Big Bang Exhibition Evaluation

Summary Report

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STFC
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SUMMARY REPORT

I OBJECTIVES AND METHODOLOGY

This evaluation set out to understand what was successfully communicated by the Big Bang Exhibition and the relevance this had to visitors. It also looked at the workings of the Exhibition design. Target audiences were teenagers between the ages of 13 and 18 years, and non-science specialist adults. The study comprised 2 focus groups and 7 accompanied visits to the Exhibition, making 32 Exhibition visitors who were interviewed in-depth. A visitor count was also undertaken.

II WHAT WAS COMMUNICATED BY THE EXHIBITION?

The Big Bang Exhibition succeeded in creating interest and a greater understanding of the Large Hadron Collider experiment at CERN. For many there was a sense of privilege at seeing the inside story and being kept up-to-date on leading edge research.

The elements in the Exhibition message hierarchy were largely communicated. The key message to emerge was that there is much new activity at the Big Ring in CERN. Particles will be smashed together and may generate new particles which will help illuminate what happened in the Big Bang. People saw that this was a massive and complicated engineering project which would deliver new scientific knowledge.

However, the underlying physics remained hugely challenging and visitors did not necessarily emerge with a coherent story. The elements often remained fragmented in peoples' minds. For example, what exactly was the experiment going to be, what relationship did it have to the Big Bang, and what exactly were scientists expecting to find at the end of it? Both the details of the underlying theory and the engineering of particle detection were also hard to put across.

Visitors were nevertheless energised by the fundamental physics questions which were raised. They recognised the vocabulary, associated with anti-matter and dark matter, and were curious to know where the anti-matter had gone and what the dark matter was composed of. In contrast, however, the Higgs Boson and the question of why particles have mass, proved too difficult for almost everyone.

It would have been helpful to have a very brief illustrated overview of the experiment as a whole; its purpose, which particles were being smashed together, what was expected to come out of it, and what it would mean for the world at large.

Audiences themselves were fragmented. Their attitudes to the experiment varied depending on their age and gender and on the level of scientific knowledge they brought to the Exhibition.

Younger, non-science orientated

- Trendy teenagers, giggly girls, serious boys, all looking for entertainment and a quick in-and-out. More interested in the results of the experiment, than the planning

Older, non-science orientated

- Academics, wives, philosophers. More concerned with the moral and philosophical issues rather than the how of the experiment, mainly women

Younger, science orientated

- Bright young physics and life sciences students, aware of scientific method. More interested in theory than hardware and sympathetic to the scientific goals

Older, science orientated

- Old engineers awed by the scale of the engineering and impressed at high speed atom smashes. Mainly men

There was something in the exhibition for each of the sectors. Some audience reactions, however, were unexpected. On the whole, visitors were not hugely impressed by the scale of the operations at CERN. Did they assume scientists can just **do** this sort of thing? For most, it came across as just another big engineering project.

Many visitors criticised the decision to run the Exhibition before there were any actual results to report. It seemed to them the Exhibition was reporting only half the story.

Adults in particular were very exercised about the risks and dangers to society. What if it all went wrong? There was a spectrum of anxieties ranging from meddling with nature and catastrophic accidents, through to the material getting into the wrong hands and creating weapons of mass destruction. Equal and opposite to these concerns was a desire to hear that positive good would come out of the experiment for the world at large. The benefits which had emerged from past CERN experiments were not really picked up in the Exhibition, and may have served to reassure people.

Was the CERN experiment seen as a triumph of international cooperation and scientific endeavour? Yes, it was, but oddly visitors had tended to assume that this project would have an international base and would be run by the usual suspects; international, financial and scientific. There may be an assumption that scientists operate in a world apart.

III HOW WERE THE DISPLAYS WORKING?

The title 'Big Bang' is inviting and effective at attracting people into the Exhibition, but ultimately misleading. Visitors did not feel that they got to see the Big Bang in this Exhibition, with its promise of images of space, explosions and celestial spheres. While they, in the end, accepted that particle physics dealt with the science of the Big Bang, they were nonetheless a little disappointed.

The cube structure, now tried and tested by the Science Museum in this location, continued to work well. It created the impression of manageable length, and visitors in no way felt crowded. The bulk of the message was conveyed by a robust combination of display elements:

Headlines	Large images
Objects	Screen interactives, both textbook and games

As a cautionary procedure, all the key communication points should feature in one or other of these elements.

Less attention was given to paragraphs of text, to written quotes from CERN scientists, and to talking heads.

The problematic area in terms of display was the corridor created between the cartoon theory wall and the introductory wall of the cube. Visitors needed to grasp the essentials of the theory in order to grasp the purpose and outcomes of the experiment. However, it was difficult to take in the theory wall because of the physical spaces involved. The direction of flow between the two walls was confusing, and it was next to impossible to read both walls, partly because people were at the wrong distance and the wrong angle from the text. In addition, the introductory wall was simple, colourful and illuminated, whereas the theory wall was darker and complicated although the cartoons looked like fun.

It was a pity that the theory wall was physically difficult to take in, because those who did read parts of it were interested and enthusiastic about the questions it raised and the clear, stimulating nature of the text. The use of cartoons was a double-edged sword. Without a doubt it engaged the teenage audience, but at the same time it provoked rather a knee-jerk response from adult audiences who felt that it was not designed for their age group. Notwithstanding, it was suggested that the cartoons and graphics be integrated into the body of the Exhibition. It seems likely that more graphics and more moving graphics would have made the purpose of the engineering and the theory behind it much clearer. One shining example where this did happen was in the game interactive "Spot the Muon". This engaged visitors, primarily the

young, and allowed them to understand by their own efforts, the nature and complexity of particle detection.

IV THOUGHTS FOR FUTURE DEVELOPMENT

In carrying the Exhibition further, it is useful to step back and put some perspective on the main forces at work. Working in favour of the campaign to build enthusiasm and support for the CERN experiment are the following:

- People are allured by the mysteries surrounding anti-matter, dark matter and the Big Bang. They want to hear more.

- The basic idea of smashing particles together and splitting off fragments is a simple idea to grasp, and everybody grasps it.

- People feel a sense of privilege in being shown what is happening at science's leading edge.

More destructive elements to be considered in future developments are:

- People need a clear mental and physical picture (moving if possible) of the theory experiment and outcomes, in order to see the significance of it all.

- Where there is fragmented understanding and confusion, people are likely to build mistrust and a sense of danger and anxiety

- Only a minority accept that building knowledge is good in itself, the remainder want to see tangible benefits emerging for the modern world.

We estimate that close to a quarter of a million visitors visited the Big Bang Exhibition between April 2007 and the time it closed at the beginning of October 2007. This represents 17.5% of general visitor and education groups within the Science Museum.