

Chapter 18

Bringing Science to the Public

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Abstract Public understanding of science as a top-down model is slowly being replaced by dialogue and direct contacts between scientists and the public. More often than in the past, research funding organisations demand that communication plans, including plans to communicate with the public, are part of project proposals. The chapter examines how these changes have been reflected in recent public science events. Scientists' public participation forms the basis not only for direct dialogue, but also for trust and an opportunity to 'negotiate' what is presented. Science events, such as science festivals and science cafés, have proven to be excellent meeting places. They are 'neutral ground', on which people do not have to go out of their way to approach science. Many activities demonstrating basic science can be categorized as 'science is fun', but the challenge is to find formats and presenters for 'new' science (that is, ongoing or recently finished research projects). The author evaluates recent science events, particularly for their success in attracting young people, and examines the importance of venue selection.

Keywords Dialogue, science cafés, science events, science festivals, science in society

This photo shows Peter Eriksson, a successful Swedish professor and stem-cell and neurology scientist, talking to passers-by on crowded Nanjing Road in central Shanghai about the latest findings in his field of interest. He gives a 'short course in neurology', shows pictures on the giant screens and answers questions about the amazing regenerative functions of the human brain. People take a break from their Saturday shopping to talk to him and his colleagues from Scandinavia, who are visiting Science and Technology Week 2007 in Shanghai.

This is what we call 'street science', and it is an interesting example of how social situations can be the basis for dialogue, learning and communication about science.

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Sadly, Peter Eriksson died unexpectedly in August 2007, at the age of 48 years. This chapter is dedicated to him and to all his wonderful colleagues, without whom we communicators would have nothing to say.

In this chapter I argue, from a practitioner's point of view, for the following propositions:

- It is important for trust, sympathy and dialogue that scientists participate personally in the communication of science.
- Science events, such as festivals and science weeks, offer excellent opportunities for such dialogue, by marshalling expertise not only in communication but also in event management.
- The spatial dimension is important; the choice of meeting place contributes to the achievement of the objectives of the event or activity.
- These meeting places for public communication of science could be considered when developing strategies for communicating 'new' science.

With my limited practitioner's knowledge about ongoing studies in the field, my references may be far from complete and often anecdotal or based on personal observations. Still, for whatever it is worth, this is the story.

18.1 Emerging Trends in Science Communication

Two important trends in science communication have become visible in recent years.

First, communication has moved from a rather simple and one-way information or promotion of science process to a more complex operation in which 'inclusion', 'learning', 'dialogue' and 'participation' are key terms. The idea of 'public understanding of science', which was to be achieved by the top-down distribution of correct and well-produced information from the scientific community, often through the

so-called ‘deficit model’, has been subordinated or abandoned. A growing insight that communication is about negotiating, a process from which both sides get something, is more and more accepted. Negotiation is also the basis for trust—the most valuable key to creating and maintaining the relationship (Miller and Gregory, 1998).

Second, science communication as a task has changed from being a sort of optional extra to something that is to be planned and accounted for from the very beginning. Research funding organizations now demand communication plans as part of funding applications. The European Commission’s 7th Research Framework Programme does not consider funding unless plans for communication or dissemination of the project’s expected results are included from the start.

However, the incentives for scientists to engage in science communication activities are more diverse and personal; those activities are more than simply a necessary and mandatory hassle that has to be dealt with to win funding for important projects. Many scientists take part in communication with personal interest and great joy.

At the same time, formats for science communication have had to be developed and tested. The internet has made new ways of communication available, from downloadable lectures, shows and experiments to podcasting. New forms of direct, person-to-person communication have developed, two of which are science cafés and science events (such as science festivals and science weeks).

18.2 Scientists’ Participation

A key characteristic of science cafés and science events, which separates them from other forms of science communication, is the participation of scientists. There is no interlocutor, mediator, adapter or translator—no journalist, editor, exhibition designer or anyone else—in between the scientist and the expected audience. While science communication often benefits from such mediation, face-to-face events are different.

The presence of the scientists opens up a real dialogue, a two-way communication. There are no filters, no explainers, no translation errors or mistakes. The public gets to meet someone who is actually involved in what he or she is presenting, for better or for worse.

This dialogue forms the basis for negotiation, creating an opportunity for the audience to contribute to the meaning of the presentation, whether it is an exhibition or an experiment. A Swedish study among young visitors to a science centre concluded that this ‘space for negotiation’ is crucial for teenagers to the exhibition—if they have the authority to interpret the message themselves, their interest increases.

There are various reasons for scientists to participate in science communication (for example by allocating time for interviews by journalists, producing public presentations of their research or taking part in a science event). There are also a number of reasons for *not* doing it.

In the UK, a survey carried out by the Royal Society shows that a large proportion of the scientists interviewed saw their role as explaining and promoting the public understanding of science. Almost two-thirds thought that the relevance of

science to everyday life was the most important issue. They also saw a need to profile their own field of research and its institutions.

According to the British scientists, the barriers to science communication were mainly the time away from research work and, to some extent, the disapproval of their colleagues and peers for engaging in science communication.

Incentives for doing science communication were mainly budgetary—to attract more research funding to their institutions. Additional funding and support for science communication would have a positive effect on scientists' interest in taking part in communication activities, but increased support, coordination and training from professional communicators would also be welcome (Royal Society 2006). A similar study has been carried out at Cornell University in the US, and another one is about to be undertaken among Swedish scientists.

It has been suggested that scientists' fears of negative repercussions in peer reviews after engaging in popular science communication may be exaggerated. However, I suspect that a simple bibliometrical study could show that researchers who take part in popular science activities are also the best funded and most often cited.

The need for support and training for participating scientists is well understood by science event organizers. Almost all can tell a story about a bad presentation by a brilliant researcher who happens to be a poor presenter. Unfortunately, an event organizer can also create bad experiences, for presenters and for audiences, by not taking into account the presentation skills, talent and interests of the scientist. While many successful scientists and science communicators made their first public presentations at a science festival or a science week, the selection of participants for such events has not always been as careful as it should have been.

Professional science communication events often provide various forms of support and guidelines for selection. A study by the European Science Events Association (Rebernik et al. 2005) lists a number of ways to ensure high professional standards among presenters at science festivals and science weeks. Most important is a matching process to assign presenters to the types of activities they are best suited to; the next most important is support and opportunities for training and practising.

Many science festival and science week organizers offer training for communication. In Sweden and Denmark, a programme developed at Stanford University in the US has been used successfully. The training scheme, called 'Elevator talks', includes the step-by-step refinement of a presentation until it takes 30 s and can be understood by a 17-year-old student. The programme was presented at the Communicating European Research conference in Brussels in November 2005, and the presentation was documented for the proceedings of the event (Claessens 2007).

18.3 Meeting Places for Dialogue

A science café is an informal setting on neutral ground and a social situation that is easy to understand and part of many people's everyday lives. The concept is simple: a scientist presents his or her research, the audience can ask questions, and the

interaction is facilitated by a moderator, who might be a science journalist or someone else with an interest and some knowledge of the subject to be discussed—no PowerPoint, no formulas, no blackboard, no ‘lecture’ in a traditional sense.

The cafés have been most successful in many places, not least in the UK and in other European countries. Growing numbers of science cafés are being arranged, and new venues and cities are being added. The British Council supports the development of science cafés in many countries by sending prominent researchers from the UK. In some cases, the cafés are the starting point for the development of other science events, such as in Bulgaria, where the first science festival was arranged in 2007, coinciding with the European Commission’s ‘Researchers’ night’ and a science café.

Science events, such as science festivals and science weeks, have grown rapidly during the past two decades. Many have emerged in Europe, but there have also been many in Asia, Africa and the Americas. The British Association for the Advancement of Science has a history of annual public meetings going back to 1831, but there are many local events in the UK in addition to the British Association’s Festival of science.

In other European countries, science weeks and science festivals have been established with local, regional or national bases. In Norway, the *Forskingsdagene* (‘research days’) cover the entire country and are funded by the national research council. Science days in Freiburg, Germany, are targeted directly at schoolchildren and are arranged in a large hall at the Europa-Park, a theme park in Rust, outside Freiburg.

The same sort of location is used in Madrid, but for a broader audience, at the Feria de Madrid. The Catalan Science Week offers activities across Catalonia, while the Slovenian Science Week takes place in Ljubljana only. In Göteborg, Sweden, many city venues are used: shopping malls, parks, museums, churches, and an old warehouse for a temporary science centre.

The method is the same: literally, to ‘bring science to the public’ by using new and unusual venues and formats, such as the shopping centres, railway stations and cinemas, as well as presentations in the form of ‘physics shows’, science theatres or just short talks and discussions in the street.

Although these science events have been established and developed independently, many of them share similar objectives and aims. The main goals are often described in terms such as ‘raising the awareness of science and technology among the general public’ and ‘interesting young people in science and a possible academic career’.

In addition to these goals, there are usually also local, regional or national goals connected to the events, such as:

- To establish relationships across scientific sectors (Danish Science Week)
- To highlight connections between research, innovation and industry (Norwegian Science Week)
- To humanise science and bring it closer to society (Catalan Science Week)
- To make people realise that the country’s position in Europe depends on its standards of education and science (Poland, Lower Silesian Festival of Science)
- To contribute to the marketing of the city as a city of events (Göteborg Science Festival, Sweden)

The various science festivals and science weeks work under very different budgets and funding arrangements, and with differing experience in marketing and organization. The successful outcome of an event depends to a large degree on how it is organized.

The European Science Events Association's study emphasizes the need for different competencies in event organization, such as marketing, management and accounting as well as learning and communication. In practice, the way events are organized varies: some have scientific boards, whereas others employ scientists in the organization. However, all share a major task in maintaining a very close relationship with the scientific community (Rebernik et al. 2005).

18.4 The Importance of the Venue

Another key characteristic of science events is the spatial and social dimension of the communication; the context in which the communication takes place matters. The choice of venues is what separates science events from other forms of science communication. Museums and laboratories can invite people to come and visit, but the potential audience has to be interested enough to find its way to the premises. Science communication events, on the other hand, can reach those who happen to pass by or who become intrigued by a particular experiment or a demonstration. This is done through the use of unusual places or the unusual use of scientific institutions.

Typical science event locations include streets, shopping malls, railway stations, cafés, libraries and theme parks. The advantages of choosing such 'everyday' places are many:

- The audience doesn't have to search for science.
- The audience doesn't feel threatened by an unfamiliar environment, or even uncomfortable.
- The communication process becomes more equal, as it takes place on 'neutral' ground.

At the International Science Festival in Göteborg, Sweden, the evaluations made during the events in 2002 and 2004 included a number of questions about the venues. The festival's activities were then divided into four different 'arenas' for the analysis.

The first is the 'lecture activity', which includes films, debates and workshops—all held in some kind of lecture hall, auditorium, museum or library, and not necessarily at the home institution.

The second is the festival's temporary 'science centre', an old warehouse that is transformed into a very basic science centre where participating organizations and university departments set up their own hands-on exhibits.

The third arena is the shopping mall, one of northern Europe's largest, with a constant flow of potential visitors. The festival occupies a space of a few hundred square metres in one of the main indoor streets for exhibitions, short lectures and demonstrations.

Finally, there is the 'Science in the Park' tent, open from noon to 7 or 8 p.m. The tent arena offers workshops, short presentations, demonstrations and discussions.

Some activities are scheduled, such as a talk at 12.30, while others are more loosely organized, such as ‘meet the researchers between 12 and 6 p.m.’

The evaluations gave overall pictures that were very positive for the festival: four out of five visitors wanted to come back next year and indicated that they would recommend a visit to their friends.

The visitor demographics reflected the city’s in a general sense. There was a larger proportion of adults with an academic education compared to the city’s average, and people older than 55 were also over-represented. Similar findings have been made at several other science communication events, so this is not surprising.

The large difference between the arenas was interesting. While the adult academic group was over-represented in the lectures arena, it was significantly less well represented in the workshop and park arenas. The arena in which the visitor demographic reflected the population as a whole was the shopping centre.

The temporary science centre attracted a large number of schoolchildren, but this was largely due to the workshop’s role in the schools programme. A significant number of visits by entire classes were pre-booked.

The Science in the Park tent showed the most encouraging outcome: the proportion of young people under the age of 24 was significant. Moreover, some of the suburban parts of the city (usually regarded as not so ‘academic’), seemed to be over-represented (Pousette 2004).

The venues did not have comparable programmes, and we do not know to what extent an activity attracted its visitors regardless of location. Nevertheless, it seems likely that place and format have an impact on the visitor profile, and the concept of different arenas has introduced a new dimension to the development of the Göteborg Science Festival.

Science communication events such as this have an educational component, in that they create informal learning situations, as opposed to the formal learning systems in schools. In some respects, this event’s activities are similar to those of science centres and museums. These include the displays, demonstrations and exhibits that invite people participate in hands-on experiences—the differences being that the festival’s activities occur as temporary exhibits in places like shopping malls and parks, and that the scientists normally participate.

The encounter between visitor and exhibit has been studied from the educational point of view, to determine how well the scientific message is conveyed. The interactions between teenagers and exhibits at one of Sweden’s science centres were examined, and the conclusion was that the teenagers—normally reluctant to visit science centres—wanted to have the right to interpret and to ‘contribute to the meaning of the activity’. For them, the exhibits and the place should also be ‘places for developing social identity’ (Fors 2006).

These findings may support observations (not statistically proven) that science event activities like those in the park in Göteborg, where people are allowed to approach the activity at their own speed and level of interest, may be an important way to encourage people’s interest in science and technology.

The conclusions from Göteborg are supported by similar observations elsewhere, and the findings provide input for a further discussion about the potential of science communication events to reach targeted groups and audiences, such as

young people. They also point to the need for continued development of tools for evaluating science communication activities.

18.5 Public Communication of ‘New’ Science

Science communication events have tended to concentrate on particular aspects of ‘science’ (Rebernik et al. 2005):

- Basic knowledge as a starting step to sophisticated research, with a ‘learning’ objective
- ‘Science for fun’, in the form of shows, contests and presentations
- Science on an academic level, mostly in the form of lectures, debates, laboratory practice and workshops
- Science as an integral part of our culture, including the humanities and arts as substantial parts of the programme
- ‘New’ science—the most recent progress in science and technology

There are significant differences between European science events. Some, like the science days at the Europa-Park outside Freiburg in Germany, focus on the informal learning objective, while others, such as the Feria de Madrid, have more of ‘science for fun’ profile. However, events based on a mix of elements are becoming the norm.

Science communication event organizers have become increasingly aware of the need to develop presentations of ‘new’ science—recently published scientific results, or even interim reports from ongoing projects—and this focus is a growing trend. One reason for this is that more scientists now participate in communication events, partly because many research funding organizations now require the inclusion of communication plans in funding proposals. When researchers participate in events, their natural choice of subject is their own field of research and recent work relevant to them.

The European Commission has developed this trend further (at least in Europe) by arranging some well-attended conferences for research projects funded under the 6th Research Framework Programme. Another conference is being planned for 2009 for projects funded under the 7th Research Framework Programme. The research project groups have been invited to Brussels to present recently finished or ongoing work. By taking part in the conference, they also get to exchange experiences, best practice and ideas about how to communicate science. Science centres, publishers, journalists, broadcasting companies and science event organizers have been invited and have proposed sessions for the participating research groups. Contributions to the most recent of the two conferences arranged so far have been published (Claessens 2007).

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