

# Science museums and their role in the relationship between science and society

The number of centres devoted to science communication in Spain is now substantial and currently includes: interactive science museums and centres as well as specialised museums, such as planetariums, aquariums, botanical gardens, and zoos. The definition of a science-communication centre remains controversial; for example, should an institution containing a dolphinarium be included? There are also various examples of joint centres, such as an aquarium/museum (Casa de los Peces) and a planetarium/Imax cinema (Hemisfèric).

The most important development in recent years has been the appearance of new museums and planetariums, including about twenty distributed around Spain. The initiative to create these centres, their funding, and their active maintenance have come from foundations linked to financial institutions (CosmoCaixa, Kutxaespacio de la Ciencia); town councils (Museos Científicos Coruñeses, Planetario de Madrid); regional governments (Planetario de Pamplona, Museo de las Ciencias de Castilla-La Mancha); and consortiums bringing different bodies together (Parque de las Ciencias de Granada). Society's recognition of the financial contribution of these institutions to popularising science is richly deserved. Currently, the number of visitors and people involved in the activities of these museums is over 10 million per year. The number of visitors to the Museo de las Ciencias Príncipe Felipe in Valencia stands out in particular.

In general, the new museums and planetaria present exhibitions and undertake activities that are related to aspects of contemporary science and the social impact of science and technology. Such exhibitions do not necessarily use collection items; instead, they often use exhibition components of a different nature (interactive, audiovisual, computer-based, models, etc.) that are specially designed to demonstrate a phenomenon, explain a concept, or provoke ideas and responses in general.

One of the most notable characteristics of the new museums is the opportunity they offer for interaction. This arises from a concept of exhibition items as educational elements (regardless of whether they are part of the collection or not). The importance of interaction has been emphasised by the popular statement that contains four invitations: "Forbidden not to touch, forbidden not to think, forbidden not to feel, forbidden not to dream".

Traditional science and technology museums have also undergone a transformation, incorporating some interactive elements into their exhibitions. However, it has to be said that both the Museo Nacional de Ciencias Naturales and the Museo Nacional de Ciencia y Tecnología lack the resources required to carry out their educational tasks at the level one would expect from such important institutions, and from the research activity they undertake. The Museo Nacional de

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Ciencia y Tecnología de Cataluña is a unique model of an integrated and coordinated network of interesting installations in the field of industrial archaeology.

The new science museums have an extensive social task. They play a key role in improving the public perception of science, contributing to a positive evaluation of science and its technological developments. In addition, they stimulate the population's education about the characteristic activities and abilities of science. They also help people to understand scientific concepts linked to the present day and propose steps for integrating them into culture.

Science museums also play a role in supporting and complementing formal education. They are therefore visited by numerous schoolchildren every year and present aspects of science that differ in content and form from those of educational centres. Such aspects are more closely related to current affairs and interdisciplinarity and are linked to situations involving play, happiness, and freedom of initiative. Other activities, such as science workshops, have a more didactic focus, or are oriented towards specifically teaching certain topics specified in the school curriculum.

Annual meetings of the managers of science centres and planetarium have been held since 1997, to exchange experiences and establish guidelines for collaboration. In the first of these meetings, held in La Coruña, a manifesto was signed (see Bibliography) linking the activity of these centres to the cultural needs of the population that arise from scientific and technical developments.

The atmosphere among Spanish museums is one of a community with common objectives. This has led to the joint production of exhibitions (one that stands out is "Madera del Ayre", which travelled all over Spain and was brought about by

collaboration between the Museo Nacional de Ciencias Naturales and the Casa de las Ciencias). It has also resulted in audiovisual planetarium programmes (such as *Vía Láctea* -the Milky Way- that premiered simultaneously in planetariums in Madrid, Pamplona, and La Coruña). There are many other shared projects, including publications, conferences, and general activities.

Science museums not only carry out activities within their facilities, they also frequently present their exhibitions in other non-specialised locations, or even move around in the form of "travelling museums", as did the Fundación La Caixa's *Carpa de la Ciencia* (Science Marquee). Another notable example of this is the portable planetarium, which was a private initiative.

Science museums have taken the lead in carrying out actions such as producing publications with a wide circulation, and holding conferences, debates or exhibitions to inform the public about alarming or worrying social situations related to science and technology (mad cow disease, mobile phone antenna, black tides, human cloning, etc.).

Since 1988, the Museos Científicos Coruñeses have held annual awards for the best science communication work (audiovisuals, books, unpublished texts, journalistic articles). These awards are currently linked to the European Commission's Descartes Prize for Science Communication. Likewise, there are prizes to encourage scientific research among young people, including those directed at secondary education students, such as the "Luis Freire" prize, held annually since 1998. Science museums have particular importance, as organisers or major participants, in a wide range of initiatives, including science fairs, science days, and similar events. Those held in Madrid (*Madrid por la Ciencia*, Madrid for Science), La Coruña (*Día de la Ciencia en la calle*, Day of science in the

street), Seville, and the Balearic Islands are particularly noteworthy.

We should also highlight museums' concern for the task of public communication of science and technology. Their involvement in this task is demonstrated by the three *Comunicación Social de la Ciencia* congresses that have been held by the Parque de las Ciencias de Granada (1999), the Museo de las Ciencias Príncipe Felipe de Valencia (2001), and the Museos Científicos Coruñeses (2005).

In addition, science museums participate in organising (alone or in collaboration with universities, CSIC institutes, and other bodies) days, courses, and conference cycles. Museum conference halls have become the most appropriate

place for meetings between scientists and the general population.

Planetaria are an exceptional tools for teaching concepts related to astronomy and geography. Above all, they make it possible for people of all ages to become enthusiastic about the marvellous spectacle of the night sky, through the learning process. The trend of creating public planetaria should be supported, until there is at least one per regional government.

The development of zoos and aquariums must enable them to combine, in an increasingly effective way, the task of environmental education with a philosophy of respect for living beings and biodiversity conservation.