Australian Government

Department of Innovation
Industry, Science and Research

Stepping up to meet national needs

Review of Questacon
The National Science and Technology Centre

July 2008

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It is a matter of prime importance to a healthy democracy that scientific issues be well understood by the citizenry. In that regard, it is important to expose Australians, and in particular young people, to the processes and the ethos of science and technology. This, I believe, Questacon does uniquely well … It is difficult for me to think of any other single activity in the science education field more worthy of support than Questacon.

——Sir Gustav Nossal AC, CBE

Senator The Hon Kim Carr
Minister for Innovation, Industry, Science and Research
PO Box 6022
Parliament House
CANBERRA ACT 2600

Dear Minister

On behalf of the panel established to conduct the review of Questacon in the context of other relevant science communication activities, I am pleased to provide this Report with recommendations for your consideration.

The timing of this review coincides with Questacon's 20th year as Australia's National Science and Technology Centre and I thank you for this opportunity to examine an institution which has become an iconic symbol of the Australian Government's support for, and commitment to science and innovation.

Questacon has become internationally renowned as one of the world's leading science centres. More than 7 million people have visited Questacon, with a further 15 million engaging with Questacon's outreach programs and exhibitions beyond Canberra.

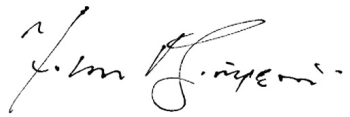
In view of Questacon's recent move into the Department of Innovation, Industry, Science and Research, the review provides a timely opportunity to consider the most appropriate governance structure for Questacon so that the Centre can deliver its mission in a sustainable and meaningful way. The Panel's conclusion is that Questacon's mission is best served by a governance model which optimises the Centre's independence and longer term operational certainty. It is very clear to the Review Panel that, no matter which model is adopted for Questacon's governance and structure, the current financial position is not sustainable. There is an urgent requirement for additional funding to meet immediate and short-term operational needs, as well as to meet capital development needs in the short, medium and longer terms. This report contains recommendations concerning Questacon's mission, the Centre's future governance and its funding needs.

As you have previously affirmed, Questacon has a key role in our innovation system, engaging Australians and inspiring them in ways to increase their understanding of science and innovation. This review recommends particular initiatives which will consolidate and strengthen this role for Questacon, thereby contributing to important

objectives of the Australian Government. This Review coincides with the National Innovation System Review and I look forward to further analysis of the ways in which Questacon will be able to contribute to the outcomes of that review.

In submitting this Report for your consideration, I wish to acknowledge the contributions by the members of the panel, by the secretariat, by your Department including Questacon staff, by members of the Questacon Advisory Council and by individuals and organisations who willingly provided input and submissions as part of a stakeholder consultation process.

Their collective inputs have enabled the panel to review and come to appreciate the complexity and depth of Questacon as a national institution, and to evaluate opportunities for its future in the context of other science communication activities across Australia and in the context of science centre developments internationally.



John P Simpson
Chairman
Review Panel

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Recommendations

The Questacon Review Panel has arrived at the following recommendations.

Recommendation 1

That the Government endorse the following mandate for Questacon, Australia's National Science and Technology Centre:

- Mission: To inspire future scientists and the wider community and enhance awareness and understanding of the contribution of science to Australia's future.

Recommendation 2

To maximise its reach and impact in the community, that Questacon focus on the following key strategies:

- effective operation of the Questacon facility in Canberra and national outreach activities
- development of effective partnerships with organisations having complementary skills and facilities
- contributions to enhance school science education and national curriculum outcomes
- implementation of best practice in interactive science communication, including online and digital technologies
- international engagement which facilitates Questacon's national role.

Recommendation 3

To fulfil the above mandate, that Questacon provide the community with opportunities for:

- practical learning about science and its role in our lives
- appreciating the value of leading edge science developments, especially those involving Australian scientists
- understanding local, national and global science issues and challenges.

Recommendation 4

That Questacon, CSIRO and the ABC cooperate in identifying new structures for improving national coordination, including cooperation with state and regional science centres, to ensure:

- more effective science communication, awareness and education
- efficient use of science awareness and education resources
- more equitable access to these activities and resources across Australia.

Recommendation 5

That to support the achievement of its mission, the Government establish Questacon as a statutory authority as part of a broader strategy to achieve an expanded and better resourced Questacon.

Recommendation 6

That, should support and/or funding for Questacon to operate as a statutory authority be unlikely in the short to medium term, the Government consider integrating Questacon into CSIRO by integrating the science education and communications activities of the two organisations. Integration of the organisations should be subject to measures including appropriate legal safeguards, which ensure:

- that the distinct identity of Questacon as the National Science and Technology Centre and its unique brand be preserved in any such integration
- that integration be subject to the development of a business plan demonstrating how Questacon's mission could be furthered through integration and setting out transition, operational and governance arrangements into the future.

Recommendation 7

That to facilitate the achievement of Questacon's mission and key strategies into the future, a significant increase in resources (in line with scenario 3 in the report) be provided to:

- refurbish the Questacon building and construct an additional building adjacent to it with increased exhibition, education and visitor spaces to accommodate continuing long-term growth in visitor numbers
- provide new programs to enhance its mission, in particular to showcase leading edge science and innovation, including Australian achievements, and to engage the community in local, national and global science issues and challenges
- implement a more comprehensive outreach program less vulnerable to changes in private sponsorship priorities.

Recommendation 8

That if Recommendation 7 is not to be implemented in the immediate term, then a moderate funding increase (along the lines of scenario 2 in the report) be provided as soon as possible to address pressure on Questacon's infrastructure and services and provide for:

- modification of the Questacon building to enhance visitor amenity and safety and to respond to planned public works in the Questacon precinct
- secure core funding for outreach programs
- significant development of online and digital services.

Recommendation 9

That an examination be undertaken of Questacon's exhibition production model, including its funding, cost-effectiveness, accommodation, future skills supply and its linkage to visitor experience quality.

Recommendation 10

That opportunities for funding from other Commonwealth portfolios be fully explored, recognising Questacon's potential to provide students, teachers and the community with an understanding of the nature and dimensions of national challenges and of the capacity of science to address them.

Recommendation 11

That Questacon continue to seek sponsorships and donations from the private and philanthropic sectors while also pursuing partnerships with business and other non-government sources to enhance and extend the reach of core activities supported by Government, thereby engaging the wider community in Questacon's mission.

1 Introduction

This review coincides with Questacon's 20th anniversary. Questacon plays an iconic role in the Parliamentary triangle, having been opened in Australia's bicentennial year as a joint gift to the nation by the Australian and Japanese Governments.

Over the past 20 years, several reviews of Questacon have all affirmed its continuing relevance and importance. The Government's last formal review of Questacon was undertaken in 2003 after the organisation was transferred to the Education, Science and Training portfolio. Five years later, following Questacon's transfer to the Innovation, Industry, Science and Research portfolio, it is timely to reflect on its place in a rapidly changing national and global context and how it might assist in raising the profile of science in addressing key national and global challenges.

1.1 Terms of reference and Review Panel membership

The terms of reference for this review are to:

1 Examine the role, functions, priorities and resourcing of Questacon and make recommendations aimed at ensuring that its core activities, including its outreach programs, have a sustainable funding basis;

2 Examine ways by which Questacon's outreach programs can be financially secured and consider options for their future operation and funding;

3 Examine ways by which external funding for Questacon programs can be maximised.

The Review's terms of reference also require it to take account of:

- current science and innovation communication activities and funding sources within the portfolio and the most efficient and effective mechanisms for delivering on government objectives in this area
- other Commonwealth or State programs or activities that may be relevant to the objective of delivering a national science communication outreach program
- the experience of relevant overseas institutions and national strategies particularly in Europe and North America.

While the terms of reference seek recommendations on appropriate resourcing levels for Questacon activities, they also require that these include recommendations for managing future activities within current funding parameters.

The members of the Review Panel are:

- **Mr John Simpson (Chairman)**, Group General Manager, Corporate Affairs, National Australia Bank
- **Mr Antony Cohen**, Director, KPMG Corporate Finance
- **Professor Graham Durant**, Director, Questacon
- **Ms Patricia Kelly**, Deputy Secretary, Department of Innovation, Industry, Science and Research
- **Dr Jim Peacock AC**, CSIRO Fellow and Australia's Chief Scientist
- **Associate Professor Susan M Stocklmayer AM**, Director, Centre for the Public Awareness of Science, Australian National University.

To inform the Review process, Questacon sent 93 letters to relevant organisations inviting them to submit written inputs addressing the terms of reference. In addition, the Review Panel met with a further 19 individuals to seek their input. A total of 39 consultation inputs were received and taken into account in the preparation of this report and its recommendations.

1.2 Background and context

> It has been argued by the Australian scientific community that the hands and minds that should shape Australian science into the next century are not being attracted to careers in science.
>
> If that is so, it would be a tragedy for all of us.[1] (The Hon Bob Hawke, 1988)

Questacon, created from the words *Quest* (to search, to discover) and *Con* (to study, to examine) opened in 1980 at the former Ainslie Primary School in Canberra. It was the brainchild of The Australian National University (ANU) physics lecturer, Professor Mike Gore who had examined science centre developments overseas before driving efforts for Australia to establish its own interactive science centre.

In 1984, the Australian Government began negotiations for the establishment of a national science centre as a bicentennial project. The government and business community of Japan donated half the construction cost (one billion Yen) as a bicentennial gift to Australia.[2]

At the opening of the National Science and Technology Centre on 23 November 1988, former Prime Minister, the Hon Bob Hawke MP (quoted above), explained the context for its establishment. He said that scientific research was one of the fundamentals needed to restructure Australia's economy to allow for future sustainable prosperity. A shortage of scientists would pose a threat to that vision. He

[1] The Hon RL Hawke MP, *Speech at the Opening of the National Science and Technology Centre*, Canberra, 23 November 1988.
[2] See http://www.dest.gov.au/sectors/science_innovation/Questacon/History.htm

called for a concerted national effort to encourage further development of science and technology in Australia.

The Prime Minister referred to Australia's election earlier that month to the vice-chairmanship of the Intergovernmental Panel on Climate Change. This highlights that 20 years ago the Government viewed the National Science and Technology Centre within the context of responses to major national and global challenges, including challenges like climate change that are even more relevant today.

The Government's desire to see Australian industry play a greater role in supporting research spending and researchers was also a theme in the Prime Minister's speech, and he emphasised the importance of industry sponsorship support for the Centre.

The decision to place the Centre among premier institutions in the Parliamentary triangle was, Mr Hawke said, a reflection of the high priority the Government attached to it. So was the Cabinet decision to establish the Centre as a statutory corporation (although this did not eventuate, a matter addressed in section 2.3 of this report on Governance).

Since its establishment, the National Science and Technology Centre in Canberra, henceforth referred to as Questacon, has attracted 7 million visitors, and 15 million more have experienced its touring exhibits and outreach programs. Questacon has also supported the development of science centres and science communication and awareness programs at the state/territory and local level.

2 Key issues

Questacon is at a crossroads. This year it celebrates 20 years as Australia's National Science and Technology Centre. The Centre has far exceeded expectations in attracting visitors and has established an international reputation as a leader in the interactive science communication field. This success has brought its own challenges, with visitor numbers stretching the building's capacity to its limits, and projected to grow further.

Questacon in the 21st century operates within a more complex environment that has implications for its future direction. Australia faces a range of national challenges that will call on the ingenuity and creativity of its population for solutions, including climate change, energy and water security, and skills shortages. More than ever, science will play an important role in developing innovative responses to these and other challenges.

The Review Panel has considered this context in arriving at proposals for Questacon's future. The Panel is also aware of the concurrent Review of the National Innovation System and realises that it may have implications for the Questacon Review. Given the different reporting timeframes for the two reviews, it has not been possible to take into account the findings of that broader review in arriving at the proposals in this report.

Below is a summary of the key issues facing Questacon, followed by specific recommendations.

2.1 Core role and functions of Questacon

While it has operated for two decades, Questacon has done so without an explicit Government mandate in the sense that it has not had any statutory basis and its mission and key activities have largely been internally generated. While its overall activities have been in line with the general mission of raising awareness and appreciation of science, this lack of an explicit mandate has led to a lack of clarity about the relevance and priority of some activities, for example, outreach and teacher support. Questacon has also experienced significant disruption and uncertainty, with responsibility for the centre transferring between three different Government portfolios in the past five years.

Questacon's specific goals have changed over time to respond to national and portfolio priorities, but there have been some common themes. It has focused on school-age children and their parents and teachers as its key audience and has sought:

- to provide quality interactive programs to increase science awareness and understanding in Australia
- to place this understanding of science in an Australian context and relate it to shaping Australia's future
- to build partnerships to ensure the broadest access to its programs across Australia
- to build a well-managed and efficient organisation to support the achievement of these goals.

In pursuit of these goals, Questacon has developed a suite of functions and activities, including production of high quality exhibits explaining the fundamentals of science, programs relating science to the Australian context and challenges, partnerships to enhance access to its programs, and capacity-building within Questacon to support program delivery.

Questacon's current mission 'A better future for all Australians through engagement with science and innovation' is similar to that of other science centres around the world:

> **Science Centre Singapore**
>
> To promote interest, learning and creativity in science and technology, through imaginative and enjoyable experience and contribute to the nation's development of its human resource.
>
> **Japan's National Museum of Emerging Science and Innovation—Miraikan**
>
> To 'share the state-of-the-art knowledge and innovation with all who have natural curiosity and interest in science in order to achieve a society where everyone looks to the future guided by wisdom and understanding'.

These examples indicate that governments view science centres as playing an important role in developing their most critical resource—their people. This is especially so in an Australian and global context where innovation is seen as central to future prosperity. As declared by Australia's Minister for Innovation, Industry, Science and Research:

> The new agenda for prosperity in Australia is the innovation agenda.[3]

In its consultations with a broad range of stakeholders, the Review Panel found overwhelming support for Questacon's activities and affirmation of the continuing value and relevance of Questacon's role in the future. In particular, there was consensus on the importance of sustaining Questacon's outreach role:

> Questacon's programs should be viewed as crucial to Australia's science and innovation future, especially as the outreach programs target regional, rural and remote areas of Australia, in which communities may not typically have access to

[3] Senator the Hon Kim Carr, Minister for Innovation, Industry, Science and Research, *New Agenda for Prosperity*, The Australian/Melbourne Institute 2008 Economic and Social Outlook Conference, 28 March 2008

> the hands-on and experimental approach to science as presented by these programs. (Australian Academy of Science)

Given the rapid growth in Australia in the use of digital media, there was agreement on the scope for Questacon to introduce greater use of online and digital media to enhance, but not replace, face-to-face outreach. This could lead, for example, to interactive sessions with schools online to supplement visits to Questacon in Canberra or outreach visits. There may be opportunities to leverage the Government's rollout of the digital broadband initiative.

Significant stakeholder support also emerged for Questacon to expand its role in showcasing Australian science achievements and important science-based issues impacting on Australia. For example, the Federation of Australian Scientific and Technological Societies called for:

> … consideration of a showcase museum of contemporary science, research and innovation to be developed in the Questacon precinct and physically linked with Questacon, that presents cutting edge Australian science and research for older students, young adults and broader domestic and international communities.

The consultations highlighted Questacon's strong international reputation and the importance of sustaining that profile, especially in the context of growth in the number of science centres in the Asian region and increasing collaboration between those centres. In particular there is a continuing role for collaboration with Japan, especially in this 20th anniversary year of the joint establishment of Questacon by Australia and Japan. International engagement helps ensure that Questacon stays abreast of international best practice in science centre management and activities, and that it has a voice on the international stage on relevant issues.

At present, Questacon's activities across this wide-ranging agenda are supported by a modest budget of $20.8 million in 2008–09, including a government appropriation of $11.125 million and the remainder from external sources (60:40 ratio). This Review examines the extent to which Questacon can continue to sustain its current activities in these areas and looks at options for expanding its role and functions to address the needs highlighted in the consultations.

To provide a solid foundation for these activities, however, it is important that Government endorse a mandate for Questacon to guide it in the coming decades.

Recommendation 1

That the Government endorse the following mandate for Questacon, Australia's National Science and Technology Centre:

- Mission: To inspire future scientists and the wider community and enhance awareness and understanding of the contribution of science to Australia's future.

Recommendation 2

To maximise its reach and impact in the community, that Questacon focus on the following key strategies:

- effective operation of the Questacon facility in Canberra and national outreach activities
- development of effective partnerships with organisations having complementary skills and facilities
- contributions to enhance school science education and national curriculum outcomes
- implementation of best practice in interactive science communication, including online and digital technologies
- international engagement which facilitates Questacon's national role.

Recommendation 3

To fulfil the above mandate, that Questacon provide the community with opportunities for:

- practical learning about science and its role in our lives
- appreciating the value of leading edge science developments, especially those involving Australian scientists
- understanding local, national and global science issues and challenges.

2.2 National science communication activities

The Review Panel's consultations highlighted consensus on the need for enhanced national coordination amongst the many providers of science communication and awareness programs to ensure effective use of resources and optimise reach and impact.

The *Reaching all Australians* report in 2003[4] called for the establishment of a national framework and working group to improve coordination in this area. The 2003 PMSEIC Report recommended a national framework and local action model for science communication activities.[5] In 2005, the National Science Partnership was formed to develop cooperative projects, with representation from Questacon, CSIRO Education, CSIRO Science Education Centres, Western Australia's Scitech, and other state/regional science centres. A more recent report by the Coordinating Committee

[4] National Reference Group, *Reaching All Australians: A report on delivering science, mathematics, engineering and technology education and awareness programs to regional, rural and remote Australia*, September 2003
[5] PMSEIC Report, *Science Engagement and Education: Equipping young Australians to lead us to the future,* November 2003. See Recommendation 5.

on Science and Technology recommended greater coordination in science education and awareness between Australian Government agencies.[6]

Questacon, CSIRO and the ABC are the main national organisations engaged in general science awareness programs. Questacon and CSIRO are in the Innovation, Industry, Science and Research portfolio and the ABC also receives some support from that portfolio through the SCOPE science outreach program.

The Review Panel considers there are opportunities for these three organisations to enhance their collaboration. Questacon and CSIRO have recently held discussions on the benefits from closer cooperation in their science communication activities and have agreed to consider the scope for such cooperation more systematically. A significant national program of activities could be delivered leveraging the joint program development capability and delivery mechanisms of these two organisations, and taking advantage of their combined geographic reach.

There would be value in similar detailed discussions with the ABC to scale up the potential national impact of such cooperation.

Recommendation 4

That Questacon, CSIRO and the ABC cooperate in identifying new structures for improving national coordination, including cooperation with state and regional science centres, to ensure:

- more effective science communication, awareness and education
- efficient use of science awareness and education resources
- more equitable access to these activities and resources across Australia.

2.3 Governance options

A recurring theme since Questacon's establishment has been debate about the most appropriate governance for the organisation. The original intent was to establish Questacon, the National Science and Technology Centre, as a statutory authority. The former Prime Minister, the Hon RJL Hawke MP, referred to this intent in his speech at the opening of the Centre in 1988:

> Another proof of the importance we attach to this Centre is the decision taken by Cabinet this week… to establish the Centre as a statutory corporation. In this form, the Centre will receive the recognition it deserves as a significant national institution, and will also have the maximum autonomy to pursue corporate sponsorship and other commercial activities.

[6] Coordination Committee on Science and Technology, *Audit of Science Education and Awareness Initiatives Delivered by CCST Member Organisations in 2006/07 Financial Year*, Jan 2008, p.3.

The National Science and Technology Centre Bill 1991 was drafted to establish Questacon as a statutory authority, but there was a view within a central agency that Questacon's ability to attract sponsors as part of a department should at least be tested for a period. There was also an issue relating to Questacon's proposed sales tax exemption, an exemption enjoyed by national cultural institutions. Enabling legislation did not proceed.

Following Questacon Advisory Council agreement in November 1996 that Questacon pay sales tax, a Cabinet submission was lodged the same month to pave the way for legislation but a decision was postponed, and then was not pursued in 1997 due to the Government's opposition to establishing more statutory authorities. In late 1999 the then Prime Minister advised that he would not agree to Questacon becoming a statutory authority, on the basis that it could be created as an independent agency under existing Commonwealth legislation.

In 2000, efforts continued to establish Questacon as an executive agency under the Public Service Act 1999 and as a prescribed agency under the Financial Management and Accountability Act 1997 (FMA Act). Action ceased in 2002–03 when the review of corporate governance of statutory authorities (Uhrig review) was undertaken. The governance issue was not reconsidered after the release of the Uhrig review.

The governance issue needs to be addressed to maximise the prospects for Questacon to deliver successfully on its mission in the future. This is particularly urgent in view of the ageing of Questacon's building, continuing growth in visitor numbers and demand for its outreach activities in the context of a limited and uncertain budget (ie uncertain in the sense that Questacon is dependent on external revenue for over 40 per cent of its budget).

The Review Panel examined the following options for Questacon's governance:

- remaining part of a Government department
- becoming part of CSIRO
- becoming an executive agency
- becoming a statutory authority or agency.

A detailed analysis of the pros and cons of each option is in Appendix 2. The option of becoming an executive agency, while confirming the relative independence of Questacon, would result in increased management responsibilities and costs with little likelihood of improving Questacon's ability to achieve its mission. An executive agency would be declared as separate from the Department, for staffing and accountability and reporting purposes, under the Public Service Act. The agency would have to pay for any services it seeks from the Department. The most obvious drawback of this model is that it would not provide any more long-term security to Questacon than it currently has (Governments can create and abolish such agencies

at will and without legislation) while removing many of the support benefits that Questacon enjoys by being part of a Department. Therefore, the Review Panel has discounted it from further consideration.

The Panel also noted the long-term relationship between Questacon and The Australian National University, given that Questacon started in 1980 as an initiative of the ANU. The University has continued as a key partner, particularly in the Shell Questacon Science Circus outreach program through the close involvement of ANU Graduate Diploma in Science Communication graduate students, and as a knowledge partner in the Questacon Smart Moves outreach and other programs. Professor Ian Chubb, ANU Vice Chancellor, in providing input to this review, stated that he would welcome further and broader partnership activity with Questacon, particularly in the communication of Australian achievements in science and technology and how this benefits the nation.

However, the option of Questacon becoming part of The Australian National University was not considered. There was a view that such a move would not secure long-term funding for Questacon. For this reason, the Review has focused on options for Questacon's future within Government.

Table 1 assesses the benefits of the remaining three options against the following key criteria. The options that have the greatest benefits under the relevant criteria are given a big tick and shaded:

Table 1 Criteria for assessing different options for governance structure

Criteria/Structure	Part of Department	Part of CSIRO	Statutory authority
Clear mandate	√	√	√
Control of strategy/resources	x	x	√
Sustainability over time	x	√	√
Risk profile for retaining identity	√	√	√
Facilitate capacity to undertake entrepreneurial activity	√	√	√
Cost of establishment	√	√	x
Ongoing cost	√	√	X
National program potential	√	√	√
Knowledge Partnerships	√	√	√
Enabling partnerships/sponsorships	√	√	√
National and international status	√	√	√

Each of the governance options would have some financial implications for Questacon but the fundamental issue of the quantum of Questacon's appropriation funding is not resolved by any structural option. Also, under all the options, Questacon would still not be classed as a charity and this may remain a barrier for donors constrained by their own rules to donate only to charity. In addition:

- Remaining a part of a department ie status quo, would provide least long-term stability and control over strategy and resources, and would constrain Questacon's ability to attract external funding;

- Integration with CSIRO offers more advantages than remaining in a department in terms of offering better long-term stability and synergies in outreach activities, national projects and partnerships, and a stronger link between research, development and science awareness activities. Questacon would be well placed to draw support from the CSIRO client base. Integration could potentially offer opportunities to reduce some overhead and other costs. However, the combined activities would still face the challenge of securing adequate government and private funding and unless managed carefully, this option could pose a potential threat to Questacon's brand, identity, and ultimately to its capacity to deliver on its mission;

- Becoming a statutory authority or statutory agency would provide Questacon with greater flexibility, clarity and autonomy in pursuing its long-term mission, greater opportunities to undertake entrepreneurial activity in support of its objectives, and enhanced national/international status and potential to establish partnerships and also offers the greatest potential to increase funding from non Government sources. A disadvantage is the cost and longer time taken to complete a legislative process. The benefit of a statutory authority under the Commonwealth Authorities and Companies Act 1997, rather than a statutory agency under the Financial Management and Accountability Act 1997, would be enhanced protection of entrepreneurial freedom through the governance of a Board that has full power to act on commercial opportunities.

As noted above, under no option would Questacon be able to achieve charity status but the statutory authority option should allow Prescribed Private Funds with appropriate trust deeds to contribute to Questacon—something that will be more difficult to achieve under the other structures.

Questacon currently has Deductible Gift Recipient status, which means that donations of $2 or more are tax deductible. In addition, third parties that provide financial support in the form of promotion or sponsorship can claim a tax deduction for such financial support as a business expense.

It would be beneficial for Questacon if it could access funding from Prescribed Private Funds (trusts that attract tax-deductible donations). Under the amendment to Income Tax Assessment Act 97 in 2005, Prescribed Private Funds are now able to make

distributions (subject to their rules) to entities that are both Deductible Gift Recipients and tax exempt even if they are not charities.

However Questacon is not currently tax exempt. This could be addressed through an approach to the Australian Taxation Office, but the nature of that approach will depend on the future governance arrangements agreed for Questacon:

- If Questacon remains in DIISR, the Department (which is tax exempt), would need to gain DGR status for public museum activities.
- If Questacon becomes part of CSIRO, CSIRO could gain DGR status for public museum activities (currently it has DGR status for research activities and insect collection purposes). If DGR status for a public museum were to be obtained, CSIRO would have suitable DGR and tax exempt status and Questacon would be able to draw donations through the CSIRO entity.
- If Questacon becomes a statutory authority, it could be given tax exempt status and retain the DGR status (although still not a charity) and this would permit the receiving of donations.

Having taken into account all the relevant issues, the Review Panel makes the following recommendation in respect of Questacon's future governance:

Recommendation 5

That to support the achievement of its mission, the Government establish Questacon as a statutory authority as part of a broader strategy to achieve an expanded and better resourced Questacon.

Recommendation 6

That, should support and/or funding for Questacon to operate as a statutory authority be unlikely in the short to medium term, the Government consider integrating Questacon into CSIRO by integrating the science education and communications activities of the two organisations. Integration of the organisations should be subject to measures including appropriate legal safeguards which ensure:

- that the distinct identity of Questacon as the National Science and Technology Centre and its unique brand be preserved in any such integration
- that integration be subject to the development of a business plan demonstrating how Questacon's mission could be furthered through integration and setting out transition, operational and governance arrangements into the future.

2.4 Questacon's future development

2.4.1 The context

This section sets out the context for Questacon's future development, as well as specific options that will ensure its continuing relevance in coming decades.

Questacon's forward strategy is influenced by various external factors including national and global challenges, best practice in science centres worldwide and education and technological developments. It is also influenced by available budget and its ability to develop strategic partnerships with other organisations to address important local, national and global challenges.

National and global challenges

In common with many countries, Australia is facing a skills challenge and a need for more students to study science and engineering at an advanced level. Australia needs creative, innovative people who can think laterally and who can better understand and address complex national and global issues such as climate change, and energy and water security. There are also national challenges in early childhood education, Indigenous education, numeracy, and teacher support, all areas where Questacon is currently active. Indeed, all these issues are highlighted in the Council of Australian Governments (COAG) national agenda, as evidenced by the communiqué issued at its meeting in March 2008.[7]

Questacon is well positioned to contribute to addressing Australia's science and technology skills challenge and to highlight the role of science in addressing key national challenges. Its contribution could be significantly enhanced through provision of resources to allow expansion of its exhibits, its outreach activities and its online presence. Where possible this should continue to be pursued through relevant partnerships. For example, the National Water Commission has awarded funding to Questacon recently to develop a national, integrated water education and awareness program.[8]

Global trends in science centre development

Questacon is a long-standing and active player in the global science centre network. This global network facilitates shared learning and experience in national science communication activities across economic, cultural and political boundaries. The network comes together to examine innovations, trends and developments at an international conference every three years. The activities of the network and, in particular, the international conference held in June 2008, give some insight into the overseas experience and recent trends.

Science centres are evolving from hands-on exploratories for children to integrated science communication venues for visitors of all ages and backgrounds. Science

[7] Council of Australian Governments' Meeting, 26 March 2008, http://www.coag.gov.au/meetings/260308/index.htm
[8] National Water Commission, Project Information: *National water education partnership with Questacon*, http://www.nwc.gov.au/publications/project_info_questacon_touring_exhibition.cfm

centres are renewing their identity as not just places for hands-on interactive learning but as inclusive hubs where the community can actively engage with critical science and technology issues. This move from fun to fun-and-forum is seen in many of the world's top science centres. They are also embracing new digital media opportunities to extend their audience and reach. Science centres are developing opportunities for prolonged engagement with learning and building stronger links with formal education establishments to support the work of teachers.

More and more countries see science centres as integral to their national objectives and for this reason are increasing their investment to expand existing centres, and build new centres or networks of centres. For example Singapore is planning a new $400 million science centre and China is establishing a network of science centres at national, provincial and municipal levels. At the time of Questacon's establishment, Australia was at the forefront of science centre developments in the Asia-Pacific region. However the significant investments being made to develop science centres in other countries threaten to leave Australia behind.

Trends in digital communication

The internet has opened up many educational opportunities and resources can now be drawn from anywhere in the world at any time. The digital revolution is creating global learning communities and networks. As broadband connectivity strengthens, high quality and trusted content becomes increasingly important. Digital media open up new channels of connectivity and opportunities for science centre outreach. The national broadband initiative will open up significant opportunities for education in Australia and will require imaginative content and delivery of on-line experiences. Questacon has the capability to be at the forefront of delivering such content and the Review Panel believes that development of its digital and online services should be a very high priority. Effective online delivery of Questacon services, including new and imaginative ways of engaging its audience through the new media, is fundamental to Questacon's mission.

2.4.2 Questacon's proposed future development

This section outlines the key elements of Questacon's proposed development, the scale of which will depend on available funding. The Review Panel considers that the Australian Government can derive maximum return on its investment in Questacon by addressing issues relevant to its short and long-term development. This would enhance the prospects for Questacon to make a significant and enduring impact on the delivery of key national objectives.

Development of the Questacon facility

Questacon is a victim of its own success in that steadily increasing visitor numbers have led to a building that is increasingly overcrowded, raising issues of safety and quality. It is operating well beyond the original specification for the building of 200,000 visitors annually, currently hosting more than double that number, with further growth in visitor demand anticipated.

Questacon has been working progressively to enhance the visitor experience, creating more public space by moving staff and design and fabrication facilities out of the Parkes building and into leased premises. Few options remain to create more public space within the confines of the current building. The life of the building is being extended by current capital improvements funded by a capital grant from Government. The visitor flow, sense of arrival at a national institution and café facilities can be improved with a modest capital injection. This is, however, essentially a short-term solution which does not address the basic problem that visitor numbers have outgrown the current premises.

A more comprehensive strategy would involve an expansion of Questacon's facilities to cater for larger visitor numbers and provide a wider range of visitor experiences, including those aimed at increasing understanding of national and global challenges. The expansion would also increase Questacon's audience reach beyond the existing young children and family market to better cater for the community as a whole. It would provide flexible learning and gallery spaces. It would also provide opportunities for more prolonged engagement with science through workshops and other programs involving scientists, including from universities and science agencies.

A major study of expansion options for Questacon was carried out in 2006–07 with funding of $1 million from the Government. Further details of the proposed expansion, the underpinning business case and the costings are available in that report.

Development of Questacon outreach

Questacon's centre activities are complemented by its substantial outreach programs which are tailored to different audiences across the nation and focus on regional and remote areas of Australia[9]. These activities are supported significantly by non-government sources, making Questacon vulnerable to changes in sponsorship arrangements and an associated risk of losing critical core expertise. Providing greater funding certainty through additional appropriation would underpin core outreach programs and allow for some extension of activities. For example, currently Questacon's outreach activities allow each area to be visited only every 3 to 6 years. This leads to the criticism that Questacon does not have enough frequency and critical mass to make a real impact. Government funding of core outreach programs, in tandem with maintaining sponsorship levels would allow more frequent contacts with rural and remote communities, extended contact to improve outcomes, and further development of programs addressing national priorities such as early childhood education, Indigenous education and innovation training, including through Questacon's Invention Convention.

Development of digital science communication

The development and implementation of a more comprehensive digital media and on-line strategy would allow Questacon to reach a far greater range and number of people. It is the key way to address the criticism of limited impact under the existing

[9] Koster, E and L Lewis, *Association of Science-Technology Centers Governing Member Peer Consultation*, 2006.

resources and delivery model. Digital communication would support (but not replace) face-to-face outreach programs by reinforcing connections with students, teachers, schools and communities. Questacon has already undertaken some work in this area through development of its web-site and a number of on-line educational programs and has significant potential to expand this work. This would represent a very cost-effective means of extending Questacon's reach and effectiveness.

Development of national coordination and partnerships

Questacon helps to build capacity across national and international science communication networks. Through these networks, it benefits from the sharing of information and experience. In particular these networks can facilitate ideas development, best practice and benchmarking, development of staff and intellectual capacity and program development in areas such as early childhood education and national outreach coordination. Questacon could benefit from strengthening its existing partnerships with CSIRO, the ABC and the Australian National University, as well as with various research bodies, government agencies and state science centres. Its capacity to do this is limited by resource-constraints, however this is a false economy as better co-ordination would be likely to achieve more efficient and effective delivery of science communication activities. This would boost the national impact of science communication activities, including awareness-raising about national and global science challenges.

2.5 Development scenarios and associated funding requirements

To facilitate consideration of the options for Questacon's future development, this section sets out three scenarios with different funding implications. These funding implications are summarised in Figures 1 and 2 below.

Scenario 1 (with Government funding continuing at current levels, subject to ongoing efficiency dividends and increasing costs)

This scenario assumes no additional funding becomes available for Questacon. Questacon could continue to operate along current lines, but not in a way that would be sustainable in the long term due to the ageing building and burgeoning visitor numbers.

Evidence of the short-term nature of this option is clear from an examination of Questacon's current financial position. For the 2008–09 financial year, Questacon will receive a $11.125 million appropriation, a reduction of $37,000 compared with the previous year, taking into account an efficiency dividend of $370,000. Staffing costs will increase by 2.5% in September 2008 in line with the Questacon Collective Agreement. Depreciation costs have increased from $1.7 million in 2003–04 to $3.4 million in 2008–09 with no additional appropriation offset. This increase in depreciation costs has been due to exhibition and building values increasing significantly under fair value methodology. Increases in energy costs, including a 212% increase in 2007–08 due to an increased tariff, continue to have a significant

impact despite continued work to identify and realise efficiencies. Additional expenses related to machinery of government changes will continue to impact in 2008–09, largely in areas of increased legal, financial and human resource costs. During 2008–09, the impacts of these additional costs will include reduced administrative and staffing allocations, program reductions and the cessation of two national programs.

Key outreach activities could be sustained providing private sponsorship levels and/or revenue levels are maintained or increased, or through a reprioritisation of Questacon's overall funding priorities (eg cutting back on centre activities or exhibitions). Outreach activities would need to be prioritised, with the Panel's order of priority being:

1 Shell Questacon Science Circus (part externally funded to 2009)

2 Smart Moves (funding for Invention Convention ends in 2009; for whole program in 2011)

3 Tenix Questacon Maths Squad (funded to 2011)

4 Early Childhood (SciencePlay program finishes 2009)

5 Indigenous (ScienceLines—program has finished)

6 Sydney Science Squad (funded from revenue)

7 NRMA RoadZone (externally funded to 2010)

8 Q2U—outreach program within the ACT and surrounding region.

Questacon would continue to pursue opportunities for sponsorship and for partnership funding, as it has done recently in securing funding for a three-year period from the National Water Commission. Such external funding would be the key means for Questacon to play a significant role in showcasing Australian science and raising awareness of national and global challenges. The Panel emphasises, however, that such funding is uncertain and short term and the requirement to continue to seek it diverts both time and energy of Questacon staff, especially in a philanthropic corporate climate of increasing difficulty.

Another issue that has significance for Questacon's future development is the role of Questacon Exhibition Services, which designs, manufactures and installs its exhibits. Due to lack of space in the Questacon building in Parkes, this unit was relocated to leased premises in Fyshwick, and the associated accommodation costs continue to be a high cost item in the budget. Under this scenario and also the other two scenarios, the future role of Questacon's exhibition production model would need to be reassessed, including its funding, cost effectiveness, accommodation, future skills supply and its linkage to visitor experience quality. The additional building proposed in Scenario 3 below would provide an opportunity for Questacon Exhibition Services to be co-located once again with the remainder of the organisation in the Parkes precinct.

Scenario 2 (moderate funding increase to maximise use of existing building and underpin national outreach activity)

This scenario assumes a moderate appropriation funding increase of a total of $11.4 million for one-off capital costs in 2009–10 and 2010, and ongoing recurrent appropriation funding of $15.9 million from 2011–12 (following a ramping up of appropriation funding for core outreach activities by $1.5 million in 2009–10, $3 million in 2010–11 and $4.3 million in 2011–12 which would be maintained thereafter).

The additional capital funding would ensure that Questacon has a foyer and entry area with the functionality to better meet the needs of current visitor numbers while also meeting the required fire and safety standards. Such modifications are especially important in the context of the major road and infrastructure improvements being undertaken in the precinct by the National Capital Authority as part of the Humanities and Science Campus development. The Campus development will redirect visitors to what is currently Questacon's rear entrance. This change of entry focus requires an immediate response to ensure the safety of visitors moving across access roads to the building entrance and to manage entry congestion and visitor flow effectively.

This scenario would also provide funding security for Questacon's key outreach activities that benefit approximately 300,000 Australians each year. As these national outreach programs are dependent on relatively short-term sponsorships and earned revenue, they are currently being reassessed to operate within the budget constraints of sponsorship funding and increasing costs. A funding increase would decrease the need for opportunistically funded programs and greatly enhance Questacon's capability to plan national outreach activity strategically. The additional funding support would attract, and be supplemented by, ongoing sponsorship support that would significantly increase the total number of communities reached by Questacon's programs.

If sponsorship were to be maintained or increased, Questacon would have greater capacity to showcase Australian scientific achievements and raise awareness about national/global challenges such as climate change and water security.

Scenario 3 (significant funding increase to provide for Questacon's long-term sustainability in the context of continuing growth in visitor numbers)

This scenario assumes a significant funding increase of $75.1 million (including capital and operating costs for the four years of the expansion project) plus ongoing recurrent funding of $12 million per annum to cover operating costs of the expanded Questacon, increasing its appropriation to $27.9 million per annum). It would facilitate Questacon's long-term sustainability in the context of continuing growth in visitor numbers and enable it to fully realise a national role in:

- providing quality visitor experiences at its building in Canberra—through the refurbishment of the existing building and the construction of an adjacent building that would house a national Learning and Innovation Centre with increased exhibition, education and visitor spaces

- implementing a more comprehensive outreach program less vulnerable to changes in private sponsorship priorities
- showcasing Australian scientific achievements
- raising awareness of national and global challenges such as climate change, and energy and water security.

In all three scenarios, there would be a role for the development and implementation of an on-line and digital media strategy. However, under the first scenario, this may have to be funded by reducing face-to-face program activity. There would be greater capacity to develop and implement a comprehensive strategy under the second and third scenarios.

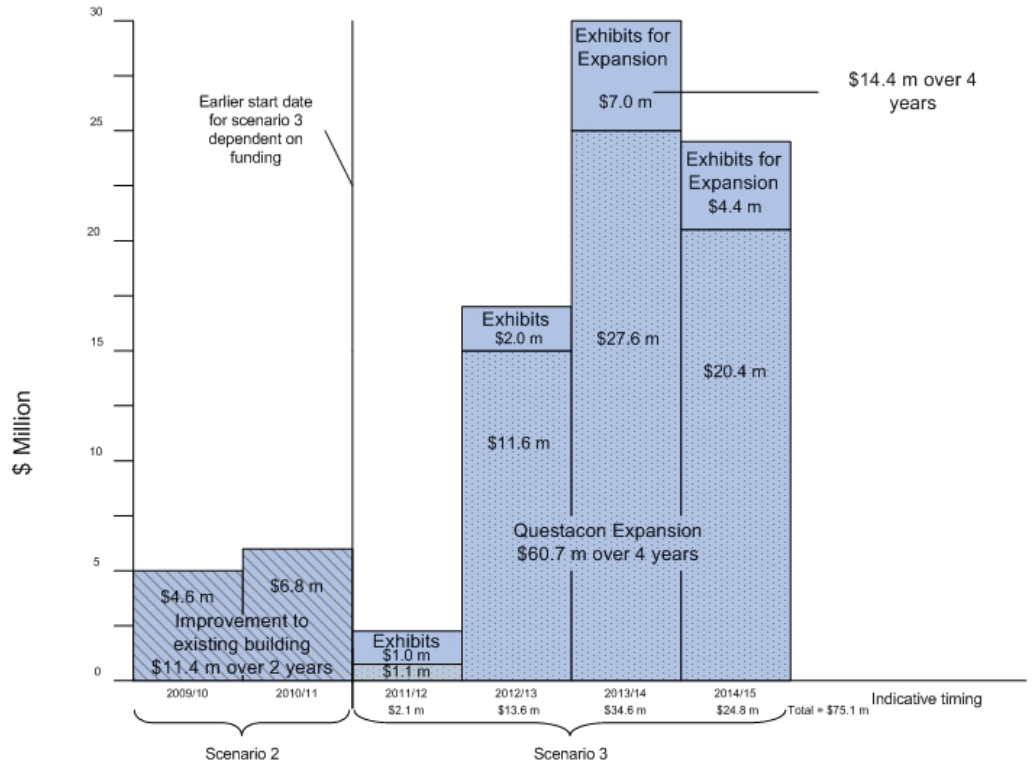
The third scenario would also create greater synergies between Questacon and other significant developments being proposed for its precinct. Proposals for that precinct to become a Humanities and Science Campus aim to create greater cohesion between the institutions of the Parliamentary zone. In addition to Questacon's proposed Centre for Learning and Innovation, the other new elements being proposed for the Campus are:

- ANU National Centre for Dialogue—a purpose-built venue for business, government, community groups and international representatives to use as a secure, neutral venue to address complex issues and challenges
- National Health and Medical Research Council (NHMRC) Life and Health House—a purpose-built facility to showcase Australia's achievements in health and medical research
- Questacon Garden of Wonder—a science garden with sculptural and interactive elements to promote a desire for discovery.

It should be noted that the Garden of Wonder is at a conceptual stage at present. It has not been scoped, planned or fully costed and has no allocated funding, although significant interest has been expressed by prominent Australians and private donors in supporting the idea and in contributing to this development should it go ahead in the future.

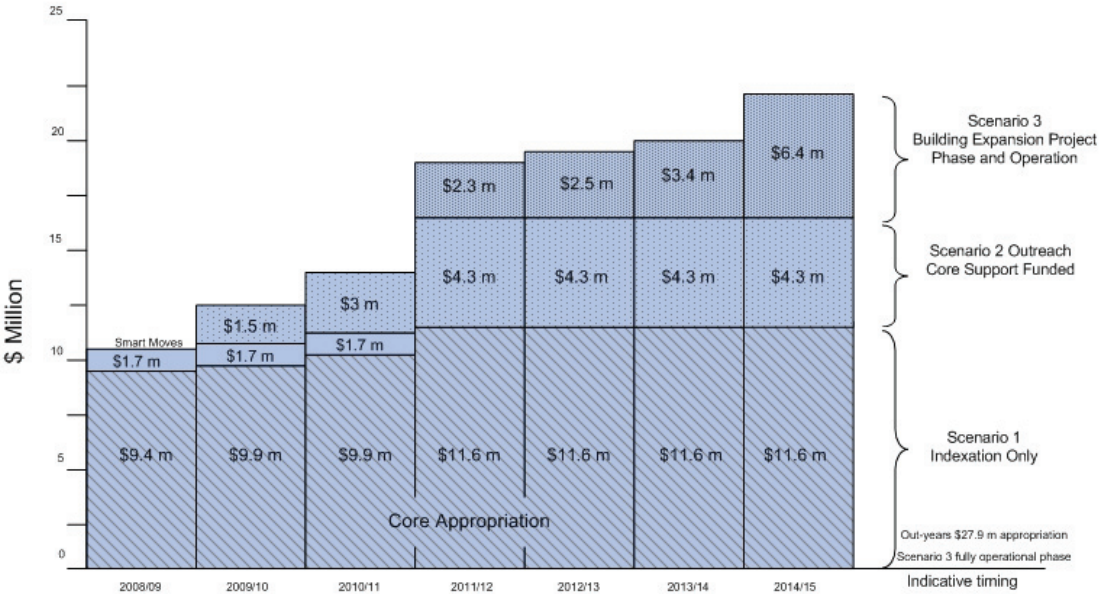
Besides creating a new vision for the area that would serve the national capital over coming decades, a more cohesive approach in planning this precinct would provide opportunities for collaboration and greater operational efficiencies through shared support services such as security, facilities maintenance and catering etc. The scenarios referred to above could, to some degree, be implemented successively and incrementally as indicated in the diagrams below.

Figure 1 Development of infrastructure—capital expenditure



Possible expenditure profile—dates variable due to available funding

Figure 2 Operating recurrent expenditure



Note: should Questacon become a Statutory Authority, additional set-up costs of $2.5m and ongoing costs of $2.5m per annum have been estimated.

Recommendation 7

That to facilitate the achievement of Questacon's mission and key strategies into the future, a significant increase in resources (in line with scenario 3 in the report) be provided to:

- refurbish the Questacon building and construct an additional building adjacent to it with increased exhibition, education and visitor spaces to accommodate continuing long-term growth in visitor numbers
- provide new programs to enhance its mission, in particular to showcase leading edge science and innovation, including Australian achievements, and to engage the community in local, national and global science issues and challenges
- implement a more comprehensive outreach program less vulnerable to changes in private sponsorship priorities.

Recommendation 8

That if Recommendation 7 is not to be implemented in the immediate term, then a moderate funding increase (along the lines of scenario 2 in the report) be provided as soon as possible to address pressure on Questacon's infrastructure and services and provide for:

- modification of the Questacon building to enhance visitor amenity and safety and to respond to planned public works in the Questacon precinct
- secure core funding for outreach programs
- significant development of online and digital services.

Recommendation 9

That an examination be undertaken of Questacon's exhibition production model, including its funding, cost-effectiveness, accommodation, future skills supply and its linkage to visitor experience quality.

2.6 Options for maximising external funding

Regardless of the development scenario decided on for Questacon, there would continue to be a motivation to seek supplementary funding from external sources and indeed a benefit in engaging funding partners from industry and the public sector.

A comparison of Questacon with similar science centres set up by governments abroad (see Appendix 4) indicates that overseas centres continue to rely mainly on Government funding, followed by earned income, and then income from private sources. In 2007–08, Questacon's annual operating revenue included the following proportions of earned income and funding from private sources:

- admissions—16%
- sale of goods—7%

- sponsorship—7%
- programs—5%
- exhibition hire—3%
- membership—2%
- other—3%.

The Review Panel considers that while it is important to identify strategies for enhancing external sources of revenue, there is also a need to avoid a situation where the search for external funding diverts attention from achieving Questacon's core objectives. Feedback from the Review Panel's consultations was that:

- Corporate sponsorship is increasingly difficult to access, but individual philanthropy is increasing.
- There is little scope to further increase admission fees at present, as it is acknowledged that admission prices are at the threshold of family affordability.
- There may be scope to attract more funding from other Government portfolios.
- There may be prospects of expanded partnerships to resource existing and new initiatives, for example with companies, universities, and other cultural institutions.
- A greater focus on digital technology could offer Questacon the opportunity to enhance its impact and presence and thereby attract more external funding support.
- Questacon could commercialise its expertise in exhibition design and construction, although this would direct valuable resources away from its core mission.

Philanthropy Australia statistics (see Table 2) indicate that the greatest proportion of Australian philanthropy is from individuals. While Australian philanthropy is dwarfed by that of the United States, Australia does reasonably well given its population size.

Table 2 International comparisons of philanthropy

Country	Foundation	Corporate	Individual	Total
Australia	$500 million	$3.2 billion	$7.7 billion	$11.4 billion
United Kingdom	£2 billion	£480 million	£7.3 billion	£9.78 billion
United States	$32.4 billion	$13.4 billion	$179 billion	$221.8 billion

Source: Philanthropy Australia, International Comparisons. 2005[10] (Philanthropy Australia notes that these figures come from different sources, most are estimations rather than hard facts, and the figures do not take into account the different population sizes and government budgets of their respective countries).

[10] http://www.philanthropy.org.au/research/factsheets/PA_intcomparisons.pdf

The rising level of individual philanthropy in Australia may present opportunities for Questacon to attract increased private funding, provided that any impediments to such private giving to Questacon can be removed. Section 2.3 on Governance options addressed the issue of securing the appropriate tax status for Questacon to enable it to attract funds from Prescribed Private Funds, the mechanisms through which a significant level of individual philanthropy is channelled.

There exists further potential to increase revenue from Questacon's retail activities. The Questacon Retail Shop has achieved a $1.5 m turnover and $114,000 net profit for the 2007/08 financial year. The potential to expand sales through online shopping and off-site sales is being explored for future development subject to availability of resources. Collaboration with the ABC is also being discussed with a view to development of merchandise and sales partnership arrangements.

There is also scope, as suggested during the consultations, to further increase funding from other areas in Government. For example, the submission from the Department of Education, Employment and Workplace Relations indicated:

> There is a good level of liaison and cooperation between Questacon and other Commonwealth bodies, including CSIRO Education and DEEWR, but there may also be scope for further collaboration and integration of school science education and teacher professional development activities, potentially including ICT training for teachers, at a national level.

Recommendation 10

That opportunities for funding from other Commonwealth portfolios be fully explored, recognising Questacon's potential to provide students, teachers and the community with an understanding of the nature and dimensions of national challenges and of the capacity of science to address them.

Recommendation 11

That Questacon continue to seek sponsorships and donations from the private and philanthropic sectors while also pursuing partnerships with business and other non-government sources to enhance and extend the reach of core activities supported by Government, thereby engaging the wider community in Questacon's mission.

3 Key Questacon activities

The terms of reference require the Review Panel to examine the role, functions, priorities and resourcing of Questacon and make recommendations aimed at ensuring that its core activities have a sustainable funding basis. This section summarises Questacon's key activities, and examines their priorities and resourcing.

3.1 Overview of key activities

Questacon attracts several million people annually through visits to its centre in Canberra, travelling exhibitions at urban or regional venues across Australia or overseas, through outreach programs to regional, rural and remote Australia or via its interactive website.

Its centre in Canberra, which attracted 403,002 visitors in 2006–07, features seven themed exhibition galleries with over 200 hands-on, interactive exhibits, and daily science shows that interpret and explore the science behind the exhibits.

The travelling exhibitions extend Questacon's reach across Australia and internationally, with 1,179,495 visitors seeing its nine touring exhibitions in 18 venues in Australian metropolitan and regional venues and in South Korea and Thailand in 2006–07.

Questacon's outreach activities aim to make science and technology accessible to Australian communities in Australian regional, rural and remote areas and in 2006–07 attracted 344,314 visitors. Establishing effective partnerships with science-based organisations and the business community to deliver these activities has been a key feature of the outreach programs. The section on outreach below will examine these activities in more detail.

Questacon was one of the world's first science centres to create virtual on-line activities, and has developed web-based education materials that complement visits to its exhibitions and programs. In 2006–07 its website[11] hosted 2,094,649 visitor sessions, an increase of 5.4% on the previous year.[12]

International engagement has been a key activity to help Questacon benchmark itself against world best practice and contribute to cooperation between science centres.

Questacon Exhibition Services is an area within Questacon with responsibility for conceiving, designing, building, installing and maintaining its educational, interactive

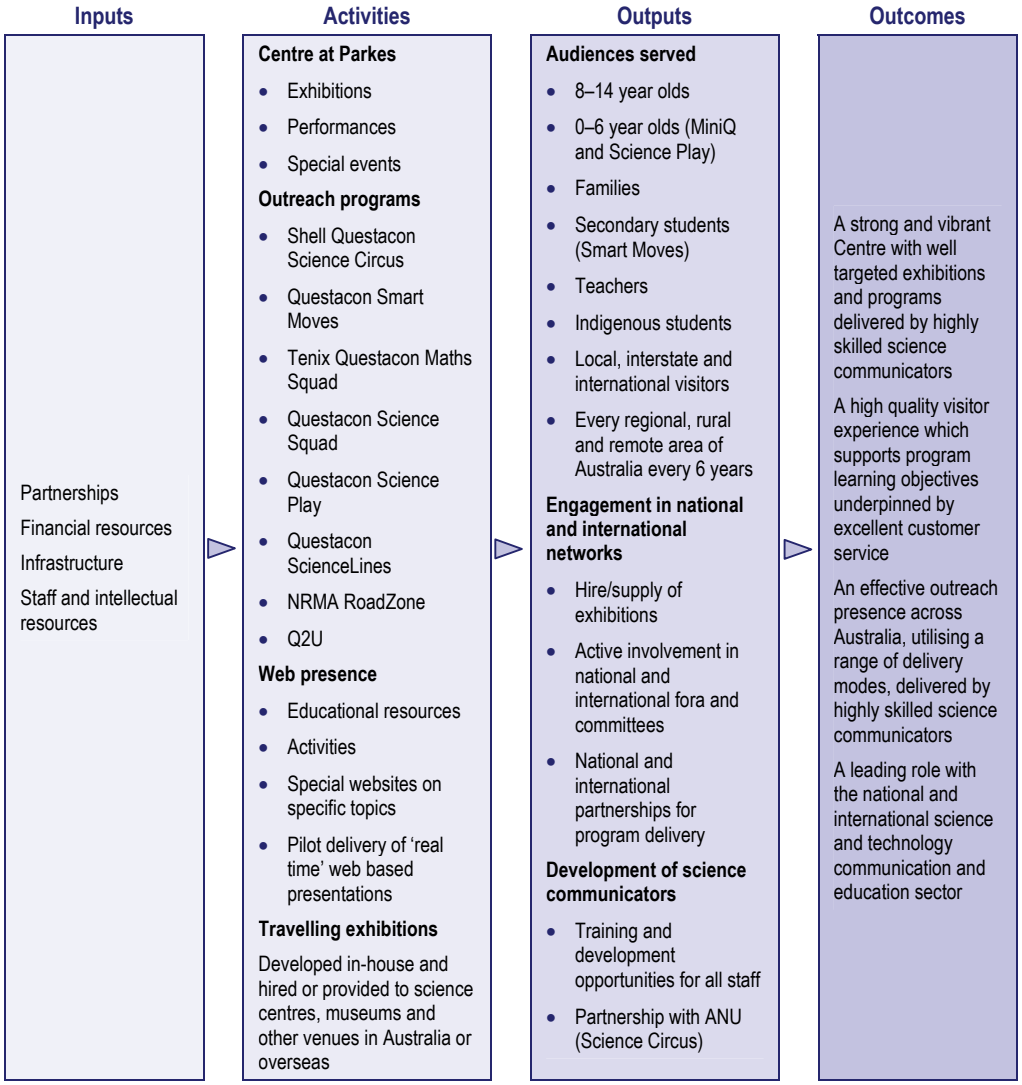
[11] Questacon's website awards include: multiple recipient of USA Today Hotsite award; finalist in Best Online Exhibition at the Museums and the Web conference in 2004, Questacon Virtual Tour won Macromedia's Site of the Day in May 2002, and Questacon's website won Kids and Games category, Nettie Awards at the Netfest Conference 2001.
[12] Questacon's annual report: *2006–2007: Looking to the Future*.

and durable exhibitions and for a limited number of other Australian and overseas clients.

Questacon also operates the Q shop, which largely sells educational resources, runs holiday programs, and Q by Night to provide access to its programs after hours, hosts birthday parties and manages venue hire as well as Questacon's membership program.

Figure 3 summarises Questacon's activities, their target audiences and the key Questacon roles and goals they are intended to address.

Figure 3 Summary of Questacon activities, target audiences, outputs and outcomes



3.2 Priorities and resourcing

Questacon allocates the highest level of staffing resources to supporting the quality of the visitor experience (see table on average staffing level in Appendix 6). Outreach activities use relatively few resources from core appropriation. The level of outreach activity is directly related to the level of income through sponsorship, special project funding and earned revenue. This is highly variable. Questacon's staffing figures for outreach do not include the 19 staff running the Science Circus because they are engaged as salaried lecturers and students on scholarship through The Australian National University (ANU). The ANU is reimbursed for most of the salaries and scholarship cost from the Science Circus budget, which is funded through a combination of earned revenue, Shell sponsorship and Questacon appropriation.

Employee expenses are by far Questacon's highest expense, followed by depreciation and then facilities (see expenses table in Appendix 6). No other expense items come close to those top three. On the revenue side (see revenue table at Appendix 6), besides Government appropriations, the top three revenue sources are, in order, centre admissions (15.9%), sales of goods and services (7.2%), and sponsorship (6.9%).

Analysis of the implications of these statistics for Questacon's efficiency is provided in the section of the report dealing with Performance.

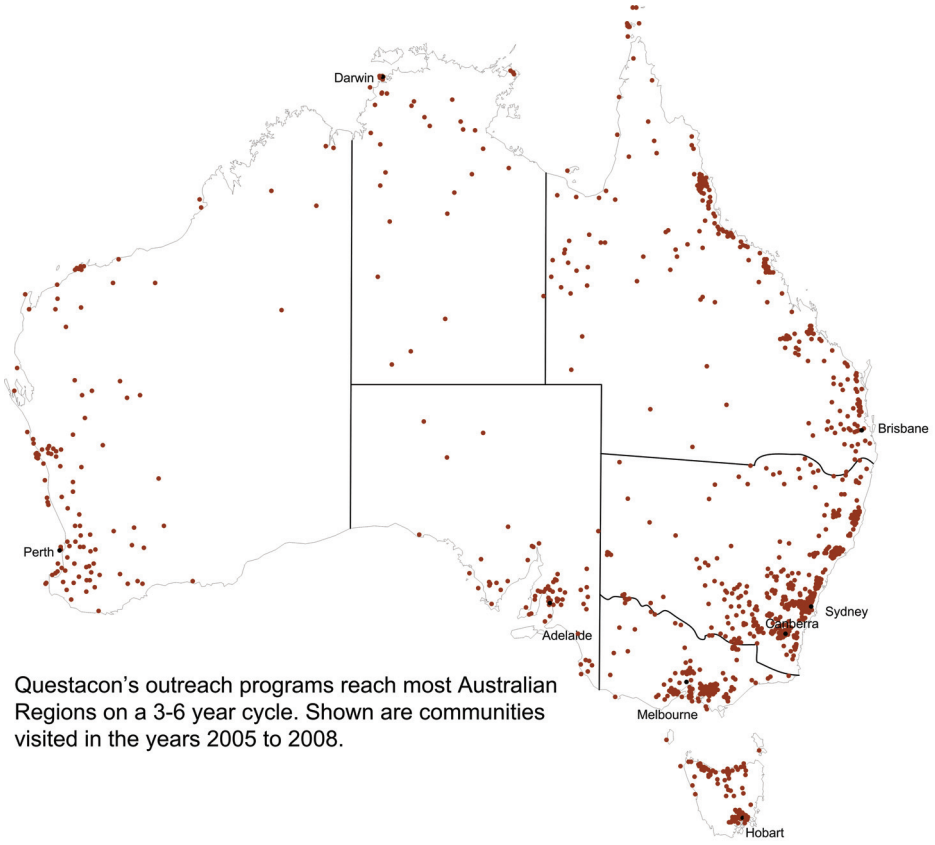
4 Outreach

The terms of reference require the Review Panel to examine ways in which Questacon's outreach programs can be secured financially and to consider options for their future operation and funding. To inform the consideration of those options, this section provides an overview of Questacon's outreach programs, of other science communication activities being undertaken within the Innovation, Industry, Science and Research portfolio, and more broadly across Australia.

4.1 Overview of Questacon outreach programs

Questacon undertakes outreach activities across the breadth of Australia, as indicated in Figure 4.

Figure 4 Geographical reach of Questacon outreach activities



Questacon's outreach programs reach most Australian Regions on a 3-6 year cycle. Shown are communities visited in the years 2005 to 2008.

Questacon has been operating eight outreach programs particularly aimed at extending its reach to Australian communities in regional, rural and remote areas (although they also operate in some capital cities). A brief description of each program is provided in Table 3, together with its rationale, target audience and current funding situation.

Table 3 Questacon outreach activities

Program description	Rationale	Target audience	Funding situation and source
1. Shell Questacon Science Circus—portable science centre and Graduate Diploma in Science Communication with ANU.	Increase Questacon's accessibility in regional/rural/remote areas. Train Science Communication graduates.	Primary and junior secondary students and their families. National, regional, rural and remote. No. visitors 06–07: 108,464	$1.3 million p.a. from Questacon, ANU, Shell, earned revenue. External funding until Dec. 2009.
2. Questacon Smart Moves (including Invention Convention)—demonstrate the latest in science, engineering and technology innovation and entrepreneurship.	Inspire young Australians to pursue careers in maths, science, engineering and technology. Encourage young entrepreneurs in science and technology.	National, regional and rural secondary students. No. visitors 06–07: 70,971	$1.8 million p.a. from Australian Government (BAA) Funding for program lapses in 2011.
3. Tenix Questacon Maths Squad—interactive school shows and workshops highlighting important role of maths in everyday life.	Encourage positive attitude to maths. Support maths teachers in context of declining numbers of trained maths teachers in schools.	National, regional and rural. Strong focus on areas of low socioeconomic status, and indigenous communities. No. visitors 06–07: 37,191	$420,000 p.a. from Tenix Funded to June 2008. Letter of offer received to extend program to June 2011.
4. Questacon Science Play—workshops, publications and on-line support to foster early childhood science learning and development.	Research indicates most cognitive development occurs early in life. Support for parents, carers and teachers in the development of appropriate educational activities and strategies.	Children 0–6 years and their teachers, parents and carers. National, regional and rural. No. visitors 06–07: 1,728, 07–08: 6,500	$450,000 p.a. from Australian Government Funded until June 2009. This project is integrated with Science Squad and NRMA RoadZone through shared overhead costs.
5. Questacon ScienceLines—presentations, workshops and websites designed in consultation with Indigenous communities.	Improving education outcomes for Indigenous Australians is a national priority.	Remote community Indigenous students and their teachers. No. visitors 06–07: 6,141	Funding has lapsed. Was previously funded through DEST appropriation of approx. $450,000 pa.
6. Questacon Science Squad—high quality, educational and entertaining science shows in schools and public venues.	Encourage students to consider careers and courses in science and technology related disciplines. Develop positive attitudes to science and technology.	Sydney students, teachers and general public. No. visitors 06–07: 32,378	$230,000 p.a. from Questacon and earned revenue. This project is integrated and interdependent with NRMA RoadZone and Science Play projects through shared overhead costs.
7. NRMA RoadZone—road safety exhibits and programs in local libraries and school shows.	Raise awareness of the role of science and technology in road safety.	9–14 year olds in NSW Programs are primarily in Sydney. Exhibits are for hire nationally. No. visitors 06–07: 69,267	$380,000 p.a. from NRMA. Funded until 2010. This project is integrated with Science Squad and Science Play through shared infrastructure and staff.
8. Q2U—outreach program in ACT and region.	To increase accessibility of Questacon to ACT Region schools.	Primary and secondary students, the general public, corporate groups, ACT region.	$45,000 from earned revenue and Questacon appropriation.

4.2 Other outreach activities across Australia

Besides Questacon, CSIRO and the ABC are major national providers of science communication and awareness activities. All three agencies receive significant funding for these activities from within the Innovation, Industry, Science and Research portfolio. As indicated in Appendix 5, they also share similar target audiences in some of their programs. There is already cooperation between Questacon and CSIRO (and discussions with the ABC about cooperation), and potential scope to increase this further to expand the reach, quality, and effectiveness of their offerings, and to achieve greater efficiencies.

In addition to these three agencies, many other Commonwealth agencies are active in science communication and awareness programs. An audit by the Commonwealth's Coordination Committee on Science and Technology (CCST) identified 146 science education and awareness initiatives delivered by 44 CCST member organisations during financial year 2006–07 and these initiatives contained no less than 533 discrete components.[13]

The number of such initiatives would be far higher if all programs funded at a state/territory or local level, or by the private sector, were to be taken into account. For example, there are science centres in several States including Scienceworks and Bendigo Discovery Centre in Victoria, Scitech in Western Australia, The Imaginarium Science Centre in Tasmania, and The Wollongong Science Centre in NSW.

Past examinations of science education and awareness activities in Australia have identified potential for enhanced reach and effectiveness through coordination of these activities.

Questacon and Scitech signed a Memorandum of Understanding in 2007 to provide a framework for cooperation, including in outreach program delivery within Western Australia. The current Square Kilometre Array astronomy public awareness project is an example of cooperation between these two centres.

The CCST audit recommended that an annual audit be undertaken of science education and awareness activities of CCST members; that key performance indicators be developed and implemented to evaluate these activities; and that communication and information sharing between relevant CCST organisations be expanded.[14]

An earlier report in 2003 on delivering science, maths, engineering and technology education and awareness to Australians in regional, rural and remote areas found that the available outreach programs, the frequency of their visits and the range of

[13] Coordination Committee on Science and Technology, *Audit of Science Education and Awareness Initiatives Delivered by CCST Member Organisations in 2006/07 Financial Year*, Jan 2008, p.3.
[14] Ibid.

experiences they provided were insufficient to meet the needs of people in these areas.[15] It recommended that:

- a national framework of action be developed to bring together national, state and local resources to enhance impact and efficiency
- this national framework lead to development of a 'national strategy/local delivery' implementation plan
- A National Working Group, with broad based representation across Australia, be established and resourced to develop the national framework of action.[16]

A PMSEIC Report[17] in 2003 recommended support for schools and their communities by nationally coordinating the outreach programs of science providers with sufficient resources to reach all Australian school students.

The National Science Partnership, with a Chair from Scitech and an Executive Officer from Questacon and comprising representatives from CSIRO Education, CSIRO Science Education Centres and state/regional science centres, was formed in 2005 to develop cooperative projects. For example, a forum on early childhood learning in science was hosted by Questacon in 2006, and a proposal was developed to support parents in fostering children's learning in science. A reinvigorated National Science Partnership may provide a forum for further building co-ordinated capabilities.

In summary, while many organisations are playing a role in delivering science communication and awareness activities in Australia, it appears that there is limited co-ordination and that demand far outstrips supply. More structured collaboration between providers of these activities should help increase the effectiveness, equity and efficiency of their provision.

Both Options 2 and 3 of the funding scenarios described provide a basis to secure funding for Questacon's outreach programs. Option 1, operating under current funding, will require prioritisation of these programs and is likely to lead to a reduced level of outreach activity being possible.

[15] National Reference Group, *Reaching All Australians: A report on delivering science, mathematics, engineering and technology education and awareness programs to regional, rural and remote Australia*. September 2003, page ix.
[16] Ibid, page xi.
[17] PMSEIC, *Report Science Engagement and Education: Equipping young Australians to lead us to the future,* November 2003

5 Performance

Questacon has been reviewed at regular intervals over the past 20 years. The reviews have affirmed its status as an international leader in the communication of science and technology through interactive exhibits and programs. These reviews have included:

- Association of Science-Technology Centres Governing Member Peer Consultation, October 2006
- Review of Questacon—The National Science and Technology Centre for the Department of Education, Science and Training, October 2003
- Visitor Research Study, Centre for Tourism Research, University of Canberra (Cambourne and Rogers), 2002
- Review for Full Membership of the Association of Science and Technology Centers (ASTC) (Marchbank and Johnson), 1999
- Review of the National Science and Technology Centre (Peter Karmel), for the Department of Communication, Information Technology and the Arts, 1996
- Review by the Department of the Arts, Sport, the Environment and Territories, December 1991.

The last formal Government-sponsored evaluation was undertaken in 2003 after Questacon was transferred to the Education, Science and Training portfolio.[18] It made 14 recommendations relating to: the delivery of Government outcomes for Australia through learning, science and innovation; the development of partnerships; and the level of Questacon's financial, human and infrastructure resources. The recommendations relating to the delivery of Government outcomes have generally been implemented except where significant additional resources were required. Ongoing progress has been made in the development of partnerships. In relation to the recommendations about Questacon's resources, there was some progress when Questacon was in the education portfolio in gaining efficiencies through greater integration of central services with the former Department of Education, Science and Training. Questacon has also been successful in obtaining short-term funding for priority projects. However, the issue of Questacon's long-term sustainability remains unresolved.

In addition to reviews of Questacon as a whole, there have been several reviews of its individual programs that have broadly confirmed the achievement of their goals.

[18] *Review of Questacon—The National Science and Technology Centre for the Department of Education, Science and Training*, October 2003

With the change of Government and transfer of Questacon to the Innovation, Industry, Science and Research portfolio, it is timely to consider again the evidence of the organisation's performance and relevance in this new context.

This section will examine Questacon's performance in terms of its appropriateness, effectiveness and efficiency.

5.1 Appropriateness

In assessing Questacon's appropriateness, it is necessary to consider how its role relates to the current Government's goals and priorities and to major national challenges.

Questacon's focus on enhancing awareness and understanding of science and its contribution to Australia's future would seem appropriate in the context of several national priorities articulated by Government.

Questacon's work is highly relevant to the Government's productivity and education 'revolutions'. Australia's strength in research and development is dependent on its capacity to supply the skilled graduates and researchers that underpin knowledge industries. Questacon provides unique support for a pipeline of future scientists and technologists through targeted interventions that engage and motivate young Australians, families and teachers in the areas of science, engineering, mathematics and technology. This contributes to the development of a positive climate of understanding of the importance of science and innovation to Australia's future, and to attracting young Australians to continue their studies in science, mathematics and technology and to pursue future careers in science.

By creating enthusiasm for science, Questacon supports government initiatives in science and maths education,[19] including the Australian School Innovation in Science, Technology and Mathematics (ASISTM) Project that aims to promote innovative approaches and improve the teaching and learning of science, technology and mathematics in Australian schools. By further developing its digital and on-line delivery strategy, Questacon can leverage the Government's proposed high-speed broadband roll-out and the provision of computers to secondary students to expand the reach and impact of its programs.

Amongst the issues currently at the forefront of Council of Australian Government (COAG) consideration are education, skills and early childhood development, water and climate change, and addressing indigenous disadvantage.[20] Questacon has undertaken activities in each of these priority areas.

[19] The Hon Kevin Rudd, MP, Prime Minister, *Towards a Productivity Revolution, A new Agenda of Micro-Economic Reform for Australia*, Address to the Australian/Melbourne Institute, New Agenda for Prosperity Conference, Melbourne University, 27 March 2008.
[20] Council of Australian Governments' Meeting, 26 March 2008, http://www.coag.gov.au/meetings/260308/index.htm

5.2 Effectiveness

Several past reviews of Questacon have affirmed its status as an international leader in the communication of science and technology through interactive exhibits and programs.

To gain a more up-to-date indication of effectiveness, it is appropriate to assess Questacon's achievements against its current key business goals which are to create interactive and inspirational experiences to increase science awareness and engagement in Australians, and to build partnerships to develop a national role in science communication and education.

Table 4 summarises Questacon's performance against the priority deliverables that it has identified for achieving these goals.

Table 4 Questacon performance

Deliverables	Performance
A strong and vibrant Centre with well targeted exhibitions and programs delivered by highly skilled science communicators.	• 403,002 visitors to the Centre in 2006–07, including 112,973 school children.[21] • 92.1% of visitors surveyed rated satisfied or very satisfied with exhibitions and programs. • 168,000 people attended a science theatre show in 2006–07. • Questacon Volunteers' Program has 71 active volunteers.
A high quality visitor experience which supports program learning objectives underpinned by excellent customer service.	• Winner of the 2005 and 2007 National Tourism Award in the Tourist Attraction category. • Winner of the 2007 Canberra and Capital Region Tourism Awards in the Tourist Attraction category. • 14,116 individuals are Questacon members. • See visitor satisfaction survey above
An effective outreach presence across Australia, utilising a range of delivery modes, delivered by highly skilled science communicators.	• 344,314 visitors to outreach programs. • In 2006–07, every state and territory was visited by at least one outreach program. • 21% of all Australian schools and 33% of schools outside capital cities experienced Questacon outreach during 2006–07. • Exit satisfaction surveys in 2006–07 indicated that Questacon outreach programs consistently received satisfaction ratings higher than 90%.
Maintain a leading role with the national and international science and technology education sector.	• 1,179,495 people visited a travelling exhibition. In 2006–07 nine exhibitions were located in 18 venues across Australia and international tours included venues in South Korea and Thailand. • Questacon received two 2006 International Council of Museums Australia Awards for International Relations in recognition of outstanding cooperative initiatives with science centres in the Asia-Pacific region. • Facilitation of the National Partnership of Science Centres, Museums and Science Education Centres. • Active engagement with the Asia Pacific Network of Science and Technology Centres, Association of Science -Technology Centres and the European Network of Science Centres and Museums.

[21] Questacon's annual report: *2006–2007: Looking to the Future*, p.14

5.3 Efficiency

An assessment of Questacon's efficiency requires consideration of the extent to which Questacon has used available financial, human, physical and information resources to maximise outputs for any given set of inputs.

One indicator of efficiency would be to compare Questacon's cost per visitor, based on operational expenses, with costs per visitor in similar institutions in Australia and overseas.

In 2006–07, Questacon's cost per visitor was $10.66, compared with $40.85 at the Australian War Memorial and $41.81 at the National Museum of Australia. It is important to note that the Australian War Memorial and National Museum of Australia, as collecting institutions, expend income on their conservation and collection management roles as well as their visitor display and presentation roles. While Questacon does not incur conservation and collection management costs as part of its role, it does reach more visitors beyond Canberra, incurring significant expenses associated with its national outreach role.

Table 5 compares Questacon's cost per visitor (AUD10.66 or USD9.26 as of June 2007) with similar overseas institutions which have been established by governments and which continue to receive operational funding from governments in order to deliver outcomes relevant to government policies and objectives (see also Appendix 4).

Table 5 Comparison of Questacon's cost per visitor with overseas institutions

Institution	National /provincial	Total visitors	Cost/visitor (US$)
Technopolis, Belgium	National	1,184,941	8.57
Questacon, Australia	National	1,926,811	**9.26**
National Science Museum, Thailand	National	1,382,110	9.73
Hong Kong Science Museum, China	Provincial	754,030	11.04
National Science Museum, Korea	National	845,217	15.25
Science Centre Singapore	National	965,000	23.69
Ontario Science Centre, Canada	Provincial	1,116,973	28.25
Miraikan, The National Museum of Emerging Science and Innovation, Japan	National	778,629	33.24
Heureka—The Finnish Science Centre, Finland	National	206,350	44.90

Source: Data sourced from Association of Science-Technology Centres Incorporated, *2007 ASTC Sourcebook of Statistics and Analysis* and the Asia Pacific Network of Science and Technology Centres 2006–07 Survey Report.

While this analysis places Questacon at the efficient end of the range of cost/visitor figures, it is important to note that the cost of providing programs and services varies between countries due to local economic factors, different rules pertaining to the use of volunteers for certain visitor services and the extent to which institutions conduct outreach programs beyond their city.

Trends in the use of Questacon's human and financial resources also provide an insight into its efficiency. Questacon's staffing has increased by about 20% since 2004–05, with the largest increases occurring in the corporate area (39%), followed by outreach (28%), then visitor experience (20%). Questacon exhibition services staffing levels fell 2% over the same period.

Corporate staffing increased partly due to a program of capital works funding, partly due to an increase in the executive and executive support areas to enhance strategic management, and partly to form a team to deliver the Questacon Expansion Scoping Study within required timeframes. Employee expenses and staffing numbers also rose in response to the increase in sponsorship and delivery requirements of programs (the NRMA RoadZone and Tenix Maths Squad expanded following injection of additional sponsorship). The Visitor Experience staffing increased in response to expansion of the programs delivered over this period, and to an increase in memberships.

The tables at Appendix 6 indicate Questacon's expenditure and revenue profile in recent years. On the revenue side, Questacon gains the highest revenue from Government appropriations, Centre Admissions, sponsorship and sale of goods and services. Sponsorship has fluctuated over the past five years. Revenue from Exhibition Development Services has also been highly variable and it is difficult to predict a trend. Membership and subscription fee income has been increasing, but is still much lower than the other revenue sources mentioned above. This may have implications for future efforts to increase revenue.

On the expenditure side, the most significant increase in costs in dollar terms is attributable to employee expenses, followed far behind by depreciation and amortisation, and then significantly behind that by facility costs (although in percentage terms, depreciation and amortisation and electricity costs have grown much faster). Other costs are far lower and most of them are remaining either static or going down, as they are reallocated to pay for fixed and unavoidable costs. This rise in expenses is unsustainable as it has required measures such as cutting the staff training budget, (thereby limiting staff development and capacity building), and ceasing all evaluation activity in the Centre.

Interestingly, while sales have increased significantly, the cost of sales has not increased significantly compared to the other expenditure items mentioned above. Given the limited scope to change the depreciation and amortisation of assets, and the explanations above relating to employee expenses, there seems little scope for gaining greater efficiencies except by trying to address some facilities costs, including the cost of energy. Energy costs are a significant component of facilities costs and Questacon has reduced usage over the past few years. There is an ongoing energy efficiency study and implementation plan to continue to maximise energy savings.

The efficiency of Questacon Exhibition Services was assessed in 2004 and the conclusion was that:

> Despite the added cost of maintaining the Fyshwick facility, the quality and costs of exhibition design and construction there compare very favourably indeed with all other sources yielding comparative data. It is unlikely that Questacon could find any supplier of exhibitions that could achieve a better blend of quality and price.[22]

Efficiency can also be assessed by considering Questacon's success in leveraging external funding and networks to achieve its objectives. In 2006–07, Questacon attracted 41% of its total revenue of $20.326 million from sources other than Government.[23]

Questacon gains leverage by undertaking many activities in cooperation with industry, and other science centres and agencies. It also harnesses the support of volunteers and in 2006–07, a pool of 71 active volunteers gave a total of 7,938 hours at Questacon. An additional 20 people were recruited through a schools volunteer training program.[24]

While it is important to explore further improvements in efficiency and effectiveness, and this will be done, the Review Panel notes that Questacon's overall performance has been good in terms of maintaining and increasing delivery of quality visitor experiences within a constrained budget. There is a concern that some of the short-term measures that have been implemented to operate within the current budget, such as cessation of internally funded evaluation activities and reduction of training, are unsustainable.

Complementing its proposals in relation to additional Government appropriation for Questacon, the Review Panel has considered the effectiveness and efficiency of existing Questacon operations and how Questacon's success in securing over 40 per cent of its revenue from external sources could be enhanced. For example, the Panel sees scope for Questacon to fully explore opportunities for funding from other Commonwealth portfolios.

[22] Anderson, Dr Peter. *Review of Exhibition Production at Questacon's Fyshwick Facility*, 2004, page 1.
[23] Questacon's 2006–07 annual report, page 52.
[24] Ibid, page 46.

6 Conclusions

The Review Panel is convinced as a result of its consultations and other deliberations that Questacon is just as relevant and necessary today as it was 20 years ago when it was established. Indeed, more than ever, a better understanding and application of science is not only critical to Australia's future national well being, but also to Australia's place in the Asia Pacific and globally.

The national challenge to encourage students to take an interest in and perhaps a vocation in science and technology is real and Questacon has a key role to play in fostering this and related objectives.

Questacon needs a clear mandate from Government to guide it in the coming decades and the Review Panel has made recommendations on the key elements of that mandate.

The Panel has concluded that there is significant scope to further enhance the impact and reach of Questacon's activities across Australia through increased cooperation with other national providers of science communication and awareness programs, in particular the CSIRO and the ABC.

The issue of appropriate governance arrangements for Questacon needs to be resolved to provide a stable long-term foundation for the organisation. The Review Panel is of the view that becoming a statutory authority would best support Questacon's achievement of the proposed mandate.

Should that prospect be unlikely in the short to medium term due to a lack of funding or other support, the Panel's less preferred option is the integration of the science education and communications activities of Questacon and the CSIRO. This would need to be subject to measures, including appropriate legal safeguards, to ensure that the distinct identity of Questacon as the National Science and Technology Centre and its unique brand would be preserved.

Together with a clear Government mandate and appropriate governance arrangements, Questacon needs to be resourced sufficiently to fully realise its mission as Australia's national science and technology centre. At the very least, in the short term, Questacon needs some additional funding to address pressure on its infrastructure and services and to secure core funding for its outreach programs. These outreach programs are critically important to meeting Questacon's mission.

Complementing its proposals in relation to additional Government appropriation for Questacon, the Review Panel has considered the effectiveness and efficiency of existing Questacon operations and how Questacon's success in securing over 40 per cent of its revenue from external sources could be enhanced. For example, the Panel

sees scope for Questacon to fully explore opportunities for funding from other Commonwealth portfolios.

The Review Panel would like to end this report by re-affirming the value of Questacon and its unique place within the Australian national institutional landscape, and the need to ensure it has strong support in future to fully realise its potential as Australia's National Science and Technology Centre.

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Appendix 2 Pros and cons of different governance options for Questacon

Option	Features	Pros	Cons
1. Remaining part of a Government Department.	Funding by annual appropriation through Departmental allocation. Additional funding possible through Departmental NPP Budget process. Responsible, through the Questacon Director and Deputy Secretary, to the Portfolio Secretary. Could continue to have an advisory council.	Established 'brand' retained. Department carries responsibility for any financial liabilities. Capacity for cost-effective provision of some overheads and services such as IT/HR systems etc. Legal/and financial accountability requirements managed by parent department.	Subject to instability due to possible transfer between portfolios. Mandate not defined in legislation. Limited choice in service agreements. Vulnerability arising from annual funding model. Limits entrepreneurial activity. Limited advisory council role. Questacon has a different employee award system.
2. Becoming part of CSIRO.	Report through Executive team member to CSIRO CEO and Board. Possibility of retaining an advisory council. Quadrennial funding through CSIRO. Allocation via CSIRO executive priorities. Additional funding possible through CSIRO science investment process. Creation of integrated national program using pooled assets of Questacon and CSIRO Education.	Greater stability as part of a statutory authority. Capacity for cost effective provision of some overheads and services such as IT/HR systems etc. Greater funding predictability/stability—quadrennial funding provides some additional assurances. Legal and financial accountability requirements managed by parent agency. Some freedom under CAC arrangements to opt in or out of general government contract agreements—ie electricity costs. Reinforced capability and efficiencies, plus new opportunities through synergies between CSIRO and Questacon activities. Greater critical mass in developing resources and enhanced access to research/researchers. Ability to earn interest income.	Questacon's mission may change to reflect CSIRO priorities rather than broader priorities. Different corporate cultures—integration would need to be managed carefully. Questacon would need to compete with other CSIRO priorities for funding. Potential loss or dilution of the existing strong brand. CSIRO has different employee award system from Questacon. These would need to be harmonised. Potentially diminished status within larger organisation.

Option	Features	Pros	Cons
3. Executive agency.	Located within a portfolio but with separate staffing, reporting and accountability under the Public Service Act 1999. Could have financial independence from portfolio if becomes Prescribed Agency under Financial Management and Accountability Act. Would not gain a separate legal identity.	Advisory council guidance continues. Degree of budgetary independence, but not complete independence. Could continue to source centralised functions such as IT/HR from Department at a cost.	Disruption and additional cost with little likelihood of improving Questacon's ability to achieve its mission. Responsible for own budget and also for any financial liabilities. Would have to contract to pay for Departmental services.
4. Statutory authority	Clear, independent role and status provided through legislation. Governing Board provides strategic direction. Funding through annual appropriation. Possible additional funding through NPP Budget process.	Certainty of mandate and mission. Autonomy—answerable direct to Minister. Status as a National institution within Australia and abroad. Although still located within a portfolio, it would be better able to work across government, and to support national science awareness and education priorities. Flexibility in procurement. Ability to contract and receive funds in its own name. Improved ability to attract donations and sponsorship. Ability to earn interest income.	Length of time required and cost to complete establishment process (in case of statutory authority). Significant ongoing additional running costs. Legal and financial accountability requirements would need to be managed by Questacon. Questacon carries responsibility for its financial liabilities. Brand potentially weakened if new body not funded adequately.

Appendix 3 Funding scenarios

Cost summary of alternative scenarios

Questacon role	Scenario 1 (within current funding	Scenario 2 (modest funding increase)	Scenario 3 (significant funding increase)
Summary of costs	Capital costs: From within existing depreciation/surplus. Recurrent: $11.1m from appropriations, $8.4 m external revenue.	Capital costs: As for scenario 1 plus a capital injection of $11.4m to address the Humanities and Science Campus redesign 2008—building modifications to the entry and foyer. Recurrent: As for scenario 1 plus $4.3 m p.a. which could be built up over 3 years (Yr1-$1.5m, Yr2-$3m, Yr 3 and ongoing-$4.3m) largely for outreach core funding.	Capital costs: $75.1m to finance a major extension of the Questacon building. Recurrent: $14.6m operating costs over 4 yrs to 2012 (ie building period) with ongoing funding of $12 m p.a. This scenario would provide a total recurrent funding of $27.9 m p.a. after project completion.
Operate Questacon as the national centre, Canberra	Maintain current scope of exhibits—with less frequent turnover to deal with decreasing real value of appropriation. Seek to maintain and increase sponsorship. Utilise operational and marketing strategies (including entry fees) to manage visitor flow. This will also aim to address the issue that Questacon reaches visitation levels that reduce quality of visitor experience. There are also constraints due to the safety limit in visitor numbers.	Maintain current scope of exhibits and of 2–3 year renewal program. The capital injection is needed for internal structural enhancements in response to major road and precinct infrastructure improvements being completed by NCA in 2008 as part of the Humanities and Science Campus development.	New building next to Questacon (housing Learning and Innovation Centre)—increased exhibition, education and visitor spaces (capital cost $52 m). New exhibitions within new building (capital cost $14.4 m). Remedial works in existing building, related external works (capital cost $8.7 m) if not delivered in Scenario 2 One-off operating costs for expansion including project staff to oversee construction, develop new exhibitions/programs and provide expertise ($14.6 m to 2012 for the project delivery phase). Ongoing operational costs for an extended Questacon are $12 m per annum.

Questacon role	Scenario 1 (within current funding	Scenario 2 (modest funding increase)	Scenario 3 (significant funding increase)
Questacon exhibition services (Fyshwick).	Reassess Questacon's exhibition production model, including its funding, cost effectiveness, accommodation, future skills supply and its linkage to visitor experience quality.	Reassess Questacon's exhibition production model, including its funding, cost effectiveness, accommodation, future skills supply and its linkage to visitor experience quality.	Reassess Questacon's exhibition production model, including its funding, cost effectiveness, accommodation, future skills supply and its linkage to visitor experience quality.
Travelling exhibition program.	Limited development—linked to programmed Questacon exhibits.	Some new exhibitions developed using popular themes to earn revenue.	Frontier science and technology touring exhibition program.
Outreach	Outreach activities dependent on continuing sponsorship or re-examination of Questacon funding priorities. Opportunistic approach to new initiatives that would need to be externally funded or subject to full cost recovery. Limited development of on-line delivery supported through shift of funding from other programs.	Recurrent funding:$4.3m Intended to secure strategic outreach program activity at enhanced level in the context of expiring sponsorship arrangements. Maintenance of current sponsorship levels allows expanded outreach. New on-line/digital delivery strategy developed and implemented.	Recurrent funding: Questacon will be well placed to draw support from the CSIRO client base and obtain potential integration efficiencies:$4.3m Secure strategic outreach program activity at enhanced level. Maintenance of sponsorship levels allows expanded outreach. Develop and implement fully coordinated digital delivery strategy Enhanced opportunities for industry sponsorship.
Raise awareness of national/global challenges.	Identify further one-off funding/leveraging opportunities eg National Water Commission funding.	Identify further one-off funding/leveraging opportunities across Government.	New program of exhibits and activities to raise awareness of national/global challenges.
Showcase Australian scientific achievements.	Limited possibilities within current funding parameters.	May achieve this goal if sponsorship funding can be retained/increased, enabling recurrent funding to be diverted to other projects.	Development of centre and travelling exhibits to profile Australian scientific achievements.
Proposed 'Garden of Wonder'.	No progress unless fully sponsored.	No progress unless fully sponsored.	Feasibility study and focus on sponsorship options. However likely to require $20m capital injection plus parking requirement costs.
Partnership and sponsorship activity.	Continue within current parameters.	Enhancement to the centre and additional funds may draw some enhanced opportunities.	Major new opportunities offered by redevelopment of the centre and significant additional funding enabling expanded activities.

Appendix 4 Comparable international science centres

In analysing science centres around the world, this Review has focused its attention on science centres that have been established by governments (with a particular focus on national governments) and which continue to receive operational funding from those governments.

Stated missions of selected science centres

The mission statements of these science centres reflect their governments' mandates for them:

- Science Centre Singapore: Mission is to promote interest, learning and creativity in science and technology, through imaginative and enjoyable experience and contribute to the nation's development of its human resource;
- Heureka—The Finnish Science Centre, Finland: Core ideology is to bring the joy of discovery to everyone, to produce inspiring learning experiences, and to value science, innovation and quality;
- Miraikan—The National Museum of Emerging Science and Innovation, Japan: Aim is to share the state-of-the-art knowledge and innovation with all who have natural curiosity and interest in science in order to achieve a society where everyone looks to the future guided by wisdom and understanding;
- Technopolis, Belgium: Aim is to inform and make the public aware of the importance of science and technology and to increase the flow of science and applied sciences by bringing science and technology to the people;
- National Science and Technology Centre (Questacon): Mission is to increase awareness and understanding of science and innovation through inspirational learning experiences.

External funding sources

The Association of Science-Technology Centres (ASTC) conducts an annual survey to assist in benchmarking for the sector internationally. One comparative measure is operational income, that refers to the running of the centres' programs including staffing costs but excludes any building or exhibit maintenance, construction or renewal. Operational income is earned or provided through public or private funds. The following definitions apply:

- earned income from admission revenue, fees, services and memberships

- public funds from Federal, State or local government sources including grants
- private funds and contributions/gifts/grants from individuals, corporations or foundations.

Comparison of total funds ($USD) from each source for several centres in 2007:

Institution and location	Earned income (USD)	Public funds (USD)	Private funds (USD)
Heureka, Finland	$2,786,362 30.1%	$5,797,412 62.5%	$681,087 7.4%
Technopolis, Belgium	$4,151,544 40.9%	$5,301,239 52.2%	$697,197 6.9%
Miraikan, Japan	$2,799,578 10.8%	$22,974,836 88.8%	$108,000 0.4%
Science Centre Singapore	$5,076,000 22.2%	$17,424,000 76.2%	$368,000 1.6%
National Science Museum, Thailand	$2,228,120 16.6%	$11,218,944 83.4%	$0 0.0%
Hong Kong Science Museum	$0 0.0%	$8,169,230 98.2%	$151,844 1.8%
National Science Museum, Korea	$0 0.0%	$12,892,000 100%	$0 0.0%
Questacon, Australia	$5,241,791 31.6%	$10,490,722 63.2%	$869,215 5.2%

Exhibition design and manufacture

A comparative cross section of science centres was examined to determine the range and number of centres that designed and manufactured their own exhibits. Results are shown in the table below. As a rough indication, it appears that those centres that do manufacture their own exhibits offer their exhibitions for hire or purchase, along with their skills and expertise in the context of a consultancy. These fully or semi commercial operations appear to support other centres in their area/region suggesting that the demand exists for these services from within and outside the sector.

Institution	Builds own exhibits?	Further information
At-Bristol, UK	Yes	Travelling exhibitions for hire. Many funded by external agencies for specific topics.
Experimentarium, Denmark	No?	Information on any exhibit fabrication was not available on their website or their annual report for 06/07.
Exploratorium, USA	Yes	Develops in-house exhibitions and travelling exhibitions. Offers travelling exhibition hire, exhibitions sales and consultancy services for full range of exhibition design activities from conception through to fabrication.
Heureka, Finland	Yes	Commercial arm—Heureka Overseas Productions.
Miraikan, Japan	No	Partnerships with R&D companies assist in the development of their exhibitions.
Ontario Science Centre, Canada	Yes	Exhibit consulting and development services (from start to finish); exhibit sales and fabrication; travelling exhibition rental.
Petrosains, Malaysia	No	Information on exhibit fabrication was not available on their website.
Questacon, Australia	Yes	Concept through to fabrication done in-house. Some outsourcing of labour/fabrication in busy periods. Travelling exhibitions available for hire or provided under alternative agreements to smaller, regional centres.
Scitech, Australia	Yes	Concept through to fabrication done in-house. Travelling exhibitions available for hire
Singapore Science Centre	No	Some design aspects undertaken in-house, but fabrication outsourced.
Technopolis, Belgium	Yes-largely	Website states that Technopolis exhibitions are 'conceptualised and largely built…' in house, suggesting that there is some outsourcing of fabrication

Appendix 5 Comparison of outreach programs offered by CSIRO, DIISR, ABC and Questacon—18 June 2008

CSIRO

Activity type	Subject focus/program elements	Target audience	Geographical reach
CSIRO Science Education Centres (CSIROSEC)	A range of topics offered from basic scientific phenomena to forensics and CSIRO Research flagship specific programs. Each program aims to: • alert school students, their families and teachers of science to the contribution of CSIRO and scientific research to our community; • encourage students to pursue careers in science, engineering and technology • engage, enthuse and educate about science and its applications.	Early Childhood; Primary; Secondary Students	Capital cities and Townsville. Focus on metro audiences (incursions or excursions). Some regional and remote areas receive Lab on Legs. Lower secondary audiences not reached due to cost and logistical constraints.
CSIROSEC National Touring Programs	AQIS Quarantine Matters—pest and disease control.		Offered nationally—but see above
	Holden Driving Innovations—the science of safety and the environment as studied by the automotive industry.		
	Eco Enigma—scientific investigation to develop an environmental impact report.		
Student Research Scheme	Senior secondary students complete science research under the guidance of a professional scientist and present their work to their class.	Senior secondary students	National
Teacher Research Scheme	Science teachers work with a scientist on a science topic of their choosing.	Teachers	National
Double Helix Science Club	Membership provides two bi monthly magazines (The Helix—ages 10+; Scientriffic—ages 7+) with articles, experiments and activities; member events and holiday programs; online resources and opportunities to participate in national experiments.	Primary school children; teacher's guides available	National and international
SCOPE—Network 10 TV show	SCOPE looks at the world of science from a student's point of view. Different theme explored each week which covers the basic concepts, latest research and hands-on activities. Themes include extreme sport, insects, space and digital technology.	8 years and older	National
Creativity in Science and Technology (CREST) Awards	Program enabling students to engage and participate in an open-ended scientific research project or create an invention through a non-competitive award program.	Primary and secondary students	National

Activity type	Subject focus/program elements	Target audience	Geographical reach
Science by Email	Weekly e-newsletter providing stories, web links to resources and an experiment or activity to try in the home or classroom.	Students, teachers, general community	National and international
Websites	Supporting websites for the CSIROSECS, SCOPE and resource pages for teachers plus the CSIRO online shop.	Students, teachers, general community	National and international
Scientists in Schools	Aims to create and support long-term professional partnerships between scientists and teachers to integrate contemporary scientific research into classrooms. Selected 'pairs' attend regional or national symposia to share ideas and best practice.	Primary and secondary teachers	National

Department of Industry, Innovation, Science and Research; Australian Government

(administered by the Science Connections Program—SCOPE)

Activity type	Subject focus/program elements	Target audience	Geographical reach
Prime Minister's Prizes for Science	Annual award to recognise outstanding achievements in science and science teaching.	Professional scientists, researchers, primary and secondary school teachers.	National
National Science Week	Annually, over 600 science events including workshops, talks, art displays, national experiments, performances and debates, held in every state and territory of Australia.	General public.	National (with some international visitors as well as international presenters)
The ABC Science Project	Funding for ABC Science Unit programs in 2007–09 includes involvement in: • National Science Week • science outreach events including 'Scientists on the Loose' • the *News in Science* online service.	General public and high school students (Scientists on the Loose).	National
Science and Mathematics Olympiads	A series of design and build and analytical exercises. Schools compete at a state and national level.	Year 10 students.	National
EngQuest	Series of activities introducing basic engineering principles to raise the profile of engineering and engineers.	Primary students.	National
Science in the City Outreach Programs	Two programs (Science in the Suburbs and Science in the Bush) delivered by the Australian Museum in collaboration with Questacon and CSIRO Education for content.	School students (demographic unspecified).	Regional areas (NSW) and suburbs of Western Sydney
Eureka Prizes	Administered by the Australian Museum. Promotes Australian scientific research.	General public; secondary students.	National

Activity type	Subject focus/program elements	Target audience	Geographical reach
The Professor Harry Messel International Science School	Biannual residential school at the University of Sydney, includes presentations from internationally respected guest lecturers from Australia and overseas.	Senior secondary science students from Australia (yrs 11 and 12) and ten other countries.	National and international
Fresh Science	Intensive media training program for early career researchers.	Early career researchers, general public, school groups, executives and journalists.	National
The Ultimo Science Festival	Talks, presentations, workshops and events during National Science Week.	School students; general public.	Ultimo, Sydney, NSW
National Youth Science Forum	Two week residential program at the ANU provides an insight into the range of science based careers.	Upper secondary students (years 10–12).	National

ABC

Activity type	Subject focus/program elements	Target audience	Geographical reach
The Surfing Scientist	Incursions to schools, performances of science shows based around basic principles and fundamentals of science.	Offered to K–12	NSW based with some tours to QLD schools. Other states and territories visited irregularly.
JJJ and ABC Radio and TV	Specific science segments and programs run weekly. Topics range from basic science questions from listeners through to specific topics such as mental health.	General public	National and international (latter via internet or satellite TV)
ABC Science Website	Information, links and resources including competitions, events and forums.	Teachers, students of all ages, general public	National and international
Other	In addition to the activities above that receive funding from the Innovation, Industry, Science and Research portfolio, there are also other relevant ABC programs such as Catalyst, the Science Show, and The New Inventors.		

Questacon

Activity type	Subject focus/program elements	Target audience	Geographical reach
Questacon Smart Moves	Incursions to schools promoting innovation, research and careers in science, engineering and technology. Annual Invention Convention selects 30 students with an idea or invention for week-long residential program in Canberra to learn skills to further develop idea into a business.	Senior secondary students	National—all rural, regional, remote areas—5–6 year cycle
The Shell Questacon Science Circus	Established 23 years ago in partnership with the Shell Companies in Australia, ANU and Questacon and staffed by postgraduate science students undertaking Graduate Diploma in Science Communication. Content around basic principles of science—predominantly physics. Designed to raise awareness and inspire audiences to engage with science. Combines several elements of delivery: • incursions to schools in regional, rural and remote areas • hands-on public science exhibition in regional town centres (opportunity for local secondary students to volunteer as local explainers with the Circus) • specific programs for Indigenous communities and professional development workshops for teachers.	Primary students, lower secondary, upper secondary students (as local explainers at public exhibitions), the general public—particularly families, Indigenous students, teachers and graduate science students (to undertake the Grad Dip)	National—all rural, regional, remote areas—5–6 year cycle
Tenix Questacon Maths Squad	Travelling mathematics program—shows and workshops and maths-based professional development workshops for teachers.	Primary school students, lower secondary students, teachers	National—all rural, regional, remote areas—5–6 year cycle
Questacon Science Play	Early childhood program—hands-on science workshops for children and carers. Principle of lifelong learning. Helps carers stimulate child's exploration process.	0–6 year olds and their carers	National—all rural, regional, remote areas—5–6 year cycle
Questacon ScienceLines	Shows and workshops for remote Indigenous schools, regional Indigenous festivals ie Croc Fest, residential programs ie Akaltye and NAIDOC week activities. Basic scientific principles and concepts—forensics, Indigenous scientific knowledge and specific training on IT equipment and programs including web page design.	Remote Indigenous communities—early childhood through to senior secondary	National
Sydney Science Squad	School incursions—shows on basic scientific topics and principles, workshops and presentations at shopping centres, libraries and professional development for teachers.	Primary school students, teachers	Sydney—regional and metro (mainly Western Sydney and outlying suburbs)
NRMA RoadZone	Co-located with the Sydney Science Squad. Presentations on road safety to school students.	Upper primary and lower secondary students	Sydney—regional and metro (mainly Western Sydney and outlying suburbs)

Activity type	Subject focus/program elements	Target audience	Geographical reach
StarLab	Inflatable, portable dome used as a darkened venue to present shows on astronomy. Hired out to other science centres and museums.	school students and general public	National
Questacon to You (Q2U)	Questacon's science theatre troupe, Excited Particles present: • Workshops and school incursions on environmental topics (waste management, alternate energy sources), basic scientific principles (rockets—physics) and specifically requested topics (gold) • Programs and presentations at public events such as Floriade and the Balloon Festival • Corporate training and development programs for public and private organisations.	Primary and secondary students, the general public, corporate groups	ACT and surrounding regions
Questacon Websites	Web-based educational materials complement and supplement exhibitions and expand visitor experience. Websites support teachers and public interest in specific topics ie forensic science (QCSI) and climate change (Polar Passport, *climateXchange*).	Students, teachers, general community, other educators	National and international

Overview of State/Territory funded science communication providers/programs[25]

Provider name	Aim/objective
Minerals Council of Australia	Increase awareness of the mining industry, increase awareness of minerals and their uses, encourage students to consider a career in the minerals industry and to support teachers in their teaching of mining, minerals, energy and environment.
University of New South Wales	To promote an understanding and awareness of the sciences amongst school students, the community and UNSW staff.
Taronga Zoo	To inspire students about our natural world and empower them to make positive changes to help save our native species.
The University of Newcastle	Address the need within the general community, especially school-age children, for increased S&T awareness and understanding. Offer training and resources for schoolteachers, in particular K–6, so that they can better educate their students in S&T issues. Provide university students with the opportunity to learn and practise science communication skills through preparation and presentation of the programs.
Wollongong Science Centre and Planetarium	To generate enthusiasm and science awareness among students and the public.
Sciencentre, Queensland Museum	Students are exposed to science, to generate further interest in science.
South Australian Museum	To allow rural students to gain access to the 'real things', ie, museum collections, knowledge and expertise. To provide teachers and students with resource-based curriculum-linked education programs suitable for all Year levels. To introduce students to the work of the Museum.
Imaginarium Science Centre	Aims to provide exciting hands-on exhibits, travelling exhibitions, programs, services and unique displays which are regularly changed. It has a five-year licence arrangement with Questacon and offers one exciting exhibition each year.
Discovery Science and Technology Centre, Bendigo	To educate, entertain and encourage an interest in the sciences for children, as well as to interest and enlighten older members of the community.
Museum Victoria	(Vision) Museum Victoria aims to reach out to an increasingly diverse audience through its collections and associated knowledge, using innovative programs that engage and fascinate.
ScienceWorks	To make learning about science and technology a fun, interactive adventure.
Scitech Discovery Centre	To inspire interest and participation in science and modern technology.
The University of Western Australia (Women in Science and Engineering Project)	To promote the study of engineering and the sciences as avenues to interesting and challenging careers for women.

[25] Adapted from *Reaching all Australians: A report on delivering science, mathematics, engineering and technology education and awareness programs to regional, rural and remote Australia*, Compiled by R Garnett for the National Reference Group, Canberra, 2003

Organisations involved in science and technology awareness and education

The following organisations are involved in science and technology awareness and education[26]:

- government departments—States and Territories (both education and science-related departments)
- Catholic and independent education jurisdictions
- universities (although most are likely funded from Federal sources)
- medical research institutes (The Garvan Institute etc)
- science centres
- botanic gardens
- zoos
- museums
- scientific societies (Geological Society of Australia, RACI etc)
- independent science societies
- professional societies (AIP, RACI, Institution of Engineers Australia)
- conservation organisations
- science teachers association
- industry (Minerals Council of Australia, Chambers of Mining and Energy—both active in each state and territory)
- private businesses and individuals eg Dean Hutton's science show.

[26] As identified by PMSEIC Working Group, *Science and Technology Awareness and Education*.

Appendix 6 Questacon staffing, revenue and expense tables

Questacon average staffing levels 2004–05 to 2007–08

Area	2004–05	2005–06	2006–07	2007–08
Corporate	25.21	30.09	40.96	34.66
Visitor Experience	53.29	60.17	63.64	64.25
Questacon Exhibition Services	32.95	36.14	29.86	31.94
Outreach	21.16	28.02	29.68	27.15
Total	132.61	154.42	164.14	158.01

Questacon revenues

Description	2003–04 ($'000)	2004–05 ($'000)	2005–06 ($'000)	2006–07 ($'000)	2007–08 ($'000)
Government appropriations	9,811	9,152	9,447	10,270	9,390
Special government program funding	0	957	1,661	1,657	1,772
Centre admissions	2,387	2,842	2,794	3,023	3,105
Exhibition hire	884	317	529	474	539
Program income	376	809	816	989	892
Exhibit development services	10	543	259	0	110
Membership and subscription fees	147	209	290	327	350
Sales of goods and services	1,090	1,241	1,235	1,333	1,406
Venue and facility hire	24	27	24	19	15
Lease revenue	87	101	109	91	94
Interest	9	34	64	107	112
Sponsorship	655	565	1,573	1,981	1,343
Other revenue	97	318	211	55	376
Total revenue	**15,577**	**17,115**	**19,012**	**20,326**	**19,504**

Sponsorship

Expenses	2003–04 ($'000)	2004–05 ($'000)	2005–06 ($'000)	2006–07 ($'000)	2007–08 ($'000)
Commercial		330	1,072	1,064	802
Others areas of government		235	501	917	541
Total sponsorship	655*	565	1,573	1,981	1,343
% of revenue (total sponsorship)	4.2%	3.3%	8.3%	9.7%	6.9%
% of revenue (commercial sponsorship)	**	1.9%	5.6%	5.2%	4.1%

* Further breakdown of sponsorship in 2003–04 is not possible due to changes in reporting structures. ** Not calculated
Sponsorship as a percentage of total revenue fluctuates per annum. This percentage over the last few years has fluctuated from 3.3% to its peak in 2006–07 of 9.7%.
The percentage of Commercial sponsorship as a percentage of total revenue has fluctuated from 1.9% in 2004–05 to its peak in 2005–06 of 5.6%

Questacon expenses

Expenses	2003–04 ($'000)	2004–05 ($'000)	2005–06 ($'000)	2006–07 ($'000)	2007–08 ($'000)
Employee*	7,560	7,777	8,896	10,137	11,010
Contractors	511	737	797	1,205	651
Consultants	266	222	195	173	71
Explainers	23	29	25	20	18
Other external services	416	299	430	454	407
Financial costs	77	103	104	95	102
Legal expenses	12	3	3	7	36
Government charges and taxes	0	1	0	1	1
Insurance	299	268	210	159	108
Cost of buying/selling assets	0	19	0	0	6
Depreciation and amortisation**	1,732	2,075	2,211	2,475	3,173
Write down of assets	548	190	207	24	563
Hospitality and catering	78	69	84	92	78
Printing and publications	372	314	236	157	98
Promotions and advertising	302	363	275	252	163
Training	176	227	243	189	137
Domestic travel	610	655	903	1,001	787
International travel	73	110	83	80	37
Other employee expenses^	63	69	73	244	104
Computer services	114	40	59	50	27
Information technology	213	253	241	258	97
Communications	156	167	151	128	120
Office and facilities hire requisites	111	94	90	75	90
Lease and hire	261	168	322	285	324
Facilities^^	1,417	1,487	1,673	1,814	1,884
Cost of sales	510	585	541	550	628
Exhibition materials, research and storage	443	831	308	222	252
Exhibition research	9	9	7	8	4
Exhibition transport and storage	144	151	349	294	210
Plant and equipment—operating expenses	16	22	23	35	27
Minor capital purchases (<$2000)	74	52	76	54	40
Director's new initiatives##	8	3	1	0	0
Total expenses	16,594	17,392	18,816	20,538	21,253

Explanatory notes:
*Employee expenses are significantly affected by the increase in sponsorship and delivery requirements of those programs. The NRMA RoadZone and Tenix Maths Squad expanded following injection of additional sponsorship. The funding provided for the Questacon Expansion Scoping Study enabled a team to be formed to deliver the scoping submission.
**Depreciation has incrementally increased due to increasing asset value. Figure includes building asset valuation, exhibits, and other assets
^Increase due to Expansion Scoping Study associated costs
^^Facility costs have increased largely related to the increasing energy costs.
##There has been a complete decline in Director's initiatives projects as all funding has been redirected to meet base operational costs.