PLaces

Platform of Local Authorities and Communicators Engaged in Science

Modules used: B2, C1

Science City

2012

This is a standardized version of the original case analysis number 11. Specific names and locations have been substituted from the original document number 11 with generic references in order to preserve the anonymity of every participant.

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Abstract

The case study deals with a city as an example of a European 'City of Scientific Culture'. Since the end of the 1990s, an alliance of actors from science and from the city began to implement a series of science communication initiatives that peaked in winning the title of the 'City of Science' in a national competition in 2005. Since then, the science communication activities have continued and been institutionalized in a public house of science operated in the city centre by the city and several scientific organizations. The study is based on interviews with participants and observers of the science communication initiatives as well as on the analysis of relevant documents. It focuses at the motives and contexts that helped to initiate and promote the movement towards better integration of science into the city and the inclusion of science in the city culture. As an important factor the raising awareness for the public understanding of science on the national level was identified that coincided with the specific demands of the city of a structural change towards knowledge-based industries and towards a modern image as a city of scientific excellence. The effects of this overall very successful movement towards the development of a scientific city culture are described in this case study and some comments are made regarding deficits in the institutionalization of the scientific culture activities and ways to proceed.

Introduction

This case study deals with the genesis and effects of the initiatives since the mid-1990s in the city to develop a scientific culture and a scientific public image. While there is no definite political decision marking the beginning of the development of a policy towards increased presence of science in the city and in its public self-presentation, the sequence of relevant events demonstrates the intention of major actors in the city to adapt the self-image of the city to the widely unnoticed reality that the city had actually become a major centre of research and development in the country as the consequence of extensive socio-economic changes since the 1980s. The basic alliance aiming at producing that image change and strengthening the relationship between citizens and city institutions with scientists and scientific organizations is formed by the city government and local scientific actors, in particular the local university.

One major event in the initial phase of the process towards a scientific city culture was the opening of the first large science centre in the country in 2000. Because of its striking architecture, the centre has become one of the city's landmarks (see Figure 1 below). A second major event –the main reason to select the city as the national case study as a 'City of Scientific Culture' in the PLACES project– is that the city won the first national competition as 'City of Science', organized by a national foundation in 2005 (this is a private association funded by the business sector and claims that "it is business community's innovation agency for the national science system" It is an important promoter of public understanding of science activities in the country). The third major event is the opening of the house of science in the city centre in 2005, in the aftermath of winning the title of a 'City of Science' and as an indirect consequence of winning that title. As there is yet no formal Local Action Plan to establish the city as a 'City of Scientific Culture'. The house of science, jointly operated and funded by the city and several regional scientific organizations, is the main permanent institution keeping together the actors who mostly collaborating *ad hoc.* Besides its function of representing science in the middle of the city, the house of science creates an institutionalized forum where key actors regularly meet and functions as a nucleus for the organization of public science communication activities.

This case is unique in several respects. First, the political structure is complicated as the city (together with its "sister city") is at the same time a federal state of the country. This constellation leads to a much closer relationship between city and university than in other national cities because universities are regulated by the federal states. When the name of the city is mentioned, it is not always distinguishable whether this name refers to the city or to the federal state with the same name. Even political and administrative institutions and of-

fices often have a hybrid character as city and state institutions at the same time. Secondly, the city is not a traditional university town. The development of a scientific culture was preceded and paralleled by the development of the scientific infrastructure of universities and other research organizations and a socio-economic change towards knowledge-based industries. Both developments –towards a modern science infrastructure and towards scientific culture– have to be viewed as interdependent components of a policy of modernization in the city.

The initiatives of strengthening the ties between science and the city and making science more prominent in its culture described in this case study and promoted by an informal policy are generally consistent with the 'City of Scientific Culture' goals as defined in the PLACES project; but these activities are not necessarily branded that way. In this country, the term 'City of Scientific Culture' and its literal translation are quite uncommon; more often cities are called 'City of Science' or 'Science City'. Both labels are furthermore used in two meanings: first, to indicate a high or excellent research capacity of a local cluster of universities and other research institutes, and, second, as a distinguishing label for cities in which the city culture is strongly influenced by science and where particular efforts are made in this respect. National "science cities" in the latter meaning can be seen as roughly equivalent to the "cities of scientific culture" in the understanding of that concept in the PLACES project. As will be shown below, this city is actually a science city in both meanings. This case study focuses on scientific culture, however.

The PLACES Toolkit defines a 'City of Scientific Culture' as follows:

A City of Scientific Culture is 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.

Following this definition in PLACES, this case study aims at describing the current state of the scientific culture in the city, the manifold initiatives to nurture that culture in the past 15 years, and the implementation and degree of institutionalization of the policy to advance a scientific city culture. Given the complex structure of two sister cities in one state, the case study focuses on the larger one. However, since most initiatives such as the 'City of Science' program and the house of science are based on close collaborations between both cities, the general conclusions are valid not only for one but for both.

Methods

The case study is based on semi-structured interviews with principal protagonists and competent observers (module C1), and on the analysis of documents related to the local initiatives to promote scientific culture (module B2). The general research goals were to reconstruct the sequence of activities aiming at improving the scientific culture in the city over a period of roughly 15 years (end of the 90s until today), to explore the factors encouraging or inhibiting these activities, to identify the key actors and learn about their motivations, and to study the impacts of the 'City of Scientific Culture' initiatives as perceived by the protagonists and observers.

Semi-structured interviews (module C1)

The interview guidelines are comprised of four main sections. First the guidelines dealt with the interviewees' role in the 'City of Scientific Culture' activities and their personal concept of it. This was followed by a section about the city policy and the many initiatives and events related to the promotion of a scientific culture with the goal to reconstruct the sequence of events, their context and the driving forces behind them. The third section focused on the interviewees' perception of effects and outcomes and the present state of the relationship between science and the city. And in the final part the interviewees were asked about personal consequences of their involvement with the 'City of Scientific Culture' activities as another way of stimulating the interviewees to think about potential impacts.

While the guidelines defined the main themes and included a number of requests for specific information, the interviews were conducted as open talks between interviewer and interviewee. Dependent on the course of the interview and the type of interview partner, the guidelines were applied in a flexible way – focusing on some topics more than others and allowing unexpected themes to emerge and being addressed by the respective interview partner.

Interviewees for the case study were selected, first, according to the relevance of their knowledge for the case study and, second, to represent the different perspectives of actors from the city and science and as observers. Mostly, the role of the interview partners was that of a principal protagonist, but two interviewees were fully or mainly observers of the local 'City of Scientific Culture' activities.

The interviews were conducted in May 2013 during two stays of the author in the city. Mostly they took place in the offices of the interview partners. In one case, a face-to-face interview was not possible due to scheduling problems and was therefore conducted by phone. Typically, the interviews lasted between

45 and 60 minutes. The interviews were audio-recorded and for each of the interviews a written summary was compiled as the basis for the analysis.

To maintain some confidentiality of the interview partners, information and statements quoted in the following analysis are not attributed to individual interview partners. Most information was actually provided by several interviewees. With few exceptions the descriptions of the sequence of events, the perceptions and the assessments of the interview partners were largely congruent.

Document analysis (module B2)

A number of printed and online documents were used to complement the interviews. Particularly important among these documents are the local proposal for the competition 'City of Science' and the review report on the respective activities in the year in which the city officially hold that exclusive title (2005).

Furthermore, two impact studies were relevant for this case study. The first of these studies was conducted on behalf of the foundation, which organized the competition for the title of the 'City of Science'. The study looked at the cities which had participated in the national competition (not just the winners) and tried to find evidence for positive effects of the competition on the involved cities, in particular regarding the creation and strengthening of actor networks between science, economy, culture and city administration (reference 5). The second study was commissioned by the city marketing department and analyzed the public image of the city within and outside of it and drew conclusions for city marketing (reference 3).

Finally, a number of press releases, newspaper articles, websites and Wikipedia articles provided factual information about the city, its science communication institutions and science communication events.

Results

Context and Background

The city, with a population of 546.000, is a city in the northern part of the country. Its sister city has a population of 108.000. Traditionally, the city studied was a city with a harbour and respective ship-building industries and a member of an important organization in international trade. Merchants dominated the city and are still important; the local Chamber of Commerce is an important institution in town, prominently placed in a historic building at the central market place.

As mentioned in the introduction, the city is one of the so-called "city states" in the country. City states are federal states which consist only of one city. The political institutions of the state and of the city overlap. For example, the state parliament is identical with the city council. The prime minister of the state is at the same time mayor of the city. In this case, the political structure is even more complicated as there is a sister city with a separate city council. This complex structure will not be detailed here. This political constellation as a city state is of relevance for the case study insofar, as there is no interest conflict between the city and the federal state, or competition about financial support between different regions of a state that may occur in other federal states. City policies, such as those towards a 'City of Scientific Culture' as described below, can be supported by the political instruments and resources of a federal state. Particularly important in this respect is that in the country, funding and governance of universities (and partly that of other research organization) takes place at the state level. While most national cities only "host" their universities (as one interview partner put it), in the case of city states the universities are administratively closely connected to the city, and the city, via the state institutions, can exert more influence on them. And, conversely, the universities have to deal with representatives of the city in their negotiations about resources and development plans.

At the beginning of the period covered in this case study, in the late 1990s, the city was still in a severe structural economic crisis because traditional industries were declining and unemployment rates were rising. A policy of structural change and modernization toward science-based industries and the tertiary sector was implemented. Permitted by political consensus and financial resources from a tax reform privileging the city states in the country, and led by a mayor with a high esteem for science, the city successfully improved and extended its scientific infrastructure by reforming its once ill-reputed university, co-founding a private university and promoting the sitting of several research institutes of the large national research institutions.

Today, the city (including its sister city) has two full universities, three universities of applied sciences and a college of art and music. About ten high level research institutions complement the list of academic research institutions in the federal state (i.e. including the sister city). Particularly noticeable is the transformation of the local university. Founded in 1971 as a "reform university", it soon developed a poor image as being dominated by left ideology rather than scientific spirit. In the 1980s a transformation process began –promoted by the city state as well as by a number of professors inside the university and the university management. The transformation process was successful and finally resulted in the university being one of the most successful universities in the national "Excellence Initiative", a competitive funding program for institutional development strategies, cutting-edge research clusters and graduate schools at universities. This transformation took place unnoticed by many who still remembered the university as before. The university's success in the Excellence Initiative therefore came as a big surprise to outsiders.

The city also attracted high-tech aerospace industries and in 1986 opened a technology park that developed successfully. The technology park hosts scientific institutes as well as high-tech companies and created many jobs in science & engineering. The technology park website mentions more than 400 enterprises and more than 6,000 jobs. Since the beginning of this transformation process towards a science-based economy, the city has thus become a leading centre of science and technology in the country, particularly regarding marine and aerospace R&D. The persistence of the bad image of its main university and the missing public acknowledgment of the structural change toward knowledge-based industries was one of the motivations leading to the city's engagement for public communication of science.

Evolution of 'science culture' activities in the city

The process towards a 'City of Scientific Culture' cannot be described as the implementation of a master plan based on a single decision of the city. It was a development that started rather informally and only over time some institutionalization took place. It is difficult to identify a clear starting point, of course, but the idea to develop science communication initiatives in the city can be traced back to the time of the national preparation of the EXPO 2000. While the EXPO itself was located in another city some 125 kilometres away, the organizers' tried to initiate decentralized activities related to the topics of the EXPO. The whole phase of EXPO preparation led to a period of vitalization of science communication activities and policy in the country, involving many players from science organizations, politics, foundations and even media, and creating networks among them based on common interests in making science more visible to the public. Adopting ideas and concepts such as "Public Understanding of Science" or the idea to organize direct dialogs between science and the public rather

than relying solely on journalism as mediator, an "Alliance" of science organizations in cooperation with a large national association of foundations aiming at advancing science prepared the so-called PUSH initiative (PUSH = Public Understanding of Science and Humanities) and published a "manifest" in 1999 appealing to scientists and science organizations to give communication and dialog with the public a higher priority. In the following years, this foundation as well as others, initiated and sponsored many public science communication activities in the country (reference 6, reference 12, reference 13).

Concern about lack of involvement of scientists in public communication was not new in the country. For example, in 1977 the former national governor gave a talk appealing to scientists to increase their public presence. He used the still frequently cited phrase of “duty of science to proactively inform the public”. To support his appeal, he pointed to a direct link between public visibility of science and the chances of science policy to compete with budget requests from other policy fields and provide an adequate funding of science (reference 9). Furthermore, in the 1970s national universities began to expand and professionalize their public relations activities.

However, for a long time the debate about 'science and the public' in the country had mainly focused on mediated communication, i.e. on the relationship between science and the media and on science journalism. This debate is still ongoing. However, in the PUSH approach direct communication with the public by means of events and exhibitions was the new focus –following the EXPO model and also taking notice of the science centre and science festival movement in similar countries. Interestingly, some of the most recent science communication initiatives in the city rely on mediated communication again, making use of the new online media such as video sharing platforms.

While it is in the nature of case studies to focus on specific conditions, events and actor constellations, it should emphasized that the development of the city, though particularly pronounced and with specific regional characteristics, is generally in line with a general movement in the country (and Europe) towards increased concern about public support for science and the decreasing attractiveness of STEM subjects and scientific careers for students. While the city was one of the first and most determined cities in the country to include science in the culture and image of the city, according to one interviewee it now becomes increasingly difficult to pursue the image of a 'City of Scientific Culture' in city marketing as a distinguishing factor from other cities with similar activities.

The concurrence of the general PUSH movement in the country and the specific need to address image problems of the local university and the city were important factors contributing to the impetus the science communication activities gained in town. However, opportunity and general motivation alone would not have led to anything without the presence of engaged actors who

perceived the chances and were prepared to take the lead and invest time, brain and money into the development of a new relationship between science and the city.

Basically, the development of activities related to the promotion of scientific culture rests on a long-standing, mostly informal collaboration of the city institutions of the two sister cities with the regional science institutions. Particularly relevant in this respect are, in the first place, the local university but also other higher education institutions and research institutions outside the university. Interviewees emphasized that participation of institutes in popularization activities has grown over time and is now rather wide-spread. One interviewee noted that university departments nowadays see it as a flaw if they do not participate in public communication events in which the university is involved.

Companies of the local high-tech industries are described as generally sympathetic and supportive towards science popularization activities. They are involved in these activities mostly on a case-by-case basis, however, and normally respond favourable to sponsorship requests but do not take the initiative.

Someone that was mentioned in almost every interview as the pioneer and main protagonist of the city's activities towards promotion of a scientific culture is a geoscientist and internationally renowned marine researcher, professor at the local university. He played a crucial role in the development of science popularization initiatives in town. With the resources of his institute and supported by his public communication officer, he started several stand-alone communication projects. But he was also prominently involved in the planning of the science centre of the city, and the series of city-wide events and activities based on broader collaborations (see below). In 2001 he received the "Communicator Award" jointly set up by the national research foundation and another set of foundations. As Chairman of the Steering Committee of the national 'Science in Dialogue' initiative, he is still one of the leading figures in the science communication field not only in the city but in the whole country.

While this professor sees many benefits of public communication of science for the city, for the university and for individual scientists who engage in dialogs with citizens, his motivation for science communication seems to be strongly based on genuine enthusiasm for communicating about research not only with peers but also with the broader public. For the university as organization, closing the previous "distance" between the city and the university was an important goal, as well as demonstrating the utility and relevance of science done there, as classical goals of public relations of scientific organizations.

Within the city administration, responsibility for science communication activities is located in the agency for business development and city marketing. This had several implications: First, the activities were acknowledged as rele-

vant for the economic well-being of the city and there was thus a budget available for them. And, second, they were planned and assessed by the city administration mainly with respect to their economic impacts. The main motivation to support science communication activities aiming at creating a scientific city culture and integrating science into the public image of the city were twofold: first, to attract tourists by providing places of excursions (science centres, museums) visible beyond the walls of the city thus attracting visitors, and, second, to create a city image making it attractive as a location for high-tech businesses, science institutions, scientists and students. However, interviewees emphasized that the intended image change of the city was not only aimed at modernizing the city image to the outside world but also to create a modern and positive self-image of the city –a new identity.

The somewhat diverse motivations of the actors from science and the city obviously did not result in major goal conflicts but led to a win-win situation. All interviewees described the collaboration as cooperative and emphasize the good personal relations between the major players.

Selected initiatives to promote a scientific culture in the city

In the following, important science communication initiatives in the city since the year 2000 are described in chronological order. The list is neither complete nor completely systematic; however it includes the most important facilities and events related to the efforts to promote a scientific culture and image of the city.

Opening of the science centre (2000)

Based on ideas developed in the run-up to the EXPO 2000 and enabled by the availability of an interested entrepreneur, plans to build the first big national hands on science centre in the city took shape. In the year 2000 the centre was opened as a public-private partnership. City and state financed the building and rented it to a private company which was responsible for the operation of the science centre. Because of its spectacular architecture (see Figure 1), it became a new landmark for the city and received nationwide visual coverage on the title pages of important magazines. In 2007 it was extended by another building across the street. Despite successful in terms of visitor acceptance, operated on a commercial basis it suffered from chronic economic problems and several times almost had to close. In May 2013, however, it was finally taken over by the city which acknowledged its importance as a place of informal science learning and education as well as its function of attracting touristic visitors. Visited by roughly 220,000 people per year, the science centre offers a permanent exhibition with the sections "Man", "Earth" and "Cosmos", and a temporary special exhibition which is regularly replaced by a new one. Furthermore, is has a special educational program for schools.

Organization of the 'Science Summer' as part of the national 'Year of Geosciences' (2002)

Since 2000, the national office for science popularization organizes 'Science Years' focusing on specific disciplines or themes. In the beginning of this series of years, a program of science communication activities, called 'Science Summer' was implemented with a focus on particular city. In the 'Science Year' 2002 the topic was geosciences and the city volunteered to organize the 'Science Summer'. The principal scientific partner in the city was a centre specialized in marine environmental sciences. In a way, organizing the 'Science Summer' was the pilot test for the larger program implemented 2005 during the 'City of Science' year. Shows, exhibitions, talks and symposiums for the general public as well as hands-on activities for children and adolescents took place. In a format called "Long night of science", several scientific institutions opened one evening to the public. Busses commuted between the different sites and took visitors from one site to the other.

Opening of a Space centre (2004)

Inspired by the idea to give the city a new image, referring to the high-tech aerospace industries in town and probably motivated by the initial success of the science centre, plans for a huge Space centre were developed –a mixture of science centre, entertainment park and business mall. This purely commercial development project was placed in an old wharf area and opened in 2004. The city and an investor co-financed the project (about 500 million Euros). However, the project turned out to be a commercial disaster and the Space centre was closed after only a few months of operation because of lack of visitors and customers.

Successful application as 'City of Science' (2005)

In particular intensity, science communication activities were organized in 2005 when the city was nominated 'City of Science' in the first national 'City of Science' competition announced by a national association of foundations promoting science. Prepared by a planning team that included representatives of the higher education institutions of the two sister cities, the City Marketing agency and the Chamber of Commerce, and supported by a many partners from city, science and media, the application was successfully defended against competing applications from other cities. With the help of considerable funds from the national association of foundations promoting science that were part of the nomination and additional funds that were raised in the city, a broad portfolio of science popularization activities, targeted to different groups und including many different formats was planned and implemented throughout the year 2005. By means of mobile containers, small exhibitions were spread in the city. Furthermore, besides many other activities open days in research institutes,

talks at public places with a so-called "Profmobil" (a bicycle with built in laptop, monitor and public address system), science talkshows and educational programs for school classes were organized. The review of the 'City of Science' initiative claims that more than 700 science communication events took place in the city and its sister city in that single year 2005. The importance that the national government attributed to an intensified and relaxed relationship between science and the public is made obvious by the visit of the then president of the country, who participated in the opening ceremony in the city.

Opening of the house of science (2005)

The idea to establish a house of science in the city developed during the preparation of the application for the 'City of Science' competition. Immediately after the nomination as 'City of Science' was confirmed, concrete plans were made and the house was opened right in the city centre in the year when the city was 'City of Science'. While the 'City of Science' nomination officially was only a temporary title awarded for one year, the house of science is a permanent institution in town –the sustainable outcome of the 'City of Science' year. It is the attempt to transform the impetus gained by the success in the national competition into a more stable institutional structure. The house of science is operated and funded by a consortium of partners that include the main scientific institutions, the city (represented by the agency for business development), and a local scientific association. The house of science is a centre for scientific lectures for the public and for meetings. It also presents exhibitions on science-related themes. The house is open to the public every day. Regular events are public lectures by researchers every Saturday at 11 a.m., and meetings to intensify the exchange between science and schools, and between science and industry.

Participation in the national 'Year of Science' (2009)

In autumn of 2009 the city participated with a series of events in the national year of science. The "Science Express", a train with a mobile science exhibition, stayed in the city's main station as well as in the sister city for some days. These stops were accompanied by events in the respective cities. The city's contribution focused on global warming issues because it is a city that would particularly be affected by sea level rise. An exhibition in the local house of science (20 August to 5 November 2009) accompanied by several public talks addressed the topic of global climate change with particular emphasis of its possible implications for the city and how research and technology contribute to a better understanding and management of climate change.

Opening of a climate house in the sister city (2009)

Using a similar business model as that of a public-private partnership, another large-scale science centre was opened in 2009 in the sister city. Unlike the one

in the main city that covers broad areas of science, the one in the sister city is basically monothematic. Its main exhibition shows the local climate and its implication for nature and the life of the population in nine places of different regions of the world along the 8th meridian east. The local climate –temperature, sun, rainfall and humidity– at these places is simulated and can be experienced by the visitors. Additional parts of the exhibition focus on the history of the climate and on climate protection. Visited by about 600.000 people each year, it is the city's major attractor for tourists. Like the science centre in the main city, the one in the sister city also organizes an educational program for pupils.

Successful participation in the 'City of Science' final competition (2012)

After seven years (2005-2012), the national association of foundations promoting science decided to cease its 'City of Science' program with a final competition among the 51 city candidates that had submitted proposals during the seven years (either successful or unsuccessful). These candidates were entitled to participate in the final competition among proposals for "new initiatives" in science communication. The city and its sister city submitted two proposals which were among the 10 of 31 that were selected by the jury. The first accepted project is about the regular production of science clips on relevant topics of science and society, one clip each month, to be distributed by all possible channels. It is planned to organize an "International Biennale of Science Clips" biannually. The other accepted project of a "Water Academy" is located in the sister city. As collaboration between scientific partners, museums, the zoo and the city, the project aims at providing informal learning opportunities for pupils. Both initiatives are designed as long-term projects; the funding coming along with the nomination is just to get the projects started.

A look at the initiatives of the above list shows (with the exception of the two science centres) that they were planned and implemented in the context of the national "Year of Science" and 'City of Science' initiatives, making prudent use of resources and opportunities that were provided by the national Federal Ministry of Education and Research, the association of foundations promoting science and the national office *Science in Dialogue*. It furthermore shows the close interrelation of national and local initiatives to promote scientific culture in the country. The city was particularly successful in using national resources to support local goals in science communication.

Outcomes and effects of the city's policy towards scientific culture

The following analysis of effects of the initiatives to promote a scientific culture in the city suffers from methodological problems as it relies mostly on perceptions of actors and observers rather than on scientific measurement of these effects. The analysis is thus only tentative. The author offers some cautious observations based on his interviews with key people and the analysis of docu-

ments and websites. The claims made about outcomes and effects have the status of hypotheses more than of proven facts. Their function is thus not to authoritatively judge the success of the city's informal policy towards a 'City of Scientific Culture' but rather to support reflection about different dimensions of the outcome and the factors that shape it.

Increased and improved science communication offers for the general public and specific target groups

The most obvious outcome of the policy to develop and advance a scientific culture is the increased presence of science in all parts of the city and city life. This includes the visual presence of science in the cityscape, destinations for tourism and leisure activities, a broad spectrum of informal education offers for adults and pupils and access of the public to local science institutions during open days and public events. For citizens and tourists alike, the city thus offers a variety of ways of getting into contact with scientists and their research.

First, the city has quite a number of institutions specialized on science popularization. In the first place these are the two large science centres with together more than 800.000 visitors each year. Both institutions were the result of local initiatives and have required considerable commitment by the city when they were founded, and the science centre has lately even been taken over by the city to prevent its closing-down. At least to some extent these large science centres can be seen as the outcome of the city's policy towards scientific culture and a scientific image. A smaller hands-on science centre exists in the sister city, and is supported by a foundation. Furthermore, the exhibitions of several museums in the two sister cities include references to science, social science and humanities.

Second, science-related topics play an increasing role in the portfolio of cultural, educational and entertaining events taking place in the two sister cities. This is particularly true for the activities during the 'Science Summer' of 2002, the 'City of Science' year 2005 and the activities organized in the context of the 'Science Year' 2009. However, several interviewees confirmed that such activities are now more regular than before even outside the mentioned programs. The scientific institutions in the two cities have increased the frequency of events for the general public –for example, a house of science opened in 2005 offers talks by scientists each week.

Third, science centres, museums and scientific institutions have created many educational opportunities for schools offering hands-on research experiences for pupils that are not feasible within the normal classrooms. Several cooperation agreements exist between interested schools and science centres and other providers of such opportunities. Research organizations have created school labs or organize summer schools and lectures for children given by sci-

entists and taking place in the university. The local university, for example, has a program with offers for children and adolescents of different age groups. It runs school labs for chemistry, physics, geology, environment and climate, and genetics; the research centre offers a school lab for aeronautics in the city.

An interesting question concerns the degree and social selectivity of participation of the city population in the activities mirroring and reinforcing the "scientific culture" in the city and its sister city. How many and which groups of citizens make use of the science communication events offered? Clearly, several events have attracted many visitors, and the science centres are visited by about 800.000 people each year –citizens of the two sister cities as well as tourists. According to an evaluation report, only 12% of the citizens of those cities have actually participated in one or more of the science communication events in the 'Year of Science', although 65% had heard about the program –mostly via the local mass media. The case study on the science centre found that the average educational level of adult visitors was well above the national average (reference 7). Some formats, such as the regular Saturday morning talks offered by scientists in the house of science clearly favour traditional middle-class citizens valuing education and knowledge. Other science communication formats may be less selective regarding the socio-economic status of the participant. Several of the local actors interviewed for this case study stated that they try hard to create opportunities with low barriers of participation in order to reach those segments of the population that are less likely to take part in common formats of science communication. One project mentioned in that respect consists of mobile exhibitions at shopping centres.

Image and identity

The traditional image of the city is that of a harbour town along the river with attractive historical buildings, the fictive location of a well-known fairy tale and the home of a famous team in the national soccer league. These image elements are still prominent in the self-image of citizens as well as in the external image, identified in a large image analysis in 2007 which was based on a public opinion survey of citizens as well as of a national and an international sample (reference 3). However, in the top list of things that the respondents perceived as having improved in the past 10 years, citizens also mentioned the local higher education landscape as well as science and technology. The image study therefore recommends relying on the positive traditional elements in the city marketing, but strengthening the references to science and technology. Currently, a replication of the image study is on the way and interviewees of this case study expect (and hope) that it will show a clear indication of the image change of the city and its sister city not only among the local population but also in the national and international sample.

Given that image change was one of the important goals of the protagonists from the city, they perceive a clear success in the integration of higher education, science and technology into the self-image of town. While the image study in 2007 did not yet find evidence of a change in the external perception by the general national (and international) population, it is quite likely that the image of it as a city closely related to science and technology changed among scientists, science mangers, students or actors in the science policy field. The many visitors of the two big science centres from outside the sister cities show that among science-interested tourists these institutions are well-known as possible places of excursion.

Figure 1: [explanation of observable information] The cityscape in the historic centre is dominated by its tradition as an important old merchant and harbour city and location of a famous national fairy tale. The pictures in the first row show a sculpture reminding three popular symbols of the city. New landmarks such as the science centre and the tower for experiments under low gravity, both located close the local university and the technology park, symbolize the extension of the image of a modern city of science, technology and higher education.

In the beginning of the development of a policy towards scientific culture, the established cultural scene of the city, interested in theatre, arts and music, seemed to have been somewhat sceptical and keeping some distance to the newly developing culture of science communication initiatives. However, the interviewees of this case study emphasized that in the process of developing a "scientific culture" this classical antagonism between the 'two cultures' as described by C.P. Snow in 1959 (reference 11) could be overcome. However, according to their perception, 'science' nowadays is broadly accepted as an intrinsic part of culture and cultural life in the city.

An anecdotal remark: One interviewee mentioned historical roots of pragmatic scepticism towards scientific 'theory' among the merchants who traditionally formed the elite of the city. He said that if formerly a merchant had two sons, he would send the brighter one with a ship out into the world to learn, and the less gifted one to university to study. Today it happens that the Chamber of Commerce holds a meeting at the university campus –unthinkable a couple of years ago, as another interviewee explained. So it seems that, in the city, the gap between the culture of science and the traditional business culture is closing.

Finally, the cityscape, as the visual representation of the 'identity' of both sister cities, reflects and perhaps reinforces the image change (Figure 1). Besides the buildings in the historic centre and at the waterfront along the river, two science-related building have become new landmarks of the city: the science centre and the tower of the local centre of applied space technology and microgravity at the local university. This tower provides low gravity conditions

for experiments by enabling a free fall of the experiment hardware in a vacuum for about 10 seconds.

Evolution of networks

The beginning of the initiatives promoting a scientific culture in the sister cities has profited from a favourite constellation of motivations and opportunities – perception of an economic crisis in town, image problems of the university, availability of funding despite a permanent budget crisis and a development of a promoting climate for science communication activities in the context of the EXPO 2000. However, without the cooperation of actors from the university and from the city (politics and administration) the opportunities would have been lost. So there was already a core network of actors in the science policy sector that got things started.

The interviewees describe the process of preparing science communication initiatives as cooperative and leading to the emergence of a network. The professor mentioned before, who had engaged in science popularization activities already before the beginning of the involvement of the city, became the major protagonist on the side of the university –explicitly commissioned by the university president. Representatives of other science organizations joined. The city assigned responsibility for science communication to the agency for business development and city marketing. In the sequence of science communication activities the network grew and tightened. In a way, the board of directors of the house of science, the list of supporting organizations and the program committee of the house reflect the science communication network as an institutionalized structure.

An evaluation study of the 'City of Science' program funded by the large national association of foundations aiming at advancing science concluded that the forming of networks in the cities who participated in the program by submitting proposals is one of the major outcomes of the program (reference 5). The study says that this worked particularly well between science and city administration. In some of the cities included in the study, new co-operations between science and enterprises developed; in some cities the ties between science and 'culture' intensified. The study also emphasizes the important role of top-level political support. The city seems to be a typical representation of this pattern.

That actors repeatedly cooperating with each other in the preparation of proposals and the organization of events form a network is not a surprise. A first question to be asked is about the structure of the network. In the case of this study, the backbone of the network is the alliance of actors from the university and other scientific organizations and the state/city politics and administration. Furthermore, professional science communicators from science centres, museums, and the house of science –are part of the network. Economic actors come

into play in two roles, as investors in science centres and as sponsors and co-operation partners in science communication events. Both are the case in the city, but the role of actors from business seems to be rather peripheral in the networks –at least at the operational level. However, some interviews suggested that a more general network of influential players from science, city politics and industry –the city elite– has helped to create and maintain political support for the science communication activities. There is no evidence from the interviews that the network includes representatives of NGOs. As far as can be judged from the interviews, schools are mostly beneficiaries of science communication activities rather than part of the network planning them. While the regional media were involved in some events as "media partners" and the interviewees generally diagnose a positive relationship between the science communication players and the media, the media do not seem to belong to the core of the network.

A second question to be asked is about the thematic focus of the evolving network. Is the network limited to the planning and organization of science communication activities? Or is it broader, influencing several dimensions of the relationship of science and the city, such as the development of the city/state policy towards the higher education institutions and other research organizations or the use of scientific expertise for decision-making and policy implementation? Answers to those questions are highly subjective, of course. Those who are members of the network tend to think that the collaboration in the science communication field has had positive impacts on collaboration in other fields, e.g. on the collaboration within the local university and between the university and other scientific organizations in the preparation of the successful city proposals to the national Excellence Initiative. One interviewee provided a more sceptical view and claimed deficits in the interaction of science and the city regarding science policy and utilization of the local expertise, though. His answers implied that the collaboration in science communication did not lead to a massive spill-over of the spirit of collaboration to science policy or to a closer interaction of science and the city in the solution of the city's practical problems.

Use of local scientific expertise

According to the definition of 'scientific culture' offered in the introduction, one indicator of scientific culture is the 'presence' of science in the city. Superficially, this presence refers to the cityscape and city life, i.e. the institutions, cultural events, leisure activities or educational offers as detailed above. There is no doubt that the informal policy towards a scientific culture has increased that kind of presence of science in the sister cities. Less obvious but equally important for the scientific culture concept, is the presence of local science in decision-making, implementation of policies and solving of the city's problems.

Does the city make use of the rich knowledge resources in their scientific institutions and the brains of scientists working there? How likely is it that a member of the city council or an officer in the city administration will call the university or some scientist he/she knows when facing a problem that scientific expertise may help to understand and solve? To some extent, the interviews explored these questions. The answers indicate that university and city administration both agree that local expertise is used by the city. For example, the university points to contract research it does for the city ant to a long-standing formal collaboration between a university institute and an institution of the city. It furthermore claims that university expertise is used in urban development planning, for instance, and that professors are frequently invited as advisors by the city. One interviewee was quite unsatisfied with the state of affairs in using the local expertise by decision-makers, however. He claimed that many political discussions about city problems would benefit from inclusion of available scientific expertise and he mentioned several specific examples. Obviously, there are different views about what would constitute a satisfactory level of interaction between science and city in urban policy-making. But it is quite clear that any effects of the scientific culture initiatives on the use of expertise would be random effects; so far, there is no specific initiative or program explicitly aiming at increasing the inclusion of local scientific expertise in decision-making processes of the city.

Scientists' integration in the city

The management of universities and other scientific organizations is usually interested in good relations with the community in which these organisations are located. Part of the public relation efforts are therefore directed to nourish that relationship by organizing open days or cultivating interactions with local journalists. The personnel of these organizations live in the community; this is a natural way of linking the organization to the city. Some of the resident researchers may even become members of the elite and establishment of the city. However, science is increasingly internationally, not locally oriented. Furthermore, researchers are increasingly mobile in a double sense: many scientists commute between home and work place, split from their family during the week, and often scientists move from one institute to the next during their career – either attracted by offers of other institutions or forced because of the increasing share of project-based contracts limited in time. The network of peers and friends may stretch over several cities, countries and continents. It is therefore not a trivial question to what degree scientists are socially integrated in the city in which they work.

On one hand, the city of this case study has quite a number of renowned researchers who are well-known in the city and are part of its 'establishment'. On the other hand, one interviewee mentioned professors who –after a long

time of being employed at the local university– did not have a cognitive map of the city or didn't know the name of the major figure in the city related to their research field. Interviewees from the university pointed to an increasing readiness among young researchers to engage in contacts with the local public. In contrast, another interview partner described the dominant culture at the local university towards the city as "distinguished distance". Pointing to the unworthy working conditions of scientists in "shabby offices", he complained about how university scientists are treated by the city/state. He assessed the relationship between the university and the city as characterized by "mutual disrespect". Of course, both descriptions are not really incongruent as the situation may change from one institute to the next, the personal motivation to engage in public communication activities may vary from researcher to researchers, and the expectation level may differ from observer to observer.

One interviewee noted that many scientists are intrinsically motivated and thus prepared to engage in communication with the public but don't find ways by themselves to realize their intention. Programs related to events such as 'Science Summer', 'City of Science' or 'Science Year' or the regular series of Saturday morning talks in the house of science create an increasing number of opportunities for scientists – not just the stars among them – to talk to the public. It seems quite clear that the support and motivation of researchers for these activities by the university and other science organizations has increased. One interviewee mentioned that he as director accepts that his researchers invest up to 5% of their working time for such activities and pointed to positive learning effects for the scientists themselves who engage in science communication.

Interdependencies between scientific performance and scientific culture

The interviewees tended to describe the city's policy towards promotion of science and technology and its policy towards a new image and relationship between science and the city as two sides of a coin. Although they could not provide hard evidence for their assessment, they assumed that the city's success in the national Excellence Initiative was to some degree positively influenced by its "science culture"-activities. Two arguments were put forward to make this link plausible: First, interviewees stated that the patterns of collaboration and the trust established in the science communication field made it easier for scientific institutions to cooperate well in the preparation of the proposal for the Excellence Initiative. Second, some assumed that the reputation as 'City of Science' and the correction of the poor image of its main university in the national coverage of the first winner in the 'City of Science' competition may have played a subtle role in the selection of scientific proposals from the city as "excellent".

Furthermore, the interviewees assumed that the scientific city image supports the university and the other science institutions in their recruiting of

both researchers and qualified students. Similarly, positive effects for the high tech industry are expected in the recruiting of scientists and engineers.

Conclusions

Much has been achieved in the city and its sister city aiming at intensifying and improving the relationship between city and science and developing a 'scientific culture' in the terminology of the PLACES project. In the country, this city can be considered a pioneer in this respect, making consequent use of national resources for science communication on one hand and developing innovative formats for the national strategy on the other hand. Communication price winner, who is a key figure in the city science communication activities as well as on the national level, demonstrates both the pioneering role of the city and that its model is a particularly successful example of a broader national movement towards more active "nourishment" of a dialog between science and the public in the country. Remarkable in town are the continuity of activities rather than the organization of only isolated events and the contextualization of these activities in the urban development plans for the modernization of the city. This context led to the mobilization of considerable resources and to a clear commitment by the city –despite tight city/state budgets.

Most initiatives in the main city and its sister city provided a variety of offers for science learning and experiencing science for the general public and for schools. So far, the political dimension of the science-in-society relationship has been excluded in the science communication activities. When explicitly asked, some interviewees made sceptical or evasive comments about participation of the public in science governance, pointing to the constitutionally guaranteed 'autonomy of science', the risk of attracting barraters by participatory formats or arguing that this would expect too much involvement from ordinary citizens. The sceptical view on participation is in line with national and international surveys of scientists in which most respondents showed a positive attitude towards 'dialog' with the public, but a negative attitude towards the public's participation in decision-making about research policy (reference 8). But other interviewees recognized the absence of participatory formats as a deficit of the current initiatives that should be addressed in the future.

The policy in town is based on a broad consensus of its relevant actors and has political support from the highest level and across the parties. It is based on a network between actors from the city and science which have if not identical but compatible interests and goals. The high tech industry in the city is interested and supportive but not formally included in the activities on a routine basis. There are some indications of institutionalization of the science-in-society policy. First, 'science communication' is a competence field in the city agency responsible for economic development and city marketing as well as in the state government. Second, the house of science, which is jointly operated and funded by the city and the scientific organizations in the city, serves as an institutional-

ized coordination body. A Local Action Plan, a formal commitment of the city or a contract between city and the scientific organizations which are successfully collaborating on an informal basis, does not yet exist. That means that there is still a strong 'ad hoc' element in the science-in-society initiatives. This is not necessarily bad or ineffective but it makes the future of the city policy towards science particularly sensitive to changes in the constellation of the relevant actors.

Finally, although support of the city's political leadership and administration is broad, the current strategy has a clearly economic framing. The big advantage of that framing is that it led to strong support from the city as it promised to address one of the big problems of the city, namely the crisis in the economy and the chronic budget problems of this city/state. The scientific partners in the collaboration brought in their own goals –raising interest in science within the general public and important target groups such as pupils, and contributing to the scientific literacy by providing opportunities for formal or informal learning. These goals are largely compatible with the concept of scientific culture, but they do not foster all aspects of scientific culture equally.

Recommendations

Based on the analysis provided above, the author tries to make some cautious suggestions of how the largely successful policy towards scientific culture could be further advanced. It is not assumed that these recommendations could or should simply be implemented; this would imply a rather hubristic attitude of the author. The recommendations may serve as a check list, giving some ideas from an observer on how to extent the current policy.

1. In order to transfer the current consensus on the significance of a science-in-society policy into future configurations of people and institutional actors, how to increase the degree of institutionalization of that policy should be considered.

2. Science communication initiatives so far have been developed top-down. One might consider ways of involving citizens in the planning of these activities. Examples: appointing them into planning groups, or forming citizen advisory panels for science centres, museums or the house of science.

3. Many formats used in the city initiatives are based on face-to-face interactions with scientists and are already 'dialogic' in this sense. The topics selected are often of social relevance (such as climate change) but are not highly controversial. It may not make sense to simply jump on the big hot issues in town, such as animal experiments or military research. But one might think of cautiously developing a culture in which more controversial discourses become possible by developing and implementing debate formats (two speakers advocating different positions but referring to science) and more symmetrical question & answer formats (scientists asking citizens, citizens asking scientists).

4. As explained above, the presence of science in city policy-making and administration is not addressed by the recent and current initiatives. Connecting science and the city in policy-making processes and linking the city's policy-makers with science managers and scientists might lead to a new branch of science-in-society initiatives, complementing those addressing the general public or schools as target group.

5. It may be useful to include the city industry and NGOs in science communication activities –not just as sponsors in the background, but more actively. This involvement might increase the complexity of the communication situations and might lead to a politicization of science communication. But it may also increase involvement of segments of the public that are less interested in "pure" science and it may provide a more realistic image of the social context of R&D.

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2. Here the author refers to a review published by the local university about the city as a 'City of Science'. The name of the review has been suppressed in order to maintain the anonymity of this case report. If you need more information or wish to know more about it, please send a message to occ@upf.edu

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