09

Management of the facility and principles for access to the beamlines

IMAGE: Entrance to the Australian Synchrotron (artist's impression).

The Australian Synchrotron will provide core infrastructure for science and industry. It will stimulate research and enhance international collaboration.

Courtesy Architectus/Thiess

Chapter 09

Management of the facility and principles for access to the beamlines

The Australian Synchrotron is a national facility to be used by researchers from around Australia and New Zealand, as well as regional and international scientists. Therefore governance, access and operations issues can only be finalised in consultation with key national stakeholders in the full knowledge of the scientific and funding requirements of the facility. The governance model should take account of the breadth of available international experience and draw on the experience of bodies such as ISAC. To that end a considerable amount of consultation has already occurred and will continue as the National Science Case is carried forward.

Without limiting the possibilities that might be discussed and developed during consultation with potential partners, a *possible* model, based on international experience, is discussed.

Ownership

Under this possible model, the Australian Synchrotron would be established as an incorporated entity structured as a company limited by shares or by guarantee. A corporate structure is a common international model (for example, the European Synchrotron Radiation Facility – France, BESSY II – Germany, Advanced Photon Source – USA, Canadian Light Source – Canada) and facilitates investment by the private sector and potential overseas stakeholders. One model would allow for the owners of the company to be the initial 'investors' in the project.

Management

To manage the facility an independent, expert Board could be appointed by 'the owners'. The Board would need to have the required set of scientific, technical and commercial skills and experience to ensure that this national facility is operated to the highest international standards. In addition to their financial oversight and other corporate governance responsibilities set by the owners, the duties of the Board would include decisions on how the facility will be managed and operated (see below), setting a broad policy and operating framework.

A number of advisory committees could be established to make recommendations to the Board and to the Management of the facility. They may comprise:

- a **Scientific Committee** to advise on the strategic direction and design specifications of the Australian Synchrotron;
- an **Access Committee** to advise on the allocation of beamtime to users (this Committee could be supported by relevant expert committees, as used at the European Synchrotron Radiation Facility in Grenoble, France); and
- a **User Committee** to advise on the requirements and concerns of the user community.

Operations

It is important that the operator has a national focus, a sound reputation in financial management and the ability to run large, highly sophisticated scientific infrastructure. To ensure the provision of an environment conducive to good science, the operator must maintain a firm focus on user needs, ensure that equipment is maintained as leading edge, and strive for reliability of service.

The options for operation of the facility are:

- operation directly by the Board
- contracting out to an operator approved by the Board.

In contracting out operations, the Board could conduct a 'capability' tender to assess interest and competence of existing scientific organisations (e.g. ANSTO, CSIRO, universities) or the private sector. This approach may assist in attracting and retaining staff as part of a larger parent organisation. Importantly, it would provide clarity in determining whether the optimal operating approach would be to establish an in-house operating team or to contract an external operator.

Establishment of the Core Beamlines

International advice received by the Australian Synchrotron has been to advocate the establishment of a core set of beamlines meeting critical needs of Australian science and industry as is proposed in this document. This is the approach that is taken at many of the overseas synchrotrons; a very successful example is the ESRF, which has seventeen participating owner countries.

The model requires 'establishment' partners to agree as a group to contribute to this generic set of beamlines rather than to fund specific portions of individual beamlines. These beamlines would be owned, built and operated by the Australian Synchrotron.

Access to the Core Beamlines

Users of the core beamlines would be either non-proprietary (typically, researchers from universities or research institutions) who, while retaining ownership of intellectual property generated, normally place their research outcomes and intellectual property in the public domain, or proprietary (typically, industry or researchers funded by industry) who retain control over any intellectual property they generate while using the synchrotron. Users would apply for either merit-based access or priority access.

The model envisages that experiment time on the core beamlines could be allocated principally by a merit assessment process but with potential for funding contributors to gain access to additional reserved time allocation, again merit based. There could also be a priority system for 'proprietary' users.

Merit-based access

Merit-based access would involve periodical calls for applications for beamtime allocations. Applicants would develop proposals setting out their research, identifying the beamline(s) capable of meeting their research requirements, and estimating the time needed on that beamline.

Merit assessment of proposals would follow international norms and occur through a process of peer review by an Access Committee which would be responsible for the selection assessment process. Depending on the strategic priorities, the merit assessment criteria could be focussed on scientific excellence, or expanded to encompass a broader range of benefits. See table 9.1.

Table 9.1 Criteria options for determining merit

Criteria based strictly on scientific merit

- Scientific excellence
- Technical feasibility of the research
- Capability and track record of the research team
- Availability of resources
- Need to use a synchrotron to conduct the research

Additional criteria for a broader view of merit

- Potential for collaboration
- Potential economic/social benefits arising from the expected outcomes of the project

Priority access

A priority access mode would be needed to accommodate users requiring rapid access, and to enable the synchrotron to develop its user base. Priority access could be provided by setting aside a proportion of available beamtime or scheduled on an ad hoc basis and rescheduling other users or a combination of both.

Consideration should be given to ease of access for researchers who are not located close to the synchrotron. It is noted that the ASRP and AINSE models provide useful guides for enhancing access for these researchers.

Pricing of Access to the Core Beamlines

Development of pricing models for access is expected to be a key area of future discussions with funding partners. For general research, international experience indicates a model where operating funds are directly provided to the facility from national science funding sources with researchers provided with beamtime on the basis of the merit of their applications and the results of their work being openly available. NSAC strongly recommends that this should be the model adopted for the Australian Synchrotron. Consistent with international practice, commercially based access charges could be directly applied in the case of users where the project results are used for commercial gain, or where the user seeks a priority position in the queue for a certain beamline.

Non-core Beamlines

The model envisages that once the core beamlines are established, stakeholders could be offered the opportunity to finance the construction of additional 'non-core beamlines'. Access rights for non-core beamlines would be related to the contribution that, in addition to funding a new beamline or instrumentation, could include operating the beamline, building a new user community, or engaging in education or outreach.

Internationally, providers of beamline funding are granted 25–75% of the available beamtime for a period of 3 to 5 years. The majority of the remaining beamtime is allocated to other users according to the merit of their applications. The precise details of the conditions for installing a non-core beamline would be negotiated with the management of the Australian Synchrotron.

Issues such as the impact of the new beamline on the efficiency of the operation of the whole facility, compliance with facility standards (particularly with respect to safety) and compatibility with other equipment for ease and efficiency of maintenance will be major items for consideration during the negotiations.

User Support

Many users of the Australian Synchrotron will not be expert in synchrotron technology, especially in the early years of operation. A major role of the expert permanent scientific and technical staff will be to make using the synchrotron as user-friendly as possible, and in certain cases to provide full service including, for example, protein crystallisation, data analysis and the opportunity to operate the system remotely. It will be important therefore that expert permanent scientific and technical staff should have the time and capability to assist researchers with experimental design, operation of the beamlines and interpretation of data.

It will also be important that rigorous induction and regular education programs are provided for users covering all aspects of accessing the synchrotron, including safety.

Industrial users and researchers who undertake synchrotron research infrequently and have little expertise in the techniques may particularly value comprehensive service provision. It is envisaged that full service provision might be important in beamlines 1, 3, 4, 5, 6 (second station), 8, 9, 10, 11 and 12 (see table 9.2).

Table 9.2. Beamlines where full user support may be needed

Beamline	Applications that may require full user support
1. High-throughput Protein Crystallography	■ Protein crystallography, structural biology
3. Powder X-ray Diffraction	■ Minerals, advanced materials, pharmaceuticals
4. Small and Wide Angle X-ray Scattering	■ Protein secondary structure, structural biology, food science, agricultural industry, functional polymer manufacture
5. X-ray Absorption Spectroscopy	■ Environment, toxicology, forensics, minerals
6. Soft X-ray Spectroscopy (second station)	■ Minerals, materials and device manufacturing (surfaces), corrosion investigation
8. Infrared Spectroscopy	■ Forensics, archaeology and museum studies, pharmaceuticals
9. Microspectroscopy	■ Nano and bio-materials development & manufacture, drug development
10. Imaging & Medical Therapy	■ Small animal imaging for medical research
11. Microdiffraction and Fluorescence Probe	■ Minerals, agriculture
12. Circular Dichroism	■ Drug design