X-ray Fluorescence Microscopy (XFM) for the detailed chemical mapping and analysis of mineral samples, allowing them to observe traces of economically important metals, opening up a new field of bio-geological mineral exploration. Examining the mineral content of leaves of desert eucalypts and acacias species could save the cost and the time involved in drilling unnecessary exploration wells and could lead to improved gold exploration success rates.
- Synchrotron research facilitates faster and more detailed analysis of proteins and other molecules, playing an important role in both the study of biochemicals and the development of new pharmaceuticals, and aiding the development of improved treatment options for blood disorders.
- Through examining the nanostructure of casein micelles, a protein structure found within components of cow's milk, researchers have identified how it can be manipulated for more efficient milk processing practices and better quality milk products.

Based on conservative valuations, the net present value of SIEF's contribution to the Synchrotron project is $799.3 million, with a benefit-cost ratio of 68.2.

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This case study was developed by ACIL Allen and CSIRO in 2016 as part of an overarching review of SIEF's Impact.