

## **Impact of Science Communication on Publics, Cities and Actors**

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**Abstract**

As part of the EU-funded PLACES project, a group of independent researchers from all over Europe developed *The PLACES Toolkit for the Impact Assessment of SCIP (Science Communication Initiatives and Policies)*. Using it, 26 case studies were carried out. Results show that SCIP have several effects on publics (visitors and citizens), on those actors that took part in them (scientists, teachers, company representatives, journalists, politicians and centre staff), and on communities and cities where SCIP take place. On “publics”, SCIP strength group members’ ties, contribute to science “normalization”, and have cognitive and emotional impacts. With different results among case studies, this research shows that SCIP also inspire intellectual curiosity, increase self-esteem (when talking about science topics) and enhance scientific vocations. On “actors”, SCIP effects are specially focused on networking, a better understanding of audience needs and an improvement of professional skills. Local policies promoting science culture are perceived by main stakeholders (in their quality of observers) as having an important role in the city and community regarding its economic development and visibility. Citizens perceive science museums and science events as important symbols of their cities, especially in the context of what they imagine is a “city of scientific culture”. Results from these studies have served as a basis for a document of recommendations for the European Commission and all those in charge of carrying out initiatives and policies in the field of science communication and scientific culture.

**Introduction**

In recent decades, a growing concern to know and assess the impact of Science Communication Initiatives and Policies (SCIP)<sup>1</sup> has been observed in both academic and professional spheres. What are the effects of SCIP and who are their main receptors are not easy questions and some authors even questioned –in a provocative way– if they existed<sup>2</sup>. Until now research has mainly been focused on visitors, and particularly on the cognitive and the emotional effects of SCIP, giving also some attention to the effects on the public science engagement and scientific vocations. Some papers are focused on other groups of actors (like scientists and museum staff) and there is some literature about the economic and community impacts<sup>3,4,5</sup>. Beyond evaluation of the individual effects of a

particular SCIP, it is also important to investigate the long term and cumulative effects of those SCIP within a broader spectrum. This is precisely what it is meant when we talk about “impact” measurement or assessment<sup>6,7,8</sup>.

As part of the European project PLACES (Platform of Local Authorities and Communicators Engaged in Science)<sup>9</sup>, a group of 28 independent researchers with solid experience in the field of Science in Society, coordinated by the Universitat Pompeu Fabra, were committed to assess the impact of SCIP from all over Europe and to elaborate common methodologies and recommendations for future actions in this field.

## **Methodology**

With such objective, this committee developed *The PLACES Toolkit for the Impact Assessment of Science Communication Initiatives and Policies*<sup>10</sup> and, using it, carried out 26 case studies. The toolkit takes a triple level/dimension (3x3) approach, where “level” refers to the agent that is responsible for the SCIP and “dimension” to *who* or *what* is receiving the influences of SCIP. Three “levels” were considered: a) museums and science centres (SCM), b) science events (SE), and c) cities of scientific culture<sup>11</sup>. “Dimensions” were also divided into three categories: a) the public sphere (visitors and citizens), b) the political sphere (local and regional dimension); and c) actors involved in SCIP themselves. The Toolkit included quantitative and qualitative instruments (standardized surveys, semi-structured interviews, focus groups as well as documental and institutional sources analyses) and explored impacts mainly through the experiences and views from visitors, citizens, actors and stakeholders (as observers). Six pilot cases and seven feedback interviews with representatives of the professional sector<sup>12</sup> (experts proposed by ECSITE, EUSEA and NERRI) contributed to the Toolkit’s validation.

Using this Toolkit, a series of 26 case studies from 19 European countries (BE, BG, CH, CY, CZ, DE, DK, EE, EL, ES, FI, FR, IE, IT, LT, NL, PT, SI, and UK) were carried out (mainly from April to October 2012). They included 9 science centers, 8 science events and 9 cities of scientific culture. A total of 2679 people older than 16 was consulted: 2321 participated in standardized surveys and 258 in semi-structured interviews or in focus groups.

## Results

### *Impacts on publics (visitors and citizens)*

Standardized surveys to visitors of science museums (SCM) or science events (SE) show that, on average, more than a half (58.53%) are “repeated visitors” (they had visited the installation at least once in the past), and almost one in four (22.68%) are “highly repeated visitors” (three visits or more in the past). Institutional sources and qualitative instruments also confirm this high presence of repeated visitors. Repeated visitors were a very useful population in the present research to explore long-term impact of SCIP.

- *The “socialization” value of SCIP*

Visitors perceive visits to a SCM or a SE as a social activity. Interviewed visitors give abundant evidences of how visits contribute to the “socialization” and “normalization” of science, reinforce laces among group’s members (family, friends, classmates) and help to minimize the gap between the ones more interested in and/or with more scientific knowledge, and those less interested in and/or with less knowledge.

- *Cognitive and emotional impact*

When asked about their motivation to come, most visitors give – in a spontaneous manner - one of these two groups of answers: a) “have a good time with family”, “an alternative for cultural or leisure activities”, “tourism”; or b) “learn something”, “obtain a better understanding of the issue X”.

The majority of visitors (76.38%) thinks that learning in a SCIP is more interesting than doing it at school (39.70% say much more interesting). Despite this answer, during semi-structured interviews many teachers and organisers tend to offer not a competitive but an integral view of the educational process, considering that “visits to a SM or a SE have become part of the student’s school career”.

- *Effects on visitors' Intellectual Curiosity, Self-confidence, Citizenship and Vocations*

Half of those surveyed felt “more confident to discuss science topics after their visit” (12.00% felt “much more confident”) and 45.14% “looked for more information about issues covered by SCIP after their last visit”. Those participating in semi-structured interviews tend to recognize this group of effects on a fewer proportion or conviction, at least at first glance. Those who recognize them, however, give strong answers. Organisers, teachers, parents and grandparents tend to assume that SCIP have strong effects on scientific vocations, but students and other visitors are not so strongly convinced about this.

***Impacts on the community, city or region***

- *A symbol of the city (particularly true for “cities of scientific culture”)*

The majority of visitors (71.70%) agrees that the SCM or SE is an important symbol of the city (26.13% strongly agree). It was also confirmed by the qualitative approach: when “regular” citizens participating in focus groups were invited to think about what a “city of scientific culture” could be and which were its main symbols, SCM and SE were quickly and spontaneously mentioned (after universities and big science infrastructures).

- *Impacts on Cultural Identity and Quality of Life*

The majority of visitors (79.78%) agrees that the SCM or SE has an important role in the city's cultural life (34.76% strongly agree), and semi-structured interviews confirm such results. Almost all interviewees confirm that SCM and SE have also increased media attention on scientific issues, particularly in small and medium cities. Despite this, a common citizen claim is that they do not receive enough information (and document analyses tend to confirm it). On average, case studies have also detected that communication 2.0 of SCIP is particularly poor.

- Economic impact

Regardless of different subjective interpretations of the concept “city of scientific culture”, citizens that consider themselves to be living in such a city tend to assert that programs and policies related to the promotion of science and scientific culture have had (and will have) a positive and strong impact on the city development, as well as on its international visibility. All of them are proud of these policies as drivers of their cities.

Surveyed visitors tend to be quite enthusiastic about the economic effect of SCM and SE (52.50% agree that they have an important role in the city’s economic development, with a 15.28% that strongly agree), but people interviewed on a qualitative basis (stakeholders as observers) are less convinced about it, at least at first. Their most common answer was that “economic impact is not the first objective of a SCM or SE”.

### ***Impacts on actors***

- Networking

The most common effect of SCIP observed by almost all groups of actors involved (scientists, teachers, journalists, politics, industry representatives, civil organisations, etc.), although not always considered the most important, is their potential to increase professional networking –which, in some cases, has been materialised in new projects.

- Public feedback and communication skills

What scientists appreciate the most is the strong and positive effect on the public’s feedback. This effect is considered “as a mirror” or “a way of having a different look on them and their activity”, providing them with a better understanding about public needs and concerns. Scientists also value the acquisition of communication skills from their participation in SCIP and the visibility of their institutions and/or their field of research.

- *Visibility*

What industry representatives appreciate the most; aside from networking (with scientists, politicians or other colleagues from their sector) is public visibility, especially since it is associated with positive values and experiences. This is particularly true in the case of SCIP with massive attendance or media coverage.

- *Educational impact and professional training*

Almost all teachers consulted confirm that SCIP have positively influenced their work and their local educational system, providing them with teaching material and training (or updating) opportunities. Some teachers also value the effect that participating in SCIP has had on their competitiveness compared to other teachers or schools.

## **Conclusion**

On the dimension of “publics” (visitors and citizens), the current research has pointed out one observation that has not received special attention in previous studies: the strong “socialising” effect of science communication initiatives and policies (SCIP), both “normalising” science and reinforcing laces among group’s members. It also confirms the well-known cognitive and emotional effect of museum and science centres (SCM) and science fairs and events (SE). Effects on intellectual curiosity, increased self-esteem when talking about science topics and scientific vocations enhancement have also been confirmed, but with big differences among cases and methodological approaches.

One of this research’s main contributions has been the study of SCIPs’ impact in the “community, local or city dimension”. In this sense, all interviewed stakeholders in their quality of observers (citizens, communicators, scientists, journalists, business people, politicians, etc.) state that local policies promoting science culture have had and/or are going to have an important role in the city regarding its economic development and visibility. Citizens perceive SCM and SE as important symbols of their cities, especially in the context of a “city of scientific culture”. They also agree that SCM and SE have an important role in the city’s cultural life and confirm that they have increased media attention on scientific issues (particularly in small and medium cities).

Finally, this study also shows that SCIP have strong impacts on those “actors” that took part in them (like scientists, teachers, company representatives, journalists, politicians and centre staff). Such impact is specially focused on an increased networking among professional from the same group and from different group of actors (with evidences of new projects and access to new financial resources), a better understanding of audience needs and an improvement of professional skills. All interviewed actors are satisfied with their involvement in SCIPs, and most of them have repeated or want to repeat the experience.

Results from these studies have served as a basis for a document of recommendations<sup>13</sup> for the European Commission and all those in charge of carrying out initiatives and policies in the field of science communication and scientific culture.



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## References and notes

<sup>1</sup> Main examples of SCIP are museums and science centres (SCM), science fairs and events (SE), as well as policies promoting scientific culture.

<sup>2</sup> Persson, P. (2000) *Community Impact of Science Centres: Is There Any?* Curator: The Museum Journal 43/1

<sup>3</sup> Garnett R. The Impact of Science Centres/Museums on their Surrounding Communities: Summary Report 2001

<sup>4</sup> European Network of Science Centres and Museums (ECSITE) UK, The Impact of Science and Discovery Centres. A review of worldwide studies. (2008)

<sup>5</sup> Falk, J.H. & Needleham, M.D. (2011). Measuring the Impact of a Science Centre on Its Community. *Journal of Research in Science Teaching.*, 48, 1-12.

<sup>6</sup> Frontier economics (2009) Assessing the impact of science centres in England.

<sup>7</sup> Neresini F., Dimopoulos K., Kallfass M., and Peters, H.P. (2009). Exploring a Black Box: Cross-National Study of Visit Effects on Visitors to Large Physics Research Centres in Europe. *Science Communication.* 30 (4):506-533.

<sup>8</sup> Gonçalves, M.E., Castro, P. (2009). Local is beautiful? Governing science-society relations in Europe *Portuguese Journal of Social Science*, 8, 191-207

<sup>9</sup> PLACES is a project funded by the European Commission, FP7, Grant Agreement 24449 (information available at [www.openplaces.eu/](http://www.openplaces.eu/)).

<sup>10</sup> *The PLACES Toolkit for the Impact Assessment of Science Communication Initiatives and Policies* (an interactive application for smartphones, tablets and PC is available from <http://www.occ.upf.edu/places>, and a full text PDF version from [www.occ.upf.edu/img/imatges/cms/TOOLKIT%20MAY%202012.pdf](http://www.occ.upf.edu/img/imatges/cms/TOOLKIT%20MAY%202012.pdf))

<sup>11</sup> What is “a city of scientific culture” is a central question for PLACES project and several actions were carried out in the framework of this project to get a bottom-up definition. For the purposes of the Impact Assessment group, the following operational definition was considered:

*A City of Scientific Culture is considered as one in which science has a strong public presence and/or notable efforts are being made to strengthen that presence. The presence of science may be indicated through public attitudes to science and the levels of attention to science centres, popular science events and publications, media science and public engagement initiatives. The efforts being made to strengthen that presence could be recognised on the existence of local policies and programmes (funding programs, communication programs, etc.) explicitly directed to this goal*

<sup>12</sup> Feedback interviews with: Andrea Carlini, Ursula Warnke, Claudia Harms, Eva Jonsson, Michèle Antoine, Reinoud Magosse, Manuel Luna Pérez, Josechu Ferreras Tomé, Fruzsina Ökrös, István Kollár-Éri, and Savita Custead.

<sup>13</sup> PLACES Recommendations from Impact Assessment (available at [www.occ.upf.edu/img/imatges/cms/PLACES Recommendations from impact\\_assessment.docx](http://www.occ.upf.edu/img/imatges/cms/PLACES_Recommendations_from_impact_assessment.docx))