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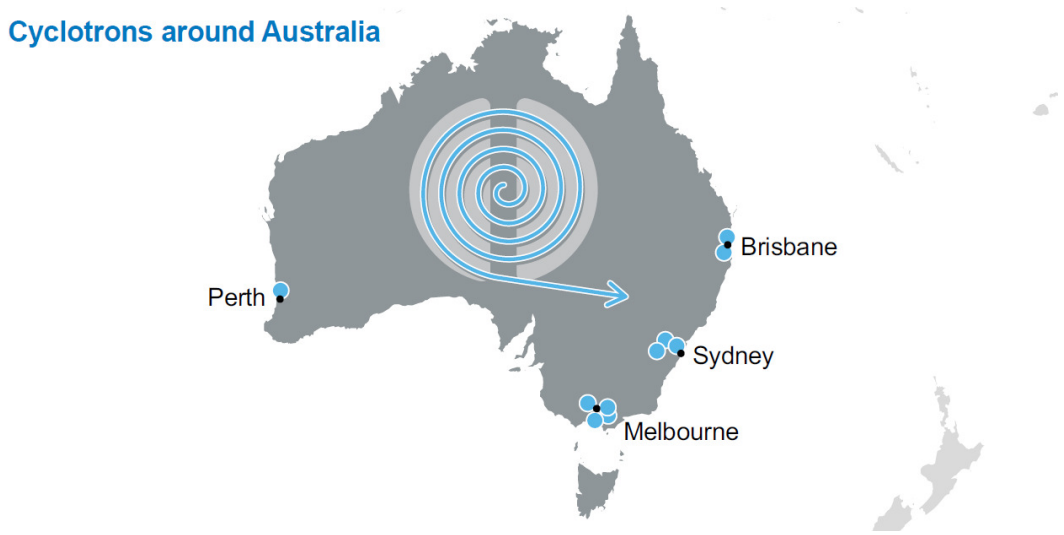
First Australian Cyclotron Users' Workshop - 2010

Free one-day workshop in Sydney



Cyclotron Network

Report of 1st User consultative meeting
15 December 2010 at ANSTO, Lucas Heights, NSW

Executive Summary

On 15 December 2010, the Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights, NSW, hosted a meeting with 39 participants from 9 institutions across Australia who operate or intend to operate cyclotrons for the production of isotopes for medical or research use.
The meeting participants recommended the following actions:

1. **Form a network that allows the sharing of information and experiences related to the operation of cyclotrons for the production of isotopes used in clinical applications and in research.**

2. **the provisional name of the grouping is 'Cyclotron Network'. To indicate the future membership of individuals or institutions from other countries, such as New Zealand, the name may be extended, e.g. International (Australasian) Cyclotron Network.**

3. **the next meeting is planned as a satellite meeting to the ANZSNM 41st Annual Scientific Meeting 2011, 13th - 18th July 2011 in Darwin, Australia. The meeting may then take place regularly in the gap years between the biennial Workshops on Targetry and Target Chemistry.**

4. **The following task forces were created:**
   a. ***Training and education;***
   b. ***Maintenance and Operations*** (incl. best practice guides and manuals)**;**
   c. ***Isotopes and targetry;***
   d. ***Communications*** (incl. web-based information sharing for members, newsletters)
   e. ***Governance*** (incl. nomination of a chairperson; preparation of the next meeting; specific proposals to be decided at the constituting meeting in Darwin, July 2011; Roger Price, WA, has agreed to collate a draft proposal on governance structure, mission and aims for discussion at the Darwin meeting)**.**

5. **All institutions are asked to nominate representative(s) for each of the task forces. Note that an institution might not participate in all task forces.**

6. **All participants have been asked to assist in compiling a comprehensive list of individuals or institutions interested in becoming part of the network. The current participant list is in the Appendix.**

7. **The notes will be circulated to institutions who could not attend; they will be invited to nominate representatives.**

Report:
The intended focus of this first meeting of cyclotron users (Appendix A: participants list) was on engineering, maintenance and operations of cyclotrons used primarily for research and/or in a hospital context rather than radiochemistry or specific clinical applications. However, the latter two are important determinants in the choice and operation of any cyclotron and were, therefore, frequently touched upon during the discussions. There was general agreement amongst the participants that commercial operators of cyclotron should be invited to future meetings. The network would then cover the three main cyclotron uses:

- hospital-based production of medical isotope mostly for clinical routine,
- isotope production for research and
- higher volume production for the commercial provision of clinically used isotopes, including other potential industrial uses of cyclotrons.

The background of this meeting has been a significant rise in the number cyclotrons now operating, being under construction or in planning in Australia. The growth in the number of cyclotrons reflects the growing demand for medical isotopes for diagnostic or therapeutic purposes.

Thus, there is now a community of cyclotron operators that ranges from the very experienced who have in the past built, operated and up-graded facilities to the those who are planning new facilities, the latter often as part of larger regional health services or research infrastructure development programs.

Such an expansion presents, as Roger Price presented in his introductory remarks, a number of important challenges:

- how to achieve the necessary knowledge transfer from the experienced to the newcomers, who try to design best practice infrastructure and operations or
- which cooperative operational models might be best suited to reach high utilisation of the overall national cyclotron capacity.

A foremost concern, highlighted by most presenters from the various institutions, was the need to increase the relevant skilled workforce, which to variably degrees was also seen as a questions of developing appropriate career paths, qualifications, certifications and accreditations.

John Dodson from the Australian Collaboration for Accelerator Science (ACAS) and Miles Apperley from the Australian Microscopy and Microanalysis Research Facility (AMMRF) presented successful examples of existing networks centred around technology platforms. They stressed the strategic benefit of user networks in the context of funding, planning, operating and integrating major infrastructure. They also showed useful metrics that demonstrated the success of their respective networks. John Dodson, in particular, pointed to the existing expertise at ACAS, such as radiofrequency and vacuum technology that are of both of particular relevance for cyclotron engineers and technicians and where some obvious benefits in the areas of training, education and skills transfer exist.

Based on a short initial questionnaire (for results see Appendix) sent out prior to the meeting the following round table discussion took place.

Round table 1 - Maintenance strategy

1. It was felt that currently there is relatively little knowledge exchange amongst cyclotron operators;

2. there is an unmet need to establish a minimum in-house level of knowledge that is not provided by cyclotron vendors on an ongoing basis;

3. the network would benefit from an identification of specific equipment and strategic spares that could be shared, or purchased jointly or be held on behalf of the network by one institution taking in account the aim of reducing response times (possible funding and costing models remain to be discussed);

4. due to the differences in instruments and their serviceability there are limitations on how much 'vendor neutral' equipment could be identified. The 'Maintenance and Operations' taskforce will collate a list of contacts, make a list of items, incl. for example electronic suppliers;

5. a more systematic capture of knowledge outside the supplier-provided manuals is needed;

6. a list of common breakdown problems would help to accrue local and shared knowledge over time;

7. creation of a forum (knowledge bank) that captures the problems/issues encountered in day-today operations, possibly in form of a member web-based archive and discussion forum, was proposed. ANSTO LifeSciences offered to host and maintain the site;

8. there could be provision of more hands-on training programs, possibly with rotations through different cyclotron sites that have different instruments aimed at fostering a broader technical and practical understanding;

9. groups that are in the planning stage of their facility would benefit from advice on facility lay-out, assistance in commissioning, and advise on the appropriate maintenance contracts that reflect the required servicing level (differences between clinical and research operations);

10. developing high-quality diagnostics for continual assessment of instrument performance and preventative maintenance should be developed as an expertise held by the network;

11. fostering relationships with the vendors' key cyclotron engineers and possibly negotiating better service provision reflecting the increased number of cyclotrons in Australia.

Round table 2 - Training and education

1. There could be structured pathways that would allow for different levels of training and education with the option to receive certification or accreditation or training certificates for each module;

2. it would e important to achieve a balance between training&education for the purpose of improving the skills of the workforce and training&education for the purpose of creating more attractive career paths that may attract recruits from other fields;

3. there would be significant benefits (education, broader knowledge transfer, technology development) in having closer interactions with the wider accelerator community, e.g. Australian Collaboration for Accelerator Science (ACAS); It is recognised that an organisation, such as ACAS, is an umbrella structure that might initially not cater to some of the specific needs of the three different user groups (clinical, research, commercial). For example, clinical cyclotron operators may in the first instance engage primarily in information sharing relevant to their specific operational challenges.

4. there is positive experience and opportunity for distance learning programs, the development of a common basic syllabus and design of new learning modules that will be owned by the network and would be accessible to members or overseas students (an appropriate fees structure could assure sustainability and quality of the educational program, e.g. accreditation fees);

5. special hands-on training and trouble shooting workshops as well as the placement in various facilities would help to fill gaps in the current knowledge base and build a skilled workforce;

6. stocktaking of what relevant course units are taught at universities (e.g. physics courses but also nuclear medicine technologist courses) would be useful as well as an assessment of whether these could be integrated over time to build knowledge and skills following a continuous learning model;

7. to achieve viability of otherwise courses with only a small number of participants there needed to be inter-institutional co-operation, such as joint courses supported by several universities or organisations in the field (such as ANSTO);

8. in view of possible accreditation models, there needed to be an involvement of professional bodies: chemistry, pharmacy, ANZSNM, etc;

9. sophisticated role profiles could develop, e.g. blended professionals who are cyclotron instrument operators but also have substantial skills in other areas.

Round table 3 - Building infrastructure

1. The importance of having a good estimate of the current and future theoretical and practical total production capacity (for shippable isotopes) across all cyclotron sites in Australia relative to the expected demands was emphasised;

2. a differentiation between the cyclotron facilities in regard to the range of produced isotope and evolving special content expertise should ease the challenges in the start-up phase of new cyclotron sites;

3. there was agreement that the cyclotron network requires some solid targetry capability and capacity. Solid target- produced isotopes could be a basis for a network, such as the AMMRF. It might operate as a brokerage system, wherein there is a differentiation in the range of isotopes produced by the various cyclotron facilities and then trading between the centres. The aim would be to achieve higher capacity utilisation. (also see: Round table 2, point 3);

4. a priority list for the most important isotopes for clinical and research use ('isotope portal') would help to understand demand and main motivations for the use of any given isotope;

5. setting up a web-based system to capture and understand the true demand for the various isotopes, including funding models that assure sustainable provision of priority isotopes, would be important;

6. Most facilities are in or close to sophisticated biomedical research environments (or close to industries that may allow industrial uses of a cyclotron) and, therefore, should assess areas of relative strength and possibilities for value-adding activities.

APPENDIX A

Participants of 1st Cyclotron Network meeting, 15 Dec. 2010

Organisation
Austin Health
University of Sydney - AMMRF
Centre for Advanced Imaging at the University of Queensland
Sir Charles Gairdner Hospital
Royal Adelaide Hospital
Austin Health
Sir Charles Gairdner Hospital
Centre for Advanced Imaging at the University of Queensland
Royal Brisbane and Women's Hospital
Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
Sydney South West Area Health Service
Sydney South West Area Health Service
Centre for Advanced Imaging at the University of Queensland
Austin Health
University of Sydney - International Office
Austin Health
Sir Charles Gairdner Hospital
Centre for Advanced Imaging at the University of Queensland
Centre for Advanced Imaging at the University of Queensland
Austin Health
Austin Health
Sydney South West Area Health Service
Austin Health
ANSTO (ANSTO Life Sciences)
ANSTO (ANSTO Life Sciences)
ANSTO (Senior adviser research management&science policy)
ANSTO (Business development)
ANSTO (ACAS representative)
ANSTO (ACAS representative)
ANSTO (ANSTO Life Sciences)
ANSTO (ANSTO Life Sciences)
ANSTO (ANSTO Life Sciences)
ANSTO (Communications)
ANSTO (ANSTO Life Sciences)
ANSTO (CEO)
ANSTO (ANSTO Life Sciences)
ANSTO (ANSTO Life Sciences)
ANSTO (ANSTO Life Sciences)
ANSTO (Communications)

APPENDIX B

Outcome of questionnaire (circulated before the meeting)

Topics	Number of people interested
1. User Power (what can we achieve as a group?)	11
2. Network of Spare Assets (sharing parts and information)	10
3. Maintenance Strategies	12
4. Creating a desirable educational environment	7
5. Protecting the Cyclotron and its associated equipment	2
6. Training and information sharing (suggestions for future workshops)	15
7. Other suggestions	* Beyond FDG: research radiotracers * Targetry * What does cyclotron GMP look like? Who is currently performing it? * Balancing the costs,risks and benefits of GMP production of PET tracers