

Interactive Science Centres for Ireland

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Declaration

This dissertation is of my own work, unless otherwise stated.

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Abstract

This dissertation examines the motives supporting the coalition Government of 2002's calls for the establishment of a science centre in Ireland and their validity. It considers a selection of the existing proposals and feasibility studies and existing evidence for and against the success of science centres worldwide. Information was compiled from existing literature and interviews with key players on the Irish and international scenes over June, July and August of 2002. A survey of visitors attending existing sites of scientific interest in Ireland, and of Irish internet-users, was also conducted to determine the current levels of public interest in museums in general, and in attending an interactive science centre in Ireland should one be established. Existing sites of scientific interest and alternative projects that could contribute to effecting the same results as the proposed science centres are also detailed and their potential considered. Ultimately, the dissertation finds that Ireland has a substantial number of science facilities and services and that improved publicity and exploitation of these sites should be a first step in the Government's efforts to improve the profile and public awareness of science in Ireland. The dissertation also finds in favour of plans for the development of a distributed network of interactive science centres in Ireland, as proposed in the Irish Council for Science, Technology and Innovation (ICSTI) report of 2000. In addition, it is recommended that such a centre should provide a full range of outreach programs providing complementary services which will extend the network's reach to all sectors of the community.

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1. Introduction

Before considering the whys and wherefores of an interactive science centre in the Irish context, I will first establish what exactly is meant by the term “interactive science centre,” and provide a brief history of the evolution of such an institute. In this chapter, I will also consider a number of the major sites of scientific interest already established in Ireland, and ask what an interactive science centre might offer that these sites cannot.

1.1 What is an interactive science centre?

“A science centre ... is a place where one can see science happen – and even more important, experience science by doing it. Interactivity is the key word in successful science centres.” Danny O’Hare (2000).

“The modern science centre ... has exhibits designed to attract, excite and educate people ... The overall idea is to entertain as well as to educate.” Dr William Reville (2001).

The key difference between an interactive science centre and a science museum is that the former concentrates on teaching curiosity and scientific method, and the latter on teaching scientific fact and history.

The evolution of interactive science centres has been dealt with in depth elsewhere, for example by McManus (1992), but for completeness I include a very brief description of the process: The first museums of science and industry founded at the turn of the 18th century, for example, the British Museum in 1753 and the Musée Nationale d’Histoire Naturelle in 1793. These museums housed collections of objects derived from the Cabinets of Curiosity of the 17th and 18th centuries, such as natural history artefacts and scientific instruments. They were usually affiliated to educational institutes and were intended to contribute to scientific knowledge. Public access was limited. The second generation of science museum focused on contemporary scientific and technological achievements and were intended to provide an educational service to the general public. Examples include the Conservatoire National des Arts et Métiers in Paris, opened in 1794 and the Franklin Institute in 1824. Second generation museums were influenced by the great public

exhibitions and world fairs of the late 19th and early 20th centuries that allowed the public to watch technology demonstrations and learn while enjoying themselves in a fun-fair atmosphere and began to develop a more hands-on approach for public interaction with exhibits.

The third-generation of science centre became more concerned with ideas and concepts and how to communicate these to the general public. Again, contemporary issues were of chief interest, and interactive exhibits were used to communicate concepts and functional mechanisms. Early third generation centres include the Palais de la Decouverte in Paris, opened in 1937, the New York Hall of Science in 1964 and the Lawrence Hall of Science, California in 1968. But it was not until 1969 when Oppenheimer's Exploratorium opened in San Francisco and the Ontario Science Centre opened in Toronto that the third generation science centre really took off.

Oppenheimer saw the Exploratorium as a means of filling a gap in public understanding of science which could not be bridged by books, magazine articles, television programmes or general science courses. The Exploratorium provided the public with access to the "props" of scientific knowledge, allowing them to handle them and to learn in an undirected fashion at their own pace, taking time to think, and constructing their own experiments with the equipment and facilities provided. He hoped that the museum would "convey the understanding that science and technology have a role which is deeply rooted in human values and aspirations" (Oppenheimer, 1968). The true strength of the Exploratorium's approach was best explained by Duensing, Assistant Director with the Exploratorium, who wrote:

"The freedom to experiment also includes the freedom to fail, to make the exhibits misbehave. Things can be taken past their functional limits so that the range of how or why something works can be experienced. In almost all forms of learning it is as important to appreciate what does not work as to appreciate what does work."
(1987, p 140)

With the arrival of such mould-breaking centres, science museums began to resemble amusement parks: their aims were to inspire visitors, to teach inquisitiveness, exploration and discovery rather than mere scientific fact. So popular was the new format

that the number of interactive science centres worldwide has escalated at a rate of 30% per decade since then, with many of the new centres modelled on the Exploratorium, thanks to its “cookbooks” of exhibit design (Beetlestone et al, 1998). Elements of the science centre experience have even found their way into mainstream amusement parks, such as Disney’s EPCOT in Florida.

1.2 Existing science museums and sites in Ireland

Although lacking an interactive science centre, Ireland does possess a number of sites of scientific and technological interest, as outlined in the RDS report “Science Centres for Ireland” and the Irish Science Centres Awareness Network (iSCAN) Directory.¹ In this section I consider the scope of several of these sites: first the two main historic science museums in Birr and Maynooth, then a range of other national science attractions.²

1.2.1 Birr

Birr Castle in Offaly hosts an historical science museum titled “The Galleries of Discovery.” The Galleries were officially opened on November 28th, 2000 by Mr Noel Treacy TD Minister for Science, Technology and Commerce, and are dedicated primarily to the scientific achievements of the Parsons family, who own the castle and grounds. The Parsons were interested in a wide range of sciences: engineering, ship-building, electricity, astronomy, photography and botany. The Galleries of Discovery house an impressive collection of the instruments used in their research, models of the Leviathan telescope and Turbinia ship, as well as many photographs of the family at leisure and working on their experiments. General exhibits which discuss the basic science behind the family’s hobbies are also included. The museum contains traditional museum pieces, such as glass cases of labelled artefacts and posters, as well as a number of multimedia exhibits, some of which are interactive.

¹ <http://www.iscan.ie/directory.htm>

² URLs for the web sites of most of the attractions mentioned here are provided in Appendix A.

Although the museum purports to be the “Irish” historic science centre, limited attention is given to the achievements of Irish scientists who were not associated with the Parsons. Brief mentions are given to the Irish instrument makers who constructed equipment used by the family, to contemporaries who participated in stellar observations and other research activities at the castle over the years, and one room of the Galleries is given over to other notable Irish scientists of the era, their achievements briefly outlined in a desk-mounted flip-book before a wall of portraits. Interestingly, in this flip-book, the “National Science Museum” in Maynooth is referred to as “The Callan Museum” implying a narrow focus, when Maynooth, although a much smaller establishment, has a far broader view of Irish science than that of Birr, as will be demonstrated in the following section.

I visited the science museum in Birr on June 29th, 2002, and was disappointed both by the limited scope of science covered by the displays and the apparent poor attendance levels. Although the queues at the admission desk seemed promising, given that the day was dull, in the 90 minutes I spent in the Galleries I encountered fewer than 10 other visitors. Administration at the site later informed me that most visitors to the castle come to see the grounds, which have been a public attracting for over 50 years. I also learned that no studies have been conducted to determine what proportion of visitors actually spends any time in the science museum.

1.2.2 Maynooth

The exhibits in Maynooth are of more general Irish scientific interest than those in Birr, though the achievements of Reverend Professor Callan are singled out for particular consideration. I visited the centre on Sunday July 7th, 2002, and spoke with curator Dr McKeith who provided me with a history of the museum and a guided tour of the exhibits. The sciences addressed by the museum include, but are not limited to, chemistry, electricity and magnetism, heat, hydrostatics, light, mechanics, meteorology, pneumatics, sound, surveying and navigation, radio and telegraphy. The exhibit space, while limited, displays a wide range of apparatus developed by Irish instrument makers and used by Irish scientists in their research. Most of the objects originate with the college, though there have also been donations from other educational establishments and private collectors. There are also artefacts of notable achievements in Irish scientific history, for example the

induction coil used by Marconi in the first ever ship to shore radio transmission which was carried out in Dun Laoghaire in 1898.

The museum also comprises a small interactive section with five PCs: two are networked with video-conferencing equipment and are intended to serve as a technology demonstration, one is configured to allow browsing of the Britannica 2001 DVD-rom, one is dedicated to resources related to astronomy and the last provides access to the museum's own comprehensive web pages and general basic science information.

The museum was originally opened in 1934, with a primary theme of ecclesiastical artefacts, and a small exhibit dedicated to the achievements of Callan. Over the years the museum's focus moved more towards Irish science. In 2000 the building was refurbished as a science museum, although a small collection of religious objects is still displayed. Funding for the refurbishment came through a Government grant of IR£100,000 which was matched by the NUI Maynooth. The museum was officially opened under the title of "National Science Centre" by An Taoiseach, Bertie Ahern on 23 November, 2000 (iSCAN, 2001).

Because of the museum's location, poor signposting and restricted opening hours, it attracts relatively few visitors. Typical Sunday afternoon attendances are of the order of 2-15 people, and depend heavily on the weather. This is a great shame, since the collection is an impressive one, with much of the instrumentation still operational more than a century after its first use. There is great potential for increased publicity, the provision of live demonstrations of the antique instrumentation and the introduction of modern interactives, although when asked about the possibility that this strategy might be pursued, Dr McKeith indicated that the museum had no ambitions of expanding its operation.

1.2.3 Other sites

Despite an apparent lack of "science" attractions in Ireland, there are in fact a great many publicly accessible sites of scientific interest. Naturalists, zoologist, ecologists and environmentalists are well catered for by facilities such as the recently expanded and refurbished Dublin Zoo, Fota Wildlife Park in Cork and aquaria such as the National Sealife Centre in Bray. In addition to these living exhibits, the Natural History Museum on

Upper Merrion Street, or the “Dead Zoo” as it is popularly known, houses a stunning collection of preserved Irish, African and Asian wildlife. Botanists and environmentalists can delight in the collections of botanical gardens such as those in Glasnevin, managed estates such as Avondale Forest Park in Wicklow or the unique habitat of the Burren in Clare.

Moving away from the ever-popular life sciences, astronomy enthusiasts are facilitated by the Schull Planetarium in Co. Cork, the only planetarium in the country, as well as Dunsink Observatory in north Dublin. Those interested in technology can visit dedicated museums such as the National Transport Museum or the National Print Museum.

Despite the lack of a major interactive science centre, we do actually have at least one small scale version: the Táin Holiday Village in Omeath, Co. Louth includes a two-room collection of 25 interactive science exhibits. Visitor reaction to the exhibits is poor: although adults enjoy them, they are very unpopular with younger visitors, and as a result are no longer widely publicized. Indeed, the centre receives no mention whatsoever on their website. Although at first glance this lack of popularity seems to bode ill, it can be understood as a consequence of the expectations of visitors to the Holiday Village which is publicized as a centre for water- and land-based adventure activities, such as canoeing, windsurfing, rock-climbing and abseiling. It is to be expected that children, especially, will find greater appeal in such sports than in the opportunity to engage in an informal “educational” experience.

Finally, W5 in the Odyssey Centre, Belfast, provides us with access to an interactive science centre on the island of Ireland, if not in the Republic. However, geographic and political factors may make the location of the centre unappealing to many potential visitors from the Republic. Aside from enduring fears and misgivings those south of the border may hold about travelling to the North of Ireland, and to Belfast in particular, public transport in Ireland is organised in such a way that Belfast is two hops away rather than one for much of the Republic. I contacted Sally Montgomery in W5 to ask whether or not the centre receives a significant number of visitors from the Republic. She was able to tell me that visitors do come to W5 from the Republic, but that the centre has not studied visitor demographics so a regional breakdown was not available.

1.3 Why do we need another site?

Each of the sites mentioned in the preceding section addresses a particular aspect of science or of Irish scientific heritage, but an interactive science centre could provide a more general overview of science, as well as a different style of presentation. In addition, such a centre could act as a hub for existing facilities, referring visitors to appropriate sites for more in-depth information on specific topics. The provision of such a facility in Ireland offers potential benefits in the areas of education, economy, tourism and public perception of science. These issues will be discussed in detail below. It should be noted that there is some overlap between benefit areas, and that improvements in any one of them impacts on the others.

1.3.1 Education

“Give people facts and you feed their minds for an hour. Give them curiosity and they feed their own minds for a lifetime.” Ian Russell.

There is a great deal of concern in Ireland about a fall off of interest in taking science subjects at all levels of the education system, the problem being compounded by an overall decline in the number of students in secondary school due to an aging population. Numbers taking science in lower secondary school are relatively stable, but there is a drop off in upper secondary: in 1990, 16% of leaving cert students took chemistry and 20% took physics; in 2001, 12% took chemistry and 16% took physics. At university level, there has been a decline in acceptance of places on science, engineering, technology and computing courses, with high non-completion rates across the board. (Task Force, 2002)

The Task Force on the Physical Sciences was established in 2000 to explore this crisis in Ireland. They commissioned the Market Research Bureau of Ireland (MRBI) to conduct a survey of attitudes towards and experiences of science among students at all levels and their parents. One interesting result that came out of this survey was that, when asking secondary school students what they actually liked about study science, students of all ages consistently stated that they enjoyed working with apparatus and materials more than any other activity in science classes. But the same survey indicated that 11% of science and physics students *never* conducted experiments during class, the figure slightly

higher again at 12% for chemistry students (MRBI 2002)! It is not surprising, in the light of these figures, that the Task Force advocated the establishment of an interactive science centre to supplement academic learning.

Beetlestone et al made the argument: “Within a year’s teaching of a science topic, a specific ‘classic’ experiment will be studied once and maybe revised later. Schools cannot invest in equipment that spends the whole year – barring one or two afternoons – in a cupboard, so science is generally taught at second hand. Science centres can, by running theme weeks and demonstrations, present the ‘classic’ experiments in the most spectacular and accessible ways” (Beetlestone et al, 1998, p11-12).

Apart from providing supplementary support to the school curriculum, science centres also provide a valuable forum for the provision of information on contemporary science and current issues. This is an area where the education system cannot react with sufficient flexibility and there is a wider appeal to the public: although I have focussed here on academic education, public education is also a key benefit of science centres, allowing those beyond the education system to develop a more rounded understanding of the science and technology relevant to their daily lives and in the world around them.

1.3.2 Economy

The Irish Government sees the development of science-based industry as key to our economic success, as evidenced by their €711 million investment in the Technology Foresight Fund in 2000. To facilitate such development, we urgently need a workforce capable of meeting the demands of such industry. As argued by O’Hare: “We simply cannot build the kind of economic future we now envisage, and presumably desire, without a strong backbone of people trained in the sciences and engineering” (2000).

The Task Force survey of secondary school students indicated that students are not pursuing science studies as IT and computing seem more attractive – though there is a fall off in the numbers pursuing these courses at university level too – and science jobs are perceived as being boring and poorly paid (MRBI, 2002). These beliefs and attitudes may contribute to a stunted development of a skilled workforce in the future. However, the attitude that science jobs are “boring” seems surprising in light of the study’s finding that

students actually enjoyed experimenting and using lab equipment during class. Perhaps the increased potential for exploration of the scientific method and for developing familiarity with scientific technologies in interactive science centres may help to banish the “boring” label that science jobs have been branded with by exposing more students to the “fun” of engaging in practical science. Addressing the issue of poor pay, however, may require efforts beyond the scope of a science centre!

There does appear to be evidence that positive experiences of science in their youth have led many to follow scientific careers. For example, “it is a proven fact that many former members have succeeded in technical and scientific careers, on account of the interest awakened and stimulated at De Jonge Onderzoekers (‘The Young Explorers’) [a youth science club in the Netherlands]” (Beeksmā, 2002). Also, a study conducted by the Exploratorium in San Francisco has shown that teenagers who worked as explainers in the institute were similarly inspired to pursue careers in science later in life. (Diamond et al, 1987. Cited in Crane et al, 1994, p216)

In addition to a qualified workforce, public support for the continued development of high technology industries in Ireland is necessary. The building of new factories and laboratories often generates local disquiet and protest, particularly where a lack of understanding of the research and development conducted within them exists. It has long been postulated that an increased awareness of science among the public will ensure support for public policy advocating expanded science and technology industry, and an interactive science centre, by providing an informal learning environment to all sectors of society can facilitate improved understanding and appreciation of science and technology even among those no longer involved in the education system.

1.3.3 Tourism

Internationally, science centres attract 250 million visitors every year. The interactive science centre is now a well established concept internationally and is as likely to feature on a holiday-makers wish list as a historical museum or art gallery. Additionally, research has shown that people who have already visited a science centre in one location will be interested in visiting others for the sake of comparison and in search of something

new (Reville, 2001). Rose Kevany of DISCoverY pointed out that interactive science centres also cater for sections of the community not excited or interested by traditional museums: these include, for example, teenage boys. Marketing research for the Pigeon House Heritage Project, one of several science centres proposed for Dublin, indicated that 24% of tourists would be willing to extend their stay in Ireland in order to visit a major science centre, were one available. Based on this information, it is valid to ask how many tourists have never visited Dublin or Ireland at all because of the lack of a science centre to include in their holiday itinerary, especially when our EU counterparts can offer a wealth of such facilities.

Science tourism is beginning to be taken seriously internationally: even the International Space Station is now catering for tourists! And Disney has jumped on the science centre bandwagon with the EPCOT centre. Irish tourism promotions rely heavily on our historical and artistic heritage, our landscape and scenery and our friendly reputation, failing to exploit our significant scientific heritage.

1.3.4 Public perception of science and technology

“[Ireland] is the only member-state of the European Union EU not to have a major science centre. This is sending the wrong message to the wider world, which is used to viewing our culture as typically defined by archaeological, mythical, musical and literary heritage. Granted, all of these things are a very important part of what we are, and have been, but Ireland also has a fine scientific heritage that is largely unknown and unappreciated by the general public.” Dr William Reville (2001)

There are two aspects to the public perception of science in relation to Ireland: first, the public perception of science among the Irish population and second, the international perception of Ireland's relationship with science and technology.

What is the typical Irish person's understanding of Ireland's place in the global development of science? How many members of us are aware of our nation's scientific firsts, or the major scientific figures of Irish origins? Among our firsts we can count the invention of the induction coil by Callan: the induction coil was a vital component in the later inventions of radio and x-ray sets. Ireland was also the venue of the first ever ship-to-

shore radio transmission by Marconi. For 70 years Ireland was home to the largest telescope in the world: the Leviathan at Birr Castle. Internationally renowned Irish scientists include Beaufort of the wind force scale, Hamilton of the Hamiltonian equation, used in quantum mechanics, Lord Kelvin of the temperature scale and Walton who won a Nobel Prize for splitting the atom.

Apart from an under publicized scientific heritage, we also lack prominent national tributes to the role of contemporary science in our lives. We have art galleries, historical museums, museums dedicated to Ireland's historical and modern achievements, but little to acknowledge modern science and technology beyond the industry grounded upon it. The museums in Birr and Maynooth both for the most part concentrate on science that is already a century old. An interactive science centre offers the chance to popularize and modernize our understanding of science in Ireland.

2. What has been done so far?

It was first suggested 15 years ago that Ireland would benefit from the establishment of an interactive science centre and since then a number of interest groups have generated proposals and conducted feasibility studies with varying degrees of success. Although the Government has expressed the desire recently to establish a centre in Ireland, no commitment has yet been made for the support of any one of these proposals. However, the European Trend Chart on Innovation for Ireland 2001 suggests that W5's close proximity may have a negative effect on the viability of opening a similar centre in the Republic now (European Commission, 2001), validifying Mollan's suggestion that W5 should be considered a main site for Ireland and that a satellite centre should be established in Dublin through a cross border initiative to increase accessibility for those in the Republic (1998, p5). In this chapter, I will outline the efforts that have already been made over the last 15 years towards establishing a science centre in Ireland.

2.1 DISCOVERY

DISCOVERY, founded in 1987, is the Dublin Interactive Science Centre project. The project was established in reaction to a commitment from the Custom House Docks Development Authority in 1986 to establish a "major cultural attraction" such as a museum of modern art or a science centre, along with retail and leisure facilities in Stack A, a disused warehouse in the International Finance Services Centre. Indeed, IDA promotional materials for the redevelopment of the area at the time specifically indicated a science museum as a component of the project. Over the last 15 years, many competing proposals for the space in Stack A have been submitted to the Dublin Docklands Authority, but only two contenders now remain: the Museum of Dublin History, supported by An Taoiseach Bertie Ahern and the DISCOVERY Science Centre, supported by An Tánaiste Mary Harney.

Despite the Stack A warehouse being deemed a "conservation priority" so many years ago and the high levels of interest in its disposal, however, it was not until 2001 that restoration work, at a cost of IR£20 million, finally got underway and a decision is yet to be made as to what type of attraction will finally find its home in Stack A by the time it

opens to the public in 2003. A key factor in the delay of a decision is the DDDA's requirement that capital funding for proposed projects must be secure in order for them to qualify for consideration: currently neither of the two remaining contenders has a firm commitment of funding.

DISCOVERY's vision for the warehouse is a science centre similar to the Eureka centre in Halifax,³ primarily aimed at a youth audience. The group commissioned three feasibility studies between 1986 and 1997, and found projected visitor numbers to be of the order of 250,000 per annum, with 99% of Irish schools expressing an interest in the centre, estimating that 11% of all primary and secondary students would pay a visit in any year. The second study, carried out in conjunction with Deloitte and Touche in 1993, placed capital and running costs for the first three years at IR£8 million. Dublin Tourism recommended the group re-examine the proposal to downscale this figure to below IR£5 million. The most recent study in 1995, conducted with a grant from the Educational Trust of Dublin City University, put capital finance at under IR£4 million for the first three years, with running costs to be offset by admission fees, retail sales and a levy on the tenants of the IFSC, which amounts to more than IR£2 million per year (RDS, 1997a). This makes the DISCOVERY centre the most inexpensive of those proposed for the Dublin area giving it an advantage over other science centre bids, though not against the competing Museum of Dublin History.

I contacted the DDDA in July and early August to enquire about plans for Stack A and was informed that they hoped to be able to make a decision "shortly," but that they could not commit to a date for an announcement.

2.2 Pigeon House Heritage Project

In 1994, an interactive science and technology museum was proposed for the historic Pigeon House Power Station in Ringsend. The museum was to focus on transport, communications, technology and science in Ireland, and was to provide a centre for complementary activities such as research and community projects. Key dimensions to the

³ <http://www.eureka.org.uk/>

museum were to be historical information on Irish science and technology, contemporary developments in Irish science, the role of science and technology in every-day life and social and cultural implications of science and technology.

The ESB, who owned the 5.5 acre site, indicated their willingness to lease the property to the Management Committee of the Ringsend and District Community Centre for the development of the museum in 1995, and work began on a feasibility study for the project. The results of the study, released on March 26th 1997 by the Management Committee of the Ringsend and District Community Centre, indicated that IR£7 million would be required to restore the building and harbour, with a further IR£4 million for displays. Market research indicated an opening for a visitor attraction of the proposed type and scale, supporting projected visitor figures of 150,000 in the year of opening, increasing to more than 200,000 over the subsequent four years. Funding was expected to be derived from national and European sources, such as ERDF, ESF, the Cohesion Fund and RAPHAEL, as well as from public, private and corporate sponsorship. In support of the venture, market research showed a high interest in attending the museum with 64% of all those surveyed claiming they would be interested in visiting, and 24% of overseas visitors indicating a willingness to stay longer in Dublin in order to visit it. (iSCAN, 1997b)

Yet, despite all these positive indicators and commitment, the project never reached fruition. When I contacted the Ringsend and District Community Centre to enquire about the project, I was told that it had been forced to fold several years because funding dried up. The Pigeon House Power Station property has since reverted to the ESB. No further information was available from either the Community Centre or the ESB.

2.3 Science Centres for Ireland conference

In 1996 a three day conference entitled “Science Centres for Ireland” was held in the RDS. “The main purpose of the Conference was to inform educators and policy makers of the unique contribution which science centres can make to the public understanding of science” (RDS, 1997a, p9). Experts from other countries were invited to speak of theoretical and practical issues in establishing and running science centres; existing and proposed centres from the Republic and Northern Ireland gave presentations on their own

projects; workshops were held where the role of science centres was discussed; and educational and public awareness issues were considered.

In the opening address, John Travers, Chief Executive of Forfás, the Government Advisory Board for Industrial Development and Science and Technology in Ireland, said: “It is quite clear that Science Centres can make a significant contribution in helping to achieve a better understanding of science and technology” (RDS, 1997a, p13). He went on to emphasise the importance of this understanding for industrial, social and economic policy in Ireland. He pointed out that although the educational success of science centres was difficult to gauge, “their growing popularity, however, is practical proof of their capacity to awaken the latent curiosity and thirst for new knowledge which exists in all people, and, in particular, to increase awareness of Science and Technology issues” (RDS, 1997a, p18).

Throughout the main presentations of the conference speakers emphasised and re-emphasised the importance for the Irish economy of science education and public perception of science. O’Hare recommended science centres as a key element of the Science, Technology and Innovation Advisory Council’s strategy. Douma, of the newMetropolis centre, Amsterdam, emphasised the escalating speed of technological revolution and the value to an economy of keeping pace with development. He also pointed out that continuous learning was becoming a feature of modern society, and proposed that we should see a national science centre as a valuable “point of transfer” of knowledge between academia, industry and the public. Thant spoke of the “fear and suspicion” the public had of science and technology due to a lack of understanding and emphasized the importance of investment in developing a scientific culture, encouraging Ireland to celebrate its shrouded scientific legacy. As regards public and international perception of Ireland’s role in scientific development, several of the non-Irish speakers expressed their surprise and amazement at having discovered while preparing for the conference that key scientific figures were Irish, or that Ireland’s science-based industry was so significant to the economy.

In the conference workshops, concern was raised about the competition between the various proposals, particularly those for Dublin, and presenting a united front identified

as an important way forward for the projects. Friedman, of the New York Hall of Science, reiterated these concerns in his review of the conference. He pointed out that he had heard a range of proposals for science centres in Ireland – including those of DISCoverY, the Pigeon House Heritage Project and Birr, whose Galleries of Discovery had not yet been completed – but that all of the plans were independent and apparently dis-interested in the successes of the others. He suggested that this might have a detrimental effect on seeing funding commitment for the establishment of any one of them due to the high quality and competitiveness of each project. Any one would be difficult to single out for backing, and diluting funding to support all of them could not make a significant impact. He emphasised the need for and value of collaboration between projects, both before and after the establishment of one or more of them. He also pointed out that none of the proposals had the crucial ingredients of a business plan, a leader or stakeholders, without which they could not hope to secure backing.

The conference resulted in two main resolutions:

- To establish a network of existing and proposed science centres in Ireland to facilitate communication between the groups
- and
- To lobby for the founding of a national science centre based on the common goals of all parties.

The first resolution was addressed by the establishment of ISCAN – the Irish Science Centres Awareness Network. A first step towards addressing the second resolution was the commissioning of the “Blueprint for a National Irish Science Centre” by the RDS, funded by Forfás.

2.4 Blueprint for the National Irish Science Centre

On May 28, 1998, Minister Treacy launched the publication of the proceedings of the “Science Centres for Ireland” conference as well as a second document, the “Blueprint for a National Irish Science Centre.” This second document was commissioned by the RDS, funded by Forfás and compiled by Dr Joost Douma, former executive director of

newMetropolis in the Netherlands. The Blueprint is a thoroughly comprehensive document detailing the reasons and a theoretical strategy for establishing an interactive science centre in central Dublin.

The ambitious proposal recommended a IR£30.5 million, purpose-built modern structure of 10,000 square metres based on the old gas-works site in the Docklands. It proposed that the capital funding required for the purchase and development of the required site and building should derive from the combined resources of the EU, the National Lottery, the Greater Dublin Authorities, the Department for Enterprise, Trade and Employment and the Department of Education and Science. Ongoing costs were to derive from the Government Departments, with private sponsorship used to develop the exhibits. Potential partners in public and private enterprise were suggested to provide funding for relevant exhibits in each of the proposed themed areas: the Universe, Matter, the Living Planet, Man as a Species and Man as an (Inter)Actor. Only the Universe area was foreseen to pose problems due to a lack of relevant industry in Ireland. In addition to capital costs, the report estimated that an annual subsidy of IR£700,000 would be needed for the maintenance and running of the site.

The proposed Centre would have hands-on exhibits as well as demonstrations, a science theatre, a film theatre, a planetarium, a shop and restaurants. It would also be engaged in a variety of outreach programs, such as teacher training, school workshops and exhibit development for other smaller centres. It was envisaged to fill a variety of public education roles: providing a “shopping mall for spontaneous learning,” an information centre capable of answering specific questions, an open learning centre for those involved in self-education, and a formal learning environment for guided visits and tours. The proposal pointed out that it has been estimated that 80% of our learning is either spontaneous or self-directed, and that interactive science centres had an important role to play in both forms of informal education.

The proposal indicated that the Centre should be designed and constructed to become a world-class attraction, internationally renowned and locally popular, and that a long-term goal of the facility would be to develop Ireland’s reputation as the “brain-park” of Europe.

A key point made in the Blueprint was the need for originality:

“While [the concepts of the Deutsches Museum, Le Palais de la Découverte and the Exploratorium] are rich enough to inspire us in the next decades, we must, however, innovate and not replicate.” (RDS, 1997b, p19)

Visitor numbers for the new Centre were estimated at 300,000 per annum, with 20% of these coming from formal education sources and 45% from Irish and international tourism. This figure compared favourably with the 402,171 visitors to the Book of Kells and 387,640 to Dublin Zoo. The detailed planning information anticipated seeing the centre open to the public in 2001, assuming prompt action being taken to initiate Phase 1 of the proposal. This did not happen, and three years later Forfás were again called on, this time by the Government, to develop a proposal for an interactive science centre that could facilitate improved public awareness of science. The result this time was ICSTI’s “Irish Science Centre” report.

2.5 The ICSTI Report

In April of 2000, An Tánaiste Mary Harney requested that Forfás develop a proposal for an interactive science centre in Ireland as a matter of urgency, saying:

“I believe we must now take urgent steps to ensure that our young people are given every encouragement to pursue the study of science, mathematics and allied subjects both in school and in college. There must also be a greater public knowledge of the highly positive contribution which S&T makes to social and economic development in Ireland. I believe that the absence of an interactive Science Centre in Ireland is a significant deficiency in meeting both of those objectives and that we are at a disadvantage with most developed countries in this regard.”

The result was the publication of an outline proposal by the Irish Council for Science Technology and Innovation (ICSTI) in July of the same year. Prepared by the Public Awareness of Science, Technology and Innovation (PASTI) working group, the report considered the evidence of published work on interactive science centres, the opinions of international experts and experiences of visits to existing centres. Finally, the

group recommended the development of a major science centre in Dublin, with two smaller complementary facilities based in Cork and Galway, thus placing a centre within 2 hours reach of more than 90% of the Irish population. Figures from the 1996 Census were used to identify these locations as the most desirable for the distributed model proposed. Outreach projects such as mobile labs and science buses to reach an even wider audience were recommended.

Exhibits in the centres were to include displays on contemporary science and engineering, interactives for younger children, artefacts from Ireland's scientific heritage and exhibits on science-art crossovers in Irish culture. One sixth of the overall exhibit space in the primary centre in Dublin was to be used for temporary exhibits and special events. Other facilities to be provided included lecture theatres, labs, a public information centre and a reference library. The report emphasised that modern thinking concentrates more heavily on the "minds-on" effects of interactive science centres, rather than simply "hands-on," and that Ireland should take advantage of the experience and knowledge gained by the many existing science centres worldwide in its construction, design and management, while tailoring the Irish implementation to reflect Irish interests and scientific heritage.

Potential visitor numbers were estimated at 300,000 per annum in Dublin and 100,000 in the smaller centres. The working group recommended that the major centre should be a medium-sized establishment, large enough to cope with peak visitor numbers, but not so large as to be intimidating.

The ICSTI report recommended the development of "world-class, low-energy, modern buildings" at each location, identifying three publicly owned sites in the west of central Dublin as potential locations for the primary centre, bringing the required capital expenditure for the entire project down to IR£55 million. A fourth potential site associated with the Media Lab Europe project was also identified. The main centre was to be an 8,000 square meter space, requiring an investment of IR£35 million to construct and equip. The two smaller sites would require IR£10 million each. An annual grant requirement of IR£2 million to finance the running of all three centres was also estimated. The balance of the required running costs was to be raised through ticket sales, retail sales, sponsorship and

private investment. These costing estimates for the project were based on those of the Blueprint, modified to cover three facilities whose total area would be the equivalent of the single site proposed in the earlier document.

This proposal is currently the favoured model for an Irish science centre network, as will be discussed later. However, the lack of funds required to execute the plans has delayed the implementation of the project, which would have seen the centre built over 2002 and 2003, opening its doors to the public in 2004.

2.6 Others

As mentioned earlier, Birr Castle, already a site for a historical science museum, is also seeking funding from the government to expand their scope to include an interactive science centre. Details of the proposed centre or any feasibility studies that might have been carried out during planning were, however, unavailable to the public. This may be as a result of the intense competition between the many proposed centres to secure government funding for their own projects.

Carlow Institute of Technology are also seeking funding from the Government to establish a permanent centre in Carlow, and have already had negotiations with An Tánaiste about it. The Institute has already held two very popular temporary events titled “The Magic of Science” in the college in 2001 and 2002, and attracted more than 3000 visitors over 16 days in June 2002, the majority of these being school groups. The interactive exhibits used in these events were provided by Techniquist, Cardiff, and several explainers from the Welsh centre were on hand to answer questions and perform science shows for visitors. A feasibility study undertaken by CIT in conjunction with their Campus Innovation Centre and Carlow local authorities for the establishment of a permanent facility projected visitor numbers of 120,000 per annum, and estimated the capital cost of establishing a centre at €12 million. The centre could also be used for the provision of science training for primary school teachers. (Dooley, 2002)

2.7 The Government's position

Government support for the establishment of an interactive science centre comes primarily from the departments of Education and Enterprise, Trade and Employment.

In November 2000, Dr Michael Woods, Minister for Education and Science, set up the Task Force on the Physical Sciences to devise a strategy for reversing the declining interest in the physical sciences in the Irish education system. The potential lack of a skilled workforce in the future which could jeopardize Ireland's economic development was the motivational reason given. The Task Force reported in April 2002, recommending a holistic approach to tackling the problem with the ambition of increasing not only the quantity but also the quality of science graduates in the future. They proposed that the problem should be tackled in parallel by the government, the education system and industry. Part of their recommendation included the establishment of a national Interactive Science Centre:

"The Task Force is conscious of the need to promote science in the wider arena, among parents and the general public as well as among the student body. It welcomes the fillip that the advent of a National Interactive Science Centre would give to increasing the public awareness of science at a time when it seeks to promote science uptake in schools and at third level and encourages Government to take an early positive decision to develop such a National Science Centre."
(Task Force, 2002, pxx)

The Department of Enterprise Trade and Employment's commitment is longer standing, with repeated statements of support from Minister Treacy and An Tánaiste Mary Harney over the last four years.

Finally, in the new Programme for Government, issued in June 2002, a statement of support for the development of one or more science centres in Ireland was given by the Fianna Fáil – Progressive Democrat coalition:

"We will support the establishment, following competitive funding procedures, of interactive science centres and awareness programmes aimed at enhancing knowledge an interest in science" (p10)

The clause as to funding procedures is largely due to economic pressures in the wake of September 11, 2001. Before this date, the Government had pledged €63.5 million for the establishment of three science centres nationwide in accordance with the ICSTI proposal, but that funding ceased to be available.

I spoke with Mr. John O'Brien, special advisor to an Tánaiste on July 22nd, 2002, to ask him about the current state of the project. He indicated that while the government is keen to see progress on the establishment of one or more interactive science centres in Ireland as soon as possible, the cost to the exchequer of implementing the ICSTI proposal, which requires the establishment of a purpose build modern facility in the city centre as a main hub for the network, is of great concern. The overall model proposed by ICSTI, one main centre in Dublin with two satellites elsewhere in the country, is still the preferred one, but the department is currently considering alternative possibilities and modifications to the plan. Among the options are funding some of the smaller and less expensive projects proposed by various interest groups across the country, for example, those submitted by the Institute of Technology in Carlow, Birr and DIScovery. None of these alternative projects have been singled out as preferred options as yet, though the government does hope to make a final decision as soon as possible and to see construction of the primary centre starting in 2003.

When asked about the possibility of entering into sponsorship talks with science and technology industry to facilitate the construction of a new centre, Mr O'Brien indicated that although interest has been expressed by corporate bodies in sponsoring equipment and exhibitions after construction of the primary centre, there is no interest in sponsoring the building itself. Capital costs will most likely be met by public bodies, or through public-private collaboration.

He confirmed that the government's motivation in establishing the centre is largely educational, but emphasised that the facility is intended to provide an education to all members of society, not just an academic education to school children. In terms of schools, the project is seen by the Government as one element of a larger program to encourage the uptake of sciences at all levels. Another key element is the re-introduction of science into the primary school curriculum. From the perspective of informal adult education, it is

hoped that the centre will allow the general population to develop an appreciation of science and technology and its role in our lives. In addition, the facility should promote science and technology careers as an exciting and interesting option.

I asked Mr O'Brien if Ms Harney's enthusiastic support of the proposed Irish facility had been inspired by visits to any particular facilities internationally, and if any of these were likely to provide a model for the Irish centre. He told me that Ms Harney was most impressed by the Weizmann Institute in Israel, which boasts a partially open-air science centre, the Barbara and Morris Levinson Visitors Center.⁴ But he also quipped that this format was unlikely to be suited to the Irish climate! The Irish centre is not intended to be a replica of any existing centre, but to be unique.

When asked about the possibility of entering into collaboration with W5 in Belfast and establishing satellites in the Republic, he indicated that the Government is not interested in developing Irish centres on this model, but is instead committed to establishing a facility in the Republic which will be relevant to and accessible by the whole country.

⁴ http://wis-wander.weizmann.ac.il/english/levinson/low_visitor.html

3. Do science centres work?

Museums are generally accepted as having an educational value, and that we “learn by doing” has been a popular maxim for generations. Given these two principles, we should expect that science centres will have an educational impact on those who are motivated to visit them. In this chapter, I will review the successes of existing science centres as regards education and public awareness of science.

3.1 *Published studies*

Much of the belief in the educational value of interactive science centres is based on faith in the effectiveness of informal learning and “learning by doing.” It is so widely taken for granted, in fact, that we do learn from science exhibits that the majority of the literature on learning in science centres focuses on techniques for increasing the quantity and quality of learning, not on the question of whether or not significant learning occurs in the first place. The most relevant reference to the question of whether or not learning occurred was to a study in 1962 concerned with whether or not visitors to the Seattle world fair learned anything from the exhibits in key areas: the findings were positive, though concerned with the short-term impact of the learning experience. Results showed that “small but significant” knowledge gains were made through exposure to the exhibits, and that “exhibits chosen as being ‘enjoyed’ were also the ones for which the greatest information retention occurred” (Taylor, 1963. Cited in Crane et al, 1994, p259)

Because of the expense involved and the time-consuming nature of longitudinal studies, and the fact that the modern interactive science centre is just over 30 years old, little evidence exists for the long-term impact of casual visits to such centres, although studies such as that of Diamond et al confirmed that a significant impact is had on those with longer term exposure (Diamond et al, 1987. Cited in Crane et al, 1994, p216). There is, however, a wealth of material on the value of interactive exhibits and their immediate affects.

The main argument for interactivity as opposed to passive learning is the belief that “we learn by doing.” In his 1985 PhD thesis, Brezin conducted practical observations to

examine this popular theory. He tested the effect that “doing” had on attentiveness, ability to relate new information and experiences to existing knowledge and ability to evaluate new information in a group of 75 eighth-grade students. In all three cases he found positive correlations, verifying the validity of interactive learning (Brezin, 1985).

Aside from facilitating understanding and learning, “participatory devices in exhibits often attract more attention and time from children and adults than do static exhibits” (Bitgood et al, 1994, p72) opening the door to the possibility of an informal educational experience being had by a visitor. And Boisvert and Slez have demonstrated that the more interactive an exhibit is, the greater the level of engagement experienced by museum visitors, and the longer its holding power (1995). In addition, Miles indicated that even when museums do not succeed in transferring large amounts of factual information to their visitors, they “do present opportunities for awakening people’s interest in a subject, so affecting their educational desires” (Miles, 1987, p121). This implies that even if the “bells and whistles” of the exhibit that initially attracted attention fail to deliver an educationally uplifting experience, the disappointed visitor may be inspired to find out more by themselves as a result of the initial interest piqued by the display. In support of this idea, White and Barry found that 19 of 21 visitors to a zoo learning site did something as a result of their visit. Activities included talking about the visit, making a repeat visit, consulting books on animals and applying the knowledge they had acquired in later observations of animals (White & Barry, 1984. Cited in Crane et al, 1994, p77). This shows that the learning experience does not end when the visit does, and that the potential for a knock-on long-term affect on learning, attitude and beliefs is not a far-fetched expectation.

As for the academic impact of learning through interactive exhibits, Borun and Flexer demonstrated that students who had viewed a particular science museum exhibit scored higher on tests on that topic than students in a control group who had not. What is more, feedback from the students indicated that they found the exhibits more enjoyable and interesting than ordinary lessons on the same topic (Borun & Flexer, 1984. Cited in Crane et al, 1994, p210). Duensing argues, too, that interactive exhibits that allow visitors to experiment with doing things wrong as well as right results in a more useful and

memorable learning experience than those that restrict the learning experience to witnessing the “correct” operation of a principle or device (Duensing, 1987). It allows the visitor to gain an understanding of the limitations of and boundaries on the phenomenon explored.

3.2 Interview with the Exploratorium

I interviewed Sue Allen, Director of Visitor Research and Evaluation at the Exploratorium, the most well known and emulated interactive science centre, to ask her about visitor experiences at the institute. I wanted to establish to what degree the organization saw their role as educational, and whether or not their audience experienced the exhibits as the Exploratorium intended. I felt that both of these issues were significant in relation to the Government’s hopes for the impact of an interactive science centre in Ireland and the reality of the resultant experience.

I asked Ms Allen whether the Exploratorium’s exhibits were primarily designed with education, public awareness or entertainment in mind, and she told me that the weighting for all three is roughly the same, with marginally less concern for public awareness than the other two factors, scoring them at 8/10, 7/10 and 8/10 respectively. She also indicated that there is variety in the objectives of each exhibit on the floor: “Some are whimsical, some good for generating social interactions, some designed to show a scientific principle.”

She went on to say that: “We don’t believe that separating entertainment from education is a productive direction for museums to go. We really want both in an integrated experience. Also, we aren’t just about science, but ‘science, art, and human perception,’ so that’s worth bearing in mind as another complicating factor.”

As regards evaluating the visitor experience, she indicated that most of the evaluation conducted is formative, that is, carried out during the design and creation stages to gauge the likely impact and reactions of the exhibits after they have been placed on display. This work is usually carried out with individual exhibits, or with small groups of roughly half a dozen exhibit elements. “The formative evaluation emphasizes two main things: Firstly, whether visitors can access the ‘critical experience’ the exhibit offers, and

secondly, how they interpret this experience. The first is done mostly through observation (can visitors make it work?), and the second mostly through open-ended interview (what did they think it was trying to show?)” This formative feedback allows exhibits to be tweaked and reworked until the desired affect is achieved, then they can be put on display for the public.

When asked whether audience reaction and feedback had an impact on the Exploratorium’s motivations in exhibit design, Ms Allen said that it “alters our implementation strategies rather than our motivations. The only goals part I think it changes is about audience: we’ve moved our target audience from mostly adults (or at least age 10) to include much younger children, mostly as a result of families with very young children using our facility, and a common perception that we are ‘a children’s museum,’ which was never our intent as an exclusive focus.”

Ms Allen felt that of all the Exploratorium’s work, the teacher training programmes had the greatest potential for impact and influence on public awareness of science. She pointed out that for most visitors to the museum, the experience lasted only a few hours and that the Exploratorium did not conduct longitudinal studies to determine the long-term impacts of such visits due to the difficulty and cost. Earlier evidence has been cited of the positive effects of longer term exposure to facilities such as those offered by the Exploratorium (Diamond et al, 1987. Cited in Crane et al, 1994, p216), and such long term exposure is offered to teachers who typically spend a month or more at the institute learning science and teaching methods. Ms Allen indicated that “there is some evidence of changes in teachers’ feelings of self-confidence, science knowledge, etc.” and that she felt that this would be the most useful way an Irish institution could best achieve its goals of education and public awareness: “Teachers reach far more people, and extended immersion experiences in this inquiry environment can impact their teaching in significant ways over time.”

3.3 Where do science centres fail?

A common criticism of science museums is that they tend to be dominated by physics exhibitions: this is because exhibits demonstrating physical principles are easier

and cheaper to design, construct and maintain than those illustrating chemistry and biology. Most chemical reactions are irreversible, resulting in expensive consumption of raw materials and generation of waste. Living biology samples need constant monitoring and care and are subject to decay.

Fischer's study on the integration of humour into astronomic exhibits surprisingly demonstrated a negative correlation between entertainment and learning. In his study, he showed two groups of adults from a total sample of 495 one of two 15-minute videos covering 20 astronomy concepts. One show was purely instructional; the second contained 10 humorous elements. The audiences were tested for learning after seeing the video, with those who had watched the non-humorous show scoring more highly than those who had seen the video with humour. Fisher hypothesised that although the humour may have focussed the audience's attention, the attention was probably focused on the humour rather than the science! Theoretically, it could be possible that the entertainment value of interactive science exhibits could detract from the full potential of the learning experience.

Although Borun and Flexer's study showed that learning did result from viewing a particular science museum exhibit and that students preferred the exhibits to lessons, students who learned from the exhibits scored no higher on tests than others who had been exposed to the same information through a classroom environment (Borun & Flexer, 1984, cited in Crane et al 1994, p210).

A crucial question we must ask ourselves is whether or not the interactive science centre market has been saturated. In countries such as the UK and Germany, where a proliferation of new sites have opened in the last decade, many centres are facing extreme financial difficulty and even closure. As previously discussed, many exhibits in new centres are based on those of long established centres, such as the Exploratorium, with little innovative or original thinking evident, providing little incentive to visitors already familiar with existing sites to expect something new.

With computers accessible by most of the public at home, in educational establishments, libraries, or internet cafes: interactive educational software and websites abound. In addition, there is a wealth of electronic educational toys available in the shops, and most young children own several. With such a profusion of interactive toys, games and

information services available to the public in their own home at relatively low costs, science centres need to offer something new and exciting that cannot be compared to these alternative sources.

Considering the Irish motivation for opening a science centre, the most significant failing is that of the 80 science centres in the UK to impact on uptake of science subjects and careers. The UK has already achieved the Irish Government's goal of having an interactive science centre within two-hours journey of 90% of the population (Durant, 2002, p11), but despite this, students in the UK still find science boring (BBC, 2002). Unless improvements are introduced into the teaching of science in schools, efforts in informal science education will have only a limited impact.

4. Is the Irish public interested in science centres?

Results of the EU Barometer report seemed to indicate that:

“[The Irish] have virtually no interest in attending science centres ... Just 4.1 per cent said they had attended [one] compared to an EU average of 11.3%. The Barometer people might not have realised that visiting a dedicated science centre is difficult here – we don’t have one.” Dick Ahlstrom (2001, p2)

Given that the Irish must travel to another country in order to visit an interactive science centre, 4.1% of the population having done so seems quite promising! The study did not ask respondents in other nations how far they had travelled to attend the centres they visited.

In terms of local attractions, short term science exhibitions around the country have received good attendance numbers. When the Tralee Science Works road show toured Galway, Waterford, Dublin and Cork in November 1996, “during the four weeks over 4000 people visited 162 shows and an equal number could not be accommodated” (iSCAN, 1997a). Carlow IT’s “The Magic of Science” event proved popular enough to attract 4000 visitors, including students from as far away as Cork and Dublin, during its short run (Dooley, 2002).

In this chapter, I will discuss a survey I conducted in order to establish general interest in and knowledge of interactive science centres among the Irish population.

4.1 Survey

In an effort to establish the level of public interest in interactive science centres in Ireland, I conducted a survey of visitors to several sites of scientific interest around the Republic. These centres were: Dublin Zoo, The National Science Museum in Maynooth and the Natural History Museum, all of which are listed as existing sites of scientific or technological interest in the appendix of the RDS report, “Science Centres for Ireland.” Results obtained at these sites were supplemented with responses to an on-line version of the survey.

4.1.1 Method

I conducted the on-location portion of the survey with the self-selecting group of visitors to sites of scientific interest. These candidates had by their presence at these facilities established themselves to be members of the general public with an interest in attending such a site. Two of the sites were museums: the Natural History Museum on Merrion Street, and the National Science Centre in Maynooth. The third was Dublin Zoo. Visitors to each of the sites were interviewed on exit and asked to say why they had chosen to visit the site in question, to what degree they had enjoyed their visit, what their general museum attendance level was, whether they knew what an interactive science centre was, and if so whether they had already visited such a centre. If respondents had already visited a centre elsewhere, they were also asked whether they would be interested in visiting one in the Republic of Ireland. It was deemed inappropriate to seek a confirmation of such interest from individuals who had not already experienced the phenomenon and would base their response on conjecture. A secondary issue addressed by the survey was the distance the public travelled to visit the sites they were attending, and the self-reported distance they would be willing to travel to attend the proposed interactive science centre if they expressed an interest in attending. A sample questionnaire for Dublin Zoo is included in Appendix B.

The on-line survey was the same as the on-location one with the exception that respondents had not already been identified as museum-goers before questioning. However, by virtue of the fact that the survey was taken on-line, they had established themselves as users of computer technology and the internet. When publicizing the on-line survey, I requested that members of the public complete the survey regardless of whether or not they had an interest in museums in order to get a wider perspective of public opinion.

Results were collated in an Excel spreadsheet for analysis. I expected to find that the majority of visitors to each on-location site lived within a close range of the site and that in relation to a proposed interactive science centre, most people would be happiest to visit a centre located locally. I expected that most people would know, or be able to guess, what an interactive science centre was, and that because of the self-selecting nature of the

on-location group questioned, that the number who had already attended interactive science centres to be higher than the 4.1% of the general public found by the EU Barometer study.

4.1.2 Results and analysis⁵

The sample set of on-location respondents consisted of 23 males and 33 females of between the ages of 18 and 83. The average age was 36. The on-line respondents were 18 males and 30 females aged between 20 and 50, with an average age of 30. The on-location sample included non-Irish tourists, whereas the on-line sample consisted only of Irish nationals.

The following tables summarise the responses of the two sample sets:

On-location

No of museum visits /year	Total
0	8
1	9
2	14
3	8
4	7
6	2
10	2
12	5

Familiar with interactive science centres	Total
N	23
Y	33

Have visited interactive science centres	Total
N	12
Y	19

On-line

No of museum visits /year	Total
0	8
1	7
2	12
3	6
4	4
5	4
6	3
7	1
12	1
15	1
35	1

Familiar with interactive science centres	Total
N	21
Y	27

Have visited interactive science centres	Total
N	8
Y	19

⁵ Tables of the responses received to questionnaires are included in Appendix C.

Would you visit an interactive science centre in Ireland?	Total
N	2
Y	19

Would you visit an interactive science centre in Ireland?	Total
N	0
Y	19

How far (max) would you travel to visit an Irish centre?	Total
30-40 mins	1
1 hour	3
1.5 hours	1
2 hours	1
3 hours	1
In Dublin	2
East Coast	1
Anywhere in Ireland	1
Local	6
Anywhere in Ireland accessible by public transport	1
No opinion	1

How far (max) would you travel to visit an Irish centre?	Total
40 mins	1
1 hour	8
1.5 hours	3
2 hours	3
20 miles	2
In Dublin	1
No opinion	1

First I will consider the on-location sample and examine what motivated people to visit the sites under consideration, how far they travelled, and who they visited the site with. Secondly, I will consider to what degree both sample sets understood the phrase “interactive science centre,” how many had attended a centre, and of these how many would visit a centre in Ireland. I will also consider the self-reported willingness-to-travel of those who expressed an interest in visiting an Irish interactive science centre.

Attendance motivations

73.2% of visitors to all on-location sites attended with family members, and a further 23.2% attended with friends. The main reason given for attending the sites was to bring children. On average 32.1% of all visitors gave this reason, with a slightly higher proportion at Dublin Zoo (36.4%)⁶. The next most popular reason overall (at 24.4%) was

⁶ This figure excludes visitors attending the Jack and Jill event and an ISPCC group outing. Inclusion of these groups raises the figure to 51.5%.

that visitors had been walking by, spotted the attraction and decided to take a closer look. All of these responses were recorded at the Natural History Museum, which is not surprising given its central location. Visitors to the Zoo and Maynooth were more deliberate in their decisions to attend the sites. Other reasons for attending sites were special occasions, such as the “Jack and Jill” event at the Zoo and the Saturday Workshop in the Natural History Museum, and membership of the site in the case of Dublin Zoo.

When individuals who had already visited interactive science centres were asked why they had gone, 23.8% also cited children as a reason for those visits. 42.9% of visits were either due to the visitor being on holiday or visiting the area where the centre was located, or bringing someone else who was on holiday or visiting. 9.5% said that they had attended for educational reasons, and the same number again indicated that they had a keen interest in science which had motivated them to visit.

Familiarity with interactive science centres

As expected, most on-location respondents (60.6%) were familiar with the concept of interactive science centres, or could guess what they were from the name. Equally, a high percentage (67.9%) of the on-line respondents indicated that they knew what an interactive science centre was. The most frequently used descriptions offered by all respondents were variants of: “interactive” (15 mentions), “active participation”, “hands-on”, “for kids” and “learning” (7 mentions each) and “educational”, “play”, “push buttons” and “touch” (5 mentions each).

Of the respondents familiar with the concept of interactive science centres, 63.6% of on-location and 70.4% of on-line respondents had visited at least one such centre. (With respect to total respondent numbers, these figures were 38.2% and 39.6% respectively. This figure is significantly higher than that found by the EU Barometer report, though the respondents to this survey were of a group more likely to have attended such a centre and there was no time limit imposed on when centres should have been attended.)

Only 2 respondents who had already visited interactive science centres said that they would not visit an Irish centre. In one instance, the earlier visit was to EPCOT as part of a holiday package, and in the second the visit had been organized as part of a school

tour. The respondents had also reported low museum attendance rates of 1/year and 0/year respectively, and were both visiting the locations they were interviewed at because of friends or family members who had wanted to attend. This seems to support the belief that individuals who have already attended one centre will be interested in visiting another. Two other respondents indicated that they would attend the centre with children, but not on their own, and a third said that the specific themes dealt with in the centre would be a deciding factor in attending.

Willingness to travel

Of the on-location respondents, 73.2% were staying locally at the time of their visit to the site at which they were interviewed. A further 12.5% came from bordering counties. The remaining 14.3% of visitors came from further afield. Dublin Zoo held the greatest attraction for these long-distance travellers, with 15.2% of all their visitors falling into this category, and coming from as far away as Down and Cork.

As expected, most members of the public willing to visit interactive science centres said that they would visit local centres or ones situated no more than 1 hour away (on-location: 47.4%; on-line: 52.6%⁷; average: 50%). The next most popular location with the on-location respondents was Dublin (11.1%), though given that this response was given exclusively by individuals staying in Dublin, this could justifiably be added to the “local” figure. This self-reported willingness to travel supports the ICSTI proposal’s recommendation of the establishment of a network of science centres to increase national reach.

Summary

Overall, although I had expected more people to be familiar with to have visited interactive science centres than indicated by the EU Barometer report, I found the overall figures much higher than I expected. The levels of expressed interest in attending a centre in Ireland were encouraging, and willingness to travel to attend sites was greater than I expected, with 14.3% of on-location visitors having come from a distance greater than the

⁷ Assuming that a distance of 20 miles can be travelled in under 1 hour by public or private transport.

county or neighbouring counties of the attraction visited, and 50% of all those surveyed willing to travel for more than an hour to visit an interactive science centre in Ireland.

Reasons given for visiting existing sites and information provided when defining interactive science centres and stating an interest in attending shows that children provide the greatest motivation for the on-location sample set when deciding to visit an attraction. This bodes well for an interactive science centre in Ireland which will provide for adults and children alike a new and unique museum-going experience in the Republic, which must guarantee its popularity. Science centres also proved to be popular attractions for Irish and international holiday-makers. I was surprised by how rarely educational motivations were given as reasons for attending sites, and interactive science centres in particular, but this may be implicit among the responses indicating that children were a factor in deciding to visit a site.

Disappointingly, only one respondent from the Republic seemed to be aware of the W5 centre in Belfast when asked would they attend an interactive science centre in Ireland, although several respondents from the North mentioned the site. Equally, only one respondent was aware of plans for the development of a centre in the Republic. It would have been interesting to include in the survey the questions of whether or not respondents were aware of W5 and whether or not they would be willing to travel to Belfast to visit it, but the issue is beyond the scope of this dissertation.

5. What are the alternatives?

In this chapter I will consider some of the alternative promotional activities the Government could choose to sponsor instead of funding the establishment of an interactive science centre in Ireland. The frugal figure of €12.7 million over three years estimated by the DISCoverly project is taken as a baseline for comparison.

5.1 Science buses/travelling exhibitions

A number of mobile projects have allow school children across Ireland to come close to the interactive science centre experience through temporary exhibits and science demonstrations and shows. Mobile exhibits benefit schools who due to location, financial or staffing reasons cannot visit stationary exhibits in other parts of the country. In addition, any interest or excitement about science that is fostered in the children will be related to the familiar environment of their own school or community, which may facilitate continued interest in science after the exhibit's departure: science will not be seen as something to be associated with a remote location or a "big-day-out," but as something potentially local and familiar. The smaller scale of the operation and the ability to readily interact with presenters or explainers may also be less intimidating than large scale impersonal displays.

The Pfizer Science Bus was designed by The Irish Centre for Talented Youth at DCU and developed at a total cost of IR£0.5 million, IR£350,000 of that donated by Pfizer. On the road since March 2000, the bus's target audience is 9-12 year olds, and every week during term-time the bus visits four schools, primarily within the Dublin area. It is equipped with a range of hands-on exhibits and experiments that the children can engage with, and the staff perform demonstrations and science shows. The bus is intended to help to reverse the downturn in numbers taking science subjects in schools "by giving children the chance to experience science in an exciting and dynamic fashion" (iSCAN, 1997c). The bus also provides material for follow-up class work to the schools. The venture has been extremely popular and successful since its inception, and Dr. Sheila Gilheany, Director of the Irish Centre for Talented Youth has been quoted as saying: "The most

frequently heard remark from children who have been on the Science Bus is ‘I want to be a scientist when I grow up’” (iSCAN, 2000). The bus’s services have been expanded recently to include teacher training for primary school teachers, faced with the recent addition of science to the primary curriculum. For the setup cost of DISCOVERY centre, the Government could afford to put another 16 science buses on the road (allowing for inflation), making a total of 17 buses to serve the 3316 state-run primary schools in the Republic. Even at this, however, every school could only avail of a visit from a science bus every 2 years, assuming an even distribution of visits.

Similar operations to the Science Bus could also be considered and deployed locally around the country, such as the services provided by the now defunct Science Works Roadshow in Tralee and Mad Science in Dublin.⁸ Science Works visited schools and special events with a collection of interactive exhibits, performing live science shows and animated star shows in its portable planetarium, and Mad Science provided science shows and workshops for children aged 7 to 12. I could not establish why the Science Works Roadshow ceased to operate, but in conversation with Brendan Hogan who used to operate the Irish Mad Science franchise, I was told that the reason for its solution was not the lack of an audience, but the logistical difficulties of running the show in an Irish context. Infrastructure, insurance and importation problems made the project unviable.

5.2 Improved school facilities and resources

Although high-profile major interactive science centres are attractive institutes and may have a positive impact on learning, visits are likely to be sporadic and isolated incidents for most of the population. The provision of local facilities is likely to have a greater impact and the provision of facilities and materials in schools to have the most beneficial educational impact. Stohr-Hunt examined the impact of regular hands-on experimentation on learning among eighth-graders in America. Using a nationally representative sample of data collected by the National Education Longitudinal Study of

⁸ The Irish Mad Science show was a franchise of an international operation based in Canada. For more information on the parent organization, see <http://www.madscience.org>.

1998 and results of a self-administered teachers' questionnaire, she found that "students who engaged in hands-on activities every day or once a week scored significantly higher on a standardized test of science achievement than students who engaged in hands-on activities once a month, less than once a month or never" (Stohr-Hunt, 1996, p101). This evidence is alarming in the Irish context when taken in conjunction with the Task Force on Physical Sciences' finding that more than 11% of students *never* carry out practical work during their science studies (MRBI, 2002). Might it be better to invest in providing science equipment in schools rather than in distant science centres?

Let us consider the costs to an individual school and to the state of organizing a class outing to an interactive science centre in Dublin: a rural school making a single trip to a science centre with a class of 30 students could be expected to pay in the region of €500 for a transitory informal educational experience lasting maybe 3-4 hours.⁹ For this price, they could instead make a long term investment and equip their school lab with one significant piece of equipment, for example a high powered microscope or an oscilloscope, which would be available to all students over a number of years. If a decision were made to spend the money required to build and maintain the centre on developing school facilities instead, an additional €12.7 million¹⁰ could be made available to the 750 state-run secondary schools in Ireland over a three year period to upgrade and modernize their lab facilities. In this case, each school would receive €17,000 a piece. This equipment would then be available to all students in the school in the long term. Although less dramatic, exciting and fun than a day-trip to a science centre, the long-term benefits of the additional facilities is likely to prove more beneficial to the students in their studies.

5.3 Science events

High profile science events can be used to promote awareness of science as well as involvement in scientific experiments and endeavours. In this section I discuss two of the best known science events in Ireland: Science Week and the Young Scientist Exhibition.

⁹ Assumes bus hire of €400, 30 child admission tickets at €3 each and two adult admission tickets at €5 each.

¹⁰ Based on the DIScovery project's costing estimates.

Science Week, co-ordinated by the Science, Technology and Innovation Awareness Programme, has been an annual event in Ireland since 1996. Science Week is a nationwide celebration of science, technology and innovation in Ireland. In 2001 over 180 events were organized by industry, state agencies, museums, educational institutes or the media. Most Science Week events are free to the public, and all age groups are catered for. Because events are organized and themed for relevance at a local level, with funding coming from sponsoring bodies in education and industry, the Government's main expense is the co-ordination and advertising of events, although a selection of the events are also organized and funded directly by Government agencies. The Government could choose to increase the frequency and/or scale of Science Week-type events in collaboration with the various sponsoring bodies to promote science and technology at a local level to all sectors of the community, perhaps achieving a more relevant and lasting understanding of the implications of science and technology at local and national levels than one, two or three science centres nationwide could hope to.

The Young Scientist Exhibition, running since 1964, is the longest running science event in the world. The event invites primary and secondary school children to submit individual and group projects on science and technology topics. The event has become more and more popular in recent years, with 450 projects submitted in 2000, 650 in 2001 and 774 in 2002. Typically, more girls than boys enter the competition, making the exhibition a valuable way of attracting girls towards the sciences in education, and later to careers in science and technology. Winners of the Irish exhibition go on to present their projects in European and international competitions, helping to promote the Irish scientific image at national and international levels. The event is currently sponsored by industry, but could provide a useful platform for the Government in its promotion of the educational and economic value of science studies.

6. Conclusions

It is very telling that Government support for the interactive science centre initiative comes primarily from the Department of Enterprise, Trade and Employment. The Task Force report, commissioned by the Department of Education lent its support to the proposals just recently, and although an educational problem needs to be addressed, the main reason for interest in addressing it seems to be the knock on effect for industry and the economy. Tourism and public perception are secondary issues to which a science centre may contribute as an added bonus.

A crucial issue I would like to raise concerns the current availability of science sites, events and other facilities in Ireland which are not exploited to their full potential. The main argument for an Irish interactive science centre is that it will raise the profile and popularity of science in Ireland, impacting on education and public awareness. However, Ireland by no means suffers from a lack of science resources, but rather from poor organization and a lack of useful and relevant publicity for those resources. Increased attention to promoting existing facilities should be the Government's first step towards increasing the profile of science and technology in Irish society.

As an attentive member of the public with an interest in science I was surprised by how much information I had never been aware of, and by the difficulties I encountered in the pursuit of further information on some of the facilities identified. Private conversation with some of the key players indicated that demand for facilities such as those already available is huge, so why have so many of us never heard of the organizations providing them? Maynooth's excellent collection is largely unheard of except in local circles. The very successful "Magic of Science" event in Carlow, although well attended, was not as busy as the 2001 event, according to the explainers present the day of my visit: the first event had been organized earlier in the year, avoiding a clash with other end-of-year activities, and had been more widely publicized in advance of the event, rather than during its run. The "Mad Science" franchise failed not for want of audience, but because of poor organization and self-imposed travel constraints limiting the venues that could be serviced. Had an expanded geographic range been feasible there is little doubt that the business

would have been as successful and profitable as its US and Canadian counterparts. Logistical problems associated with establishing the first Irish franchise, acquiring insurance and importing equipment severely hindered the smooth operation of the service. The Táin Holiday Village exhibits failed initially because of an inappropriate context, and now, in a real catch-22 scenario, suffer from a dearth of publicity on the grounds that they are not popular enough. And finally, despite the interest in attending a science centre in Ireland expressed by respondents to my survey, only one from the Republic seemed to have heard of W5, and one other was aware that “something like that” had been proposed for the IFSC.

Yet despite the number of sites already available, Ireland could indeed benefit from an interactive science centre. Not only could such a centre provide resources and facilities not already available, but it could also provide a forum for the celebration of recent and contemporary science. In addition it could act as a facilitator, co-ordinating and publicizing the activities of other sites of scientific interest and special science events, and provide a focus for the Government’s public awareness campaign. Additionally, there seems to be little doubt that science centres do have an effect on attitude and learning at least in the short term, and that long term exposure to the kind of exhibits and methods of science centres has a lasting effect. Given the value of higher exposure to sites, the distributed network of centres proposed by the ICSTI report seems to offer the greatest potential benefit in the Irish situation. Alternative enterprises, such as science buses, science fairs and public events, which also have great potential for achieving the Government’s aims are often included among the outreach programmes of existing science centres, and indeed these and other suggestions are included in the various proposals for an interactive science centre in Ireland. The establishment and ongoing support of a science centre network in Ireland may offer the Government a way of killing several birds with one stone and reaping the greatest benefits for their efforts.

As far as potential audience goes, there is an ample supply of enthusiastic potential attendees available. The facility would be well supported by schools, locals and tourists, as evidenced by a number of feasibility studies and my own survey results. The concept of a science centre is not an alien one, and many Irish people have already visited centres

internationally. That said, more than 50% of respondents in my own survey indicated that they would not be willing to travel more than 1 hour to visit an interactive science centre in Ireland, again supporting the validity of the distributed model in the Irish context. Given the population distribution and the high concentration around the Dublin area, the presence of a large centre in Dublin with (at least) two smaller regional branches also seems appropriate.

As regards design, subject matter and content, the fact that many international centres are experiencing financial difficulties and even facing closure due to a lack of originality is an issue that must be given serious consideration in plans for an Irish centre. Given the “smallness” of the world today, due to frequent and inexpensive travel between countries, most of us are in a position to visit centres in other locations, and anecdotal evidence suggests that we are more likely to visit museums and other cultural institutions when on holiday or in a new environment than when at home. These considerations make the profusion of centres in the neighbouring UK (and one under-publicized facility in Belfast) a strong competition to any centre established in Ireland. In order to secure an audience, Ireland must produce a solution that is unique on a global as well as on a national scale. The ICSTI proposal recommends that in the implementation of a distributed network, attention be given in each facility to science and scientific achievements peculiarly relevant to the local area, and that the network as a whole pay tribute to Ireland’s achievements in science and technology. These are valid and valuable recommendations towards making an Irish enterprise successful.

Another possibility for Ireland in developing an attraction worth of international attention is to become a pioneer in establishing a fourth-generation of science museum: the concept of the third-generation science museum has been thoroughly developed, in particular in the last 35 years, and the attention of many has already begun to turn towards defining the next incarnation. Ireland is in a position to play a role in this definition. Attempting to establish a fourth-generation centre, however, does not mean that we must reject the experiences and benefits of third-generation centres: the London Science Museum, one of the most respected in the world, contains many elements of second generation science museums, while having also developed an internationally respected

third-generation facility. This should be our inspiration moving forward. In addition, we should consider that if the many “cloned” science centres around the world can continue to attract visitors, though perhaps not at the desired levels, a new and unique establishment must prove a great international attraction to the increasing numbers of science tourists world-wide. What better way to inspire the Irish nation to take pride in its scientific and technological impact on the world than by instigating another high-profile science first?

Appendix A – Websites for mentioned sites of scientific interest in Ireland

National Science Centre, Maynooth: <http://www.may.ie/museum>

Dublin Zoo: <http://www.dublinzoo.ie>

National Sealife Centre, Bray, Co. Wicklow: <http://www.sealife.ie>

Dunsink Observatory, Dublin: <http://www.dunsink.dias.ie>

Schull Planetarium, Co. Cork: <http://www.westcorkweb.ie/planetarium/>

The Táin Holiday Village, Co. Louth: <http://www.tainvillage.com/>

National Botanic Gardens, Glasnevin, Dublin:
<http://www.itb.ie/HorticulturalColleges/botanicgardens.html>

Avondale Forest Park, Wicklow:
http://www.coillte.ie/tourism_and_recreation/avondale_home_parnell.htm

National Transport Museum, Dublin:
<http://www.nationaltransportmuseum.org/passenger.html>

National Print Museum, Dublin: <http://www.iol.ie/%7Enpmuseum/>

Appendix B – Sample survey

Date: _____ Time: _____ Sex: M F Age: ____

County of Residence: _____

(If non-resident in Ireland, Country of Residence and County stayed in on holidays.)

Where did you travel from today to visit Dublin Zoo? _____

Why did you decide to visit Dublin Zoo? _____

Are you here: Alone With friends With family With group (e.g. school or club)

On a scale of 1-10, how much did you enjoy your visit to the zoo?

1 (didn't enjoy it at all) 2 3 4 5 6 7 8 9 10 (thought it was fantastic)

How often do you visit museums? _____

Can you give some examples of museums have you visited in Ireland or abroad in the last 12 months?

Name	Location

What does the phrase “interactive science centre” mean to you? _____

If respondent can offer a description:

Have you ever visited an interactive science centre? Y N

If respondent has visited a centre:

Which centre(s)? _____

Why were you interested in visiting the named centre(s)? _____

Would you visit such a centre if one opened in Ireland? Y N

Where/how far would you be willing to travel to visit such a centre? _____

Appendix C – Survey responses

On-location

Dublin Zoo surveys were conducted between 2 and 4pm on Saturday, July 17, 2002.

Maynooth surveys were conducted between 2 and 6pm on Sunday, July 21, 2002.

Natural History Museum surveys were conducted between 10:30am and 12:30pm on Saturday, August 3, 2002.

Location	Sex	Age	County lived in	County come from	Why visited facility?	With	Enjoyed (/10)	how often visit museums lyr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
Dublin Zoo	F	50	Dublin	Dublin	Jack & Jill	Family	10	2	Louvre, Paris	N						
Dublin Zoo	F	30	Dublin	Dublin	Jack & Jill	Family	10	3		N						
Dublin Zoo	M	27	Dublin	Dublin	Animals, Kids	Family	4	1	Art Gallery @ Garden of remembrance	N						
Dublin Zoo	F	32	Cork	Cork	Jack & Jill	Family	9	4	City Gaol, Cork; Fota Wildlife Park, Cork; Leehy's Farm, Mitchelstown; Famine Museum, Skibereen	N						
Dublin Zoo	M	27	Tipperary	Kildare	SO wanted to	Friends	8	0		N						
Dublin Zoo	F	40	Galway	Dublin	Kids	Family	5	4	Wax Museum, Dublin; History Museum, Yorkshire	N						
Dublin Zoo	M	33	Spain (Dublin)	Dublin	Kids	Family	7	2	Art Galleries in Madrid and Salamanca	Y	educational service	N				
Dublin Zoo	M	26	Dublin	Dublin	Reputation	Friends	7	0		N						
Dublin Zoo	F	21	Belgium (Dublin)	Dublin	Animals, Reputation	Friends	9	12	Guggenheim, NY; Dali, Spain; Louvre, Paris; Smak, Ghent	Y	museum of sci	N				

Location	Sex	Age	County lived in	County come from	Why visited facility?	With	Enjoyed (10)	how often visit museums lyr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
Dublin Zoo	F	49	Down	Down	Kids	Family	7	2	Folk Parks, NI; National History, Dublin	Y	hands-on	Y	W5	Kids	Y	East Coast
Dublin Zoo	F	33	Derry	Dublin	Kids	Family	10	0		Y	computers, hands-on, touching	Y	Florida	Part of package (EPCOT)	N	
Dublin Zoo	F	51	Scotland (Dublin)	Dublin	Zoo too far away at home	Family	8	2		N						
Dublin Zoo	F	45	Wexford	Wexford	Grandchildren	Family	10	1	98 Centre, Enniscorthy; Caves in Kent	N						
Dublin Zoo	M	27	Dublin	Dublin	Day out, Walk	Friends	6	12	National History Museum, Collins Barracks; Field Museum, Chicago; Walker Art Gallery, Minneapolis; National War Museum, London; National Gallery	Y	sci centre w/ interactive exhibits	Y	Chicago; Paris	Engineer	Y	Would go as far as Dublin to Galway
Dublin Zoo	F	36	Kildare	Kildare	Member	Family	9	2		Y	Animatronics, for kids	Y	Florida - dinosaur exhibit with animatronics	on holidays	Y	1 hr away
Dublin Zoo	F	33	Dublin	Dublin	Jack & Jill	Family	10	0		N						
Dublin Zoo	M	30	Dublin	Dublin	Meet friends	Friends/Family	8	4	National Gallery; National History; Dublin Castle, Chester Beatty; Douglas Hyde, TCD	Y	teaching sci with activities visitors can engage in	Y	London; Boston; SF; Amsterdam; Brussels	Interested in sci	Y	local/en route
Dublin Zoo	F	22	England (Dublin)	Dublin	Reputation	Friends	10			Y	using computers, learning boring stuff	N				
Dublin Zoo	M	30	Dublin	Dublin	Kids	Family	7	0		N						
Dublin Zoo	F	27	Dublin	Dublin	Kids	Family	8	3	National History Museum, Kildare St; National Gallery	Y	touch things, great for kids	Y	W5	visiting Belfast	Y	on train/bus route
Dublin Zoo	M	29	Dublin	Dublin	Kids	Family	8	4	National Gallery; Natural History;	Y	push and play	Y	Australia -	reputation	Y	Dublin

Location	Sex	Age	County lived in	County come from	Why visited facility?	With	Enjoyed (10)	how often visit museums lyr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
									Dublin Castle				Canberra			
Dublin Zoo	M	35	Dublin	Dublin	Kids	Family	9	2	History, Kenya	N						
Dublin Zoo	F	47	Dublin	Dublin	Niece visiting, had family ticket	Family	3	2	Collins Barracks; Kildare St	N						
Dublin Zoo	F	35	Meath	Meath	Member	Family	8	0		Y	learn about science	N				
Dublin Zoo	F	18	Antrim	Dublin	Animals, like zoos	Family	7	1		N						
Dublin Zoo	F	26	Canada (Dublin)	Dublin	SO wanted to	Friends	8	1		Y	play with things	Y	Toronto; Ottawa	Something to do, school	N	
Dublin Zoo	M	36	Dublin	Dublin	Kids	Family	8	2	National Gallery	Y	multimedia, video	N				
Dublin Zoo	M	36	Dublin	Dublin	Member	Family	7	0		N						
Dublin Zoo	F	40	Louth	Louth	ISPCC daytrip	Group	9	6	Natural history; Kilkenny Castle; Bunratty	Y	like bru na boinne with interactive exhibits	Y	bru na boinne	just to see it, good publicity, kids were interested	Y	Anywhere
Dublin Zoo	F	22	Meath	Meath	Member	Family	8	1	Aquaria in Spain and Tenerife	Y	kids get to interact and have a go	N				
Dublin Zoo	M	28	Kildare	Kildare	Day out	Family	8	2	Dublin Zoo	N						
Dublin Zoo	F	58	Sligo	Sligo	Reputation, kids	Family	8	3	London Zoo	N						
Dublin Zoo	F	30	Dublin	Dublin	Member	Family	6	0		N						
Maynooth	M	57	Dublin	Dublin	Ex-student	Family	8	2	National Museum	N						
Maynooth	F	43	Kildare	Kildare	Out for a walk - locals	Family	10	1	Wax; Steam Museum, Leitrim; Pearse Museum, Rathfarnham	N						
Maynooth	F	51	Canada (Kildare)	Kildare	At conference in the college	Group	8	2		Y	hands-on; like the one in Ontario	Y	Ontario; Atomic Energy Museum, Tennessee	Had visitors staying and was showing them the sites	Y	local

Location	Sex	Age	County lived in	County come from	Why visited facility?	With	Enjoyed (10)	how often visit museums lyr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
Natural History	M	19	US (Dublin)	Dublin	Walking by and saw it	Friends	8.5	2	Natural History, Cincinnati; Art, Cincinnati.	Y	for kids, toys and games to show how science works	N				
Natural History	M	23	US (Dublin)	Dublin	Walking by and saw it	Friends	8	10	Prada; Salvador Dali Museum; Modern Art; Louvre; Torture Museum Amsterdam	Y	hands-on, working with stuff	N				
Natural History	M	43	Kildare	Kildare	Kids	Family	9	1	Hugh lane	Y	making experiments	N				
Natural History	F	44	Dublin	Dublin	Saturday Workshop	Family	9.5	12	Kildare St; Collins Barracks	N						
Natural History	M	33	Waterford	Dublin	Kids	Family	8	1	American Natural History, NY	Y	education, kids	Y	Space museum NY - w/ observatory and show	Because it/they were there	Y	local
Natural History	F	25	UK (Dublin)	Dublin	They were scientists - ecologist and conservationist	Friends	8	3	Louvre, Paris; Museum of Middle Ages, Paris	Y	aimed at kids, introduction to science and natural history, with push buttons	Y	Science Museum London	Holiday	Y	
Natural History	M	49	Sligo	Sligo	Walking by and saw it	Family	8	1		N						
Natural History	F	31	Dublin	Dublin	bringing a friends daughter (5)	Friends	10	10	Picasso, Barcelona; National Gallery; Douglas Hyde	Y	show advances in science and technology; play	Y	Evoluan in Holland	was taken there	Y	1 hr away
Natural History	F	60	UK (Dublin)	Dublin	Walking by and saw it	Family	8	4	Hibernia Art; Fitzwilliam Museum, Cambridge; V&A, London; Tate	Y	pressing buttons	Y	Natural History, London	Grandkids	Y	local
Natural History	F	36	Dublin	Dublin	Kids	Family	10	3	Lough Gur; Collins Barracks; Railway in Clonakilty; Kildare St; National Gallery	Y	interacting, involved	Y	Exploratorium	Holiday	Y	1 hr away
Natural History	F	28	Louth	Louth	visited years ago and wanted to show brother	Family	7	2	Collins Barracks; Tate Modern; Folk museum Omagh	Y	like W5	Y	W5	educational visit (teacher)	Y	2 hrs

Location	Sex	Age	County lived in	County come from	Why visited facility?	With	Enjoyed (10)	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
Natural History	F	40	Dublin	Dublin	Kids	Family	7	2	Natural Hist, London	Y	touch and feel	N				
Natural History	M	27	Dublin	Dublin	Saturday Workshop	Family	7	12	Modern Art; Collins Barracks; Sealife	Y	technology; physical interaction with exhibits; not passive	Y	Sci & Tech, Chicago; EPCOT	they were there	Y	30-40 mins
Natural History	M	47	US (Dublin)	Dublin	on tour bus stop	Family	8.5	3	Natural Hist, Washington; Geology, Washington	Y	hands-on; touch	Y	Baltimore	was with a 12 yr old	Y	Dublin
Natural History	M	83	US (Dublin)	Dublin	Walking by and saw it	Family	10	3	Getty, California; Norton Simon, California	N						
Natural History	F	30	UK (Dublin)	Dublin	having a cultural day	Friends	5	12	Natural History, London; Art, Birmingham	Y	pushing buttons	Y	Sidney and Manchester	Education and entertainment	Y	1-1.5 hrs
Natural History	M	30	UK (Dublin)	Dublin	Walking by and saw it	Family	9	4	Natural Hist, Oxford; V&A London; Pitt Rivers, Oxford	Y	push buttons, do things, helps to explain science	N				
Natural History	M	24	Canada (Dublin)	Dublin	Walking by and saw it	Alone	9	4	National Galleries, London and DC	Y	multimedia, kiosk based, hype	Y	Vancouver	was in the city	Y	local
Natural History	F	25	US (Dublin)	Dublin	Walking by and saw it	Friends	8.5	6	Art Gallery; Getty, US; Minneapolis Inst Art; Walker, US	Y	sci museum for kids, experiments, play	Y	St Paul, Minnesota	had someone younger with them	Y	local
Natural History	F	33	Dublin	Dublin	Kids	Family	7	3		Y	get involved, do	N				

On-line

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
M	30	Galway	5	The V&A Museum in London; The grave of Philip the II Museum in Macedonia , Greece	Y	I think it is a place where scientific theories are showed and where the viewer can participate in the theory, to see how it works	Y	It was one in Belgium, it was one to do with Physics, where they showed gravity and many more interesting physics orientated phenomena	because a probably very complicated theory was made simple to understand... I will never forget the action = reaction thing. I think it was a great way to remember	Y	2 hours
F	28	Dublin	1	National Museum of Ireland, Egyptian Museum - Cairo	N						
M	27	Dublin	0		Y	a learning resource which relates abstract scientific concepts to real-world examples	N				
M	25	Dublin	0		Y	A science related centre with interactive exhibits and displays	N				

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
F	25	Dublin	2	I haven't visited any in Ireland. Abroad, the Science and Technology museum In Australia, also the National Museum and the National Museum in New Zealand.	Y	A 'hands on' informal centre where you can learn how things work	Y	The Science + technology centre in Canberra, Australia, can't remember the exact name of it	A little different to the stereotype idea of a boring museum. I'm interested in Science and it sounded like a cool way to learn more. It was probably aimed at kids a lot but I enjoyed it too!	Y	1 hour
M	27	Dublin	2	Louvre, Paris; Various medieval churches in Nantes and Tuscany	Y	A scientific museum where the exhibits can be interacted with, for pedagogical and entertainment purposes.	N				
M	27	Dublin	4	Boston science museum (USA). MIT museum (USA). Natural history museum (Dublin). Torture museum (Portugal).	Y	Certain exhibits require action by the observer in order to function; aiming to increase understanding through involvement.	Y	These may not count, as they are both normal museums as well as having interactive exhibits: Boston science museum; MIT museum; London science museum.	Quite frankly, they're cool. Everyone loves toys and the toys in interactive science are oft the best.	Y	1 hour

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
M	26	Dublin	2	Auschwitz, Poland; Egyptian Museum, Cairo	Y	An educational centre based on exhibits where members of the public can actively interact with exhibits, which helps to develop a fuller understanding of science.	N				
M	33	Dublin	3	National Gallery of Ireland; Royal Hospital Kilmainham	N						
F	25	Dublin	2	none in Ireland, famous museums abroad e.g. Guggenheim in New York	Y	Displays that you can use to demonstrate scientific fact	Y	Science Museum in London	Fun as a child	Y	1.5 hours
F	25	Dublin	4	National Gallery Of Art. Royal Kilmainham Museum	N						
M	25	Dublin	15	James Joyce Tower, Sandycove; Old Jameson Distillery, Smithfield; Museum Plantin-Moretus, Antwerp; Anne Frank House, Amsterdam; Biblical Museum, Amsterdam; Dutch Resistance Museum, Amsterdam; Van Gogh Museum, Amsterdam; Willet-Holthuysen Museum, Amsterdam	Y	A set of hands-on exhibits in which the visitor participates and which attempt to explain scientific principles and phenomena.	Y	Science Museum, London; Armagh Planetarium	Because the are part of the tourist trail	Y	Dublin

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
M	30	Dublin	0		Y	It's a place where you can interact with the exhibits	Y	The ones in Paris and London	because they're fun	Y	
F	30	Dublin	3	National Art Museum, Dublin; Boston Museum of fine arts Boston, Science Museum, Boston, Irish Writers Museum, Dublin	Y		Y	Boston Science Museum	It was described as entertaining but informative	Y	20 miles
M	26	Dublin	5	Generally visit Museums when abroad - for example, recently the Viking Boat Museum in Gothenburg, Old Town Museum in Prague, Kaiolani Museum on Oahu, Hawaii	N						
F	42	Dublin	2	Hugh lane, Dublin; science museum Boston	Y	a place where visitors get the chance to "do" things with/to the exhibits!	Y	natural history museum, London; science museum, Boston.	long-standing interest in science.	Y	40 mins
M	29	Dublin	35	Any Art Museums; IMMA; Nat Museum Ireland; Galway Arts Project; Sligo Museum of Art	N						

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
F	34	Dublin	7	National Museum Ireland; National Art Gallery Ireland; Museum of the Resistance Amsterdam; History of New York Museum, NYC; Museum of Industry Manchester	N						
F	47	Dublin	6	NMI: Kildare St & Collins Barracks; Ulster Museum; Beaux Arts in Brussels;	N						
F	20	Dublin	0		N						
F	45	Dublin	1	National Gallery	Y	taking part in experiments, seeing samples, testing, experiencing behind the scenes	N				
F	40	Dublin	2	National Museum of Ireland; Writers Museum	N						
F	27	Wicklow	6	Citta de Scienza - Naples; heineken museum - Amsterdam; Museums in Florence; Science museum in Canada; national Museum - Canberra Australia; Sydney Museum - Sydney Australia; Te pa pa museum - Wellington New Zealand	Y	you can actively learn from the exhibits - mostly about scientific phenomenon - e.g. light, gravity etc	Y	Regina Canada; part of the te papa museum in NZ in relation to dinosaurs etc; Citta de la Scienza Naples	this is the most exciting way of presenting information for children of all ages esp. late 20s up!	Y	1 hour

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
F	29	Dublin	0		N						
F	30	Dublin	4	History museums; Art museums	Y	a science centre which is interactive i.e. you have a chance to interact with the display	Y	I visited a science park (what I would classify as an interactive science centre) in Valencia, Spain	Because I am interested in such centres and in the case above had not been to one before.	Y	1.5 hours
F	25	Dublin	5	Science Museum, V&A, British Museum (London) National Museum of Ireland, Archaeoscope (Bouillon, Belgium)	Y	Centre where visitors can interact and get feedback demonstrating scientific principles/ideas.	Y	Wellcome wing of the science museum, London.	Visiting main science museum anyway.	Y	1 hour

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
F	30	Dublin	12	National Museum, Kildare St. - Dublin; National Gallery - Dublin; Irish Writers Museum - Dublin; Hat Museum - Campagne-sur-Aude, South of France; Museum of Honey - Campagne-sur-Aude, South of France; Inquisition Museum & Cathar Museum - Carcassonne, South of France; Rennes-le-Chateau Hermitage & Tour Magdela - Rennes-le-Chateau, South of France; Chateau Villeroige - Villeroige, South of France; Templar Museum - Alet-les-Bains, South of France; The Salvador Dali Museum - Figueres, Spain; The Rembrandt Museum - Amsterdam, the Netherlands; The Marijuana & Hash Museum - Amsterdam, the Netherlands	N						
F	28	Cork	1	national history museum(I think .. it the one full of scary stuffed animals !!)	N						

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
F	26	Dublin	2	Museum of Modern Art; Musée D'Orsay - Paris	N						
F	27	Meath	1	Writers Museum - Dublin; Museum in Trondheim - Norway	Y	It means a centre where people can learn about science through interaction with exhibits etc. A bit like what was in the dome.	Y	One in Los Angeles - was amazing - had a huge display of astronomy etc and a great pendulum, which demonstrated the way the world spins, amazing!	Studied science myself	Y	1 hour
F	32	Dublin	6	Collins Barracks, Dublin; National Gallery, Dublin; Hugh Lane Gallery, Dublin	Y	assume it's like the "science museums" in the US where you get to "play" with the exhibits.	Y	can't remember	curiosity	Y	1 hour
M	25	Dublin	2	Sex and torture museums (Amsterdam!); Small religious museum preserving a hidden church from when churches had to be hidden.; Air and space.	Y	A place where exhibits are designed to demonstrate one aspect of science (usually physics) and where the visitor can test the exhibit themselves and see the results.	Y	One in the Smithsonian Institution. Another in the RDS (temporary) a few years ago.	Partly by accident, partly just for fun.	Y	2 hours

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
M	26	Dublin	2	Museum of Science & Industry - Chicago; and one in Ireland... don't remember which one though.	Y	It would mean a place whereby science is explained through interactive exhibits... e.g. A mechanical model of a pump that you can use	Y	Deutsches Museum, Munich; Museum of Science & Industry, Chicago,	They can bring entertainment to learning and also tend to focus more on practical and interesting applications of science than normal museums	Y	2 hours
F	28	Dublin	3	National Museum, Collins Barracks; Natural History Museum; National Museum of Art i.e. Gallery	Y	A science museum like La Villette in Paris. i.e. exhibits and explanations which you can take an active part in.	Y	La Villette, Paris	Because they are more fun in a 'doing' way than traditional way, although you can't beat the Natural History Museum, Dublin.	Y	1.5 hours
F	46	Dublin	1	The Louvre, Local heritage centres	N						
F	24	Dublin	5	National museum	N						
M	26	Dublin	0		N						
M	27	Dublin	4	National Gallery; Science Museum (Boston); National Aquarium (Stockholm)	Y	A place where you can see scientific displays in action and interact with them (as opposed to just looking at things)	Y	Science museum in Boston.	Because I'm a nerd (well, interested in science and technology....	Y	1 hour
F	25	Dublin	0		N						

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
M	26	Louth	3	All of our holidays are basically historical/archaeological tourism. We visit museums when abroad like other people visit pubs. e.g. Historical (Knights of St. John) Museum in Malta + 5-6 other smaller ones in Malta. Barmeath Castle (Louth). Monasterboice, Battle of Boyne, Mellifont.	N						
F	32	Dublin	2	National Museum Collins Barracks.	Y	Something similar in science to the Ceol exhibition on Irish music - where visitors can explore the exhibits rather than passive viewing.	N				
F	25	Clare	0	National Museum of Australia, Canberra	Y	Learning about science by being involved yourself in the learning process	Y	Science centre in Canberra	It was different to the usual stop and stare places such as museums, it was activity based.	Y	20 miles
F	50	Westmeath	2	Prague National Museum; IMMA (gallery, not museum) Dublin; Nat Zoological Museum, Dublin	N						
M	40	Dublin	3	Natural History; National (Kildare St.); Mizen Head visitor Centre	Y	Demonstrative experiments in real time	N				

Sex	Age	County	how often visit museums /yr?	Examples	"Interactive Science Centre"	Comments	Ever visited?	Where?	Why?	Would you visit in Ireland?	How Far?
F	24	Dublin	1	National Museum. Art Gallery. Edinburgh museum of art ...	N						
M	48	Dublin	3	MUSEUM OF MODERN ART; NATIONAL MUSEUM; WAR MUSEUM-BRUSSELS	Y	A MUSEUM WHERE ONE CAN TRY OUT DIFFERENT EXHIBITS AND EXPERIENCE ASPECTS OF SCIENCE	Y	BOSTON; WASHINGTON	I AM INTERESTED IN ALL THINGS SCIENTIFIC	Y	1 hour
F	29	Dublin	2	Hugh Lane Gallery - Dublin; National Gallery - Ireland; National Gallery - Ireland; Museum of Modern Art New York; Guggenheim - New York; Natural History Museum - Salzburg - Austria; British War Museum - London; Louvre - Paris	N						
F	27	Dublin	1	Marine Archaeology Museum in Turkey	Y	I assume its a centre with educational exhibits that you can touch, hear etc Similar to the different zones in the millennium dome in London	N				

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