Parallel Session 26: Interactions between science communication and science policies

PUBLIC POLICIES FOR SCIENTIFIC CULTURE – WHEN MATURITY BRINGS ABOUT EVALUATION

Ana Correia Moutinho

Centro de Investigação sobre Economia Portuguesa, Instituto Superior de Economia e Gestão, Universidade Técnica de Lisboa, Rua Miguel Lupi nº 20, 1200 725 Lisboa, Portugal. Tel: +351 213955745, Fax: +351 213967309, E-mail: acm@iseg.utl.pt

Abstract

In developed countries significant investments have been made to improve the scientific culture of populations. Public initiatives include the recruiting of the scientific community and a panoply of out-of-school resources designed to engage people with science. The system develops at different paces according to the socio-economic scenario and political commitment of governments. UK and Portugal provide two examples of promoting structures, Copus and Ciência Viva.

Key words: Scientific culture, policy, evaluation

Text

PUS comes of age

Public understanding of science – or whatever expression is used in each language – has finally made it to adulthood. It means it became a policy issue within S&T systems, comprising an agenda, a budget and a responsibility.

Scientific culture is a public affair and a matter of the state, although we can argue for the increasing participation of the so-called science communication industry. The implementation of policies is a long-term enterprise, requiring transversal measures to intertwine formal and informal schooling.

There is a rhetoric associated with public programmes that translates political intentions. Figure 1 summarises the basic rationales underlying the design of PUS policies. Top-down or bottom-up approaches are often discussed, whether i) the action is driven by science professionals, with the focus on cognition, supported by the belief that the feeding of information generates knowledge and support, or ii) departs from the public, focusing on specific issues while addressing people's attitudes and practices.

Equally important is the organisational nature of promoters and the extent to which these activities relate to others. If a vertical system is more easily put forward and maintained than networks, especially when resources are limited and benefits are scattered, the anguish of verticality is to promote transferable activities and avoid being limited by its own resources. Truly horizontal initiatives require the acknowledgement of different actors and the capacity of coordination in the long run, being typical of progressive societies where public participation methods are standardized.

Copus, the rise and fall of a British pioneer

The Committee on the Public Understanding of Science was a lobbying organisation for PUS launched in 1986. A triumvirate of the Royal Society, Royal Institution and The BA, run new schemes of engagement of scientist with the public. Meanwhile the scenario changed, with the research councils and medical charities committing to PUS along with the development of an active industry of science communication.

In 1999, COPUS underwent a revision. From an acronym it became a brand name and in its council included representatives from different sectors of science communication. The objective of this revamped structure was to act as a support organisation for science communication in the UK, since the vertical promotion of PUS activities was flourishing but there was no horizontal interconnection between institutions. Despite the consensual agreement for the need of an umbrella organisation Copus was extinguished by the end of 2002.

Ciência Viva, the Portuguese flag for PUS

In 1995, when Portugal had science and technology levered to the category of ministry, scientific culture definitely entered the political discourse. The major effort of catching-up of the Portuguese S&T system, nurtured by European funds, included the promotion of scientific culture among a traditionally illiterate population. Ciência Viva started as an operational unit of the ministry and grew into an agency by 1998. Moreover, this commitment to PUS materially translated into a sound 5% of the national S&T budget.

The CV program focused on the experimental teaching of science and the promotion of scientific education in schools, while launching a network of interactive science centers and scientific awareness campaigns.

Learning by evaluating

Evolving from a teenage tentative affirmation and pocket money, PUS matured into an accountable grown-up. The problem is evaluating it. In fact, given the multiplicity of inputs in the lifelong process of apprehending a scientific culture, it is virtually impossible to establish a direct link between activities and long-term quantifiable impacts. Nevertheless, if causality is difficult to establish, it is possible to identify additionality – the extent to which an activity is undertaken as a result of being supported by a certain policy and expenditure.

If the first step for evaluation is benchmarking, regular surveys can provide normalized sets of data for longitudinal analysis. The problem is that common literacy surveys still assess fragmentary knowledge, unrelated to operative skills. Also, the public’s practices are underrepresented.

Homo scientificus

If we were to depict the evolutionary scale of science and society relationships, a pictionary vision might emerge as Figure 2.

No doubt science is a matter of scientists. They fight for research funding, sanctioned by the lay public, and easily assume the role of tutors engaging in a top-down approach (exemplary pursued by Copus and quite present in Ciência Viva).

The realising of science's potential as a competitive economic advantage makes it a matter of money. In the knowledge economy there is emphasis in the skilled workforce and competing markets for R&D.

By the time the informed citizen becomes a stakeholder, echoing health, environmental and consumer concerns, science finally matters. As for the promotion of scientific culture, indicators of maturity include i) the development of support institutions – including science communication offices in Universities and R&D firms, consumer associations and regulatory bodies, like the recently created Food Standards Agency in the UK, ii) diversity in public hosting and funding of science communication activities and iii) a blooming industry with regular media coverage.

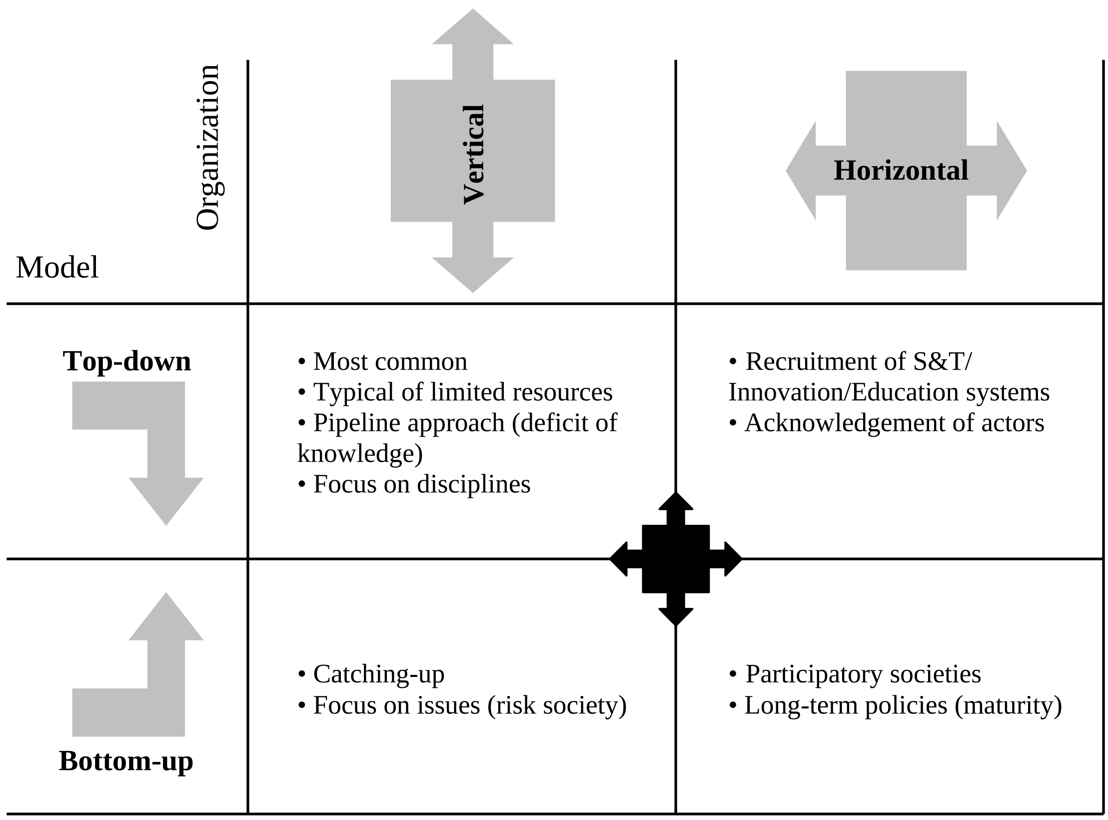
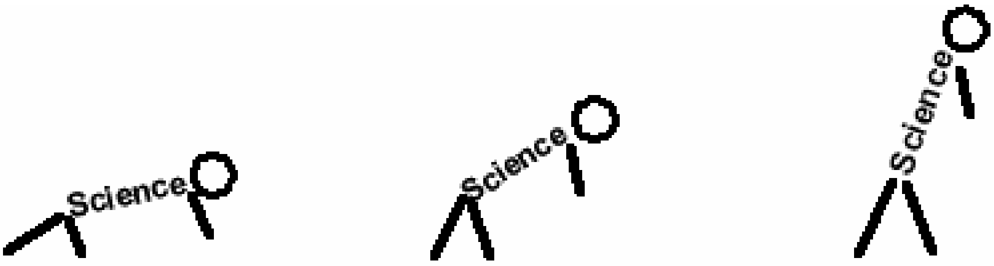


Figure 1. Rationale for public policies

Each society has to find the most appropriate position (✥) according to the policy conceptual model and organizational structure.



…is a matter of scientists. …is a matter of money. …matters!

Figure 2. Homo scientificus

Science and society relationships evolve shaped by a complex network of stimuli and demands.

Parallel Session 26: Interactions between science communication and science policies

SCIENCE AND SOCIETY: A DIALOGUE FOR THE FUTURE

Tigeras Sánchez, Pilar[1] *Perez del Val, Jaime*[2]

[1, 2] *Consejo Superior de Investigaciones Científicas. Coordinación Institucional en la Comunidad de Madrid. Serrano 113. 28006 Madrid. España.*

[1]*macael@orgc.csic.es*

[2] *j.perez@orgc.csic.es*

Abstract

If we admit the importance of the scientific advances in the development of society we have to conclude that society itself must participate in the decision making. Thus, in Spain it would be very convenient that the parliament would approve a Spanish Plan of Science and Society, with similar objectives to those of the European one but adapted to the Spanish reality.

A detailed analysis of the actual situation of the Spanish system of science and technology will not be carried out in this presentation; however some references will be made and some solutions for the short and long term will be provided.

The objectives are the promotion of a scientific culture and education, to bring together science to the citizens and to analyse the ethical dimension of science and the new technologies. This is why the idea of a dialogue has been included in the title, a democratic, sincere dialogue, free of any "a prioris" to be held between the scientific community, the social agents, the state administrations and the political parties.

The different studies performed by the European Union, the OCDE, and other institutions indicate that our system presents considerable deficiencies mainly linked to a low level of investment and expenditure in public and private R and D, which results in a deficient technological level, a scarce number of patents and in the insufficient development of the information society.

There is still a long way to go, but there are positive elements to propose a Spanish Plan of Science and Society, working seriously on particular aspects and coming to important agreements with the citizens.

Key Words: Science Policy, Civil participation

Text

Science Policy

Science policy considered as the formulation of avenues to transfer new knowledge for the improvement of society is nowadays more necessary than ever, since it is becoming increasingly more important for the well being and progress of a country. The main objectives pursued by the acquisition of scientific knowledge should end up in achieving greater life expectancy and a better quality of life in our societies.

Spain had a late start in the development of modern science, and it was only in the early 80´s when a totally new system of science and technology was finally structured with the approval of the Law of Science and Technology, of the National R and D Plan and its corresponding budgets. Unfortunately, the initial push lasted less than a decade and we are still in the last positions within the 15 EU countries, in what concerns R and D expenditures, with a 1.03% of GDP compared to the EU mean of 2% and almost a 3% of GDP investment in the US.

The European Commission, who is aware of the disadvantage of the EU relative to the USA, has proposed the goal of investing 3% of its gross national product by 2010, and has demanded a considerable effort from the member states. Therefore, there is a need for a sustained, large increase in investment in R and D in Spain which would also allow an increase in the number of researchers in our country.

Impact of Science on Social Development

Scientific and technological advances have a strong impact on society, and therefore it is paradoxical that, in Spain, the science and technology system is not sufficiently taken into account. It appears that we think only about researchers in those cases in which the media focus on public disasters such as the Aznalcollar mine spill in Doñana, the Prestige, the "mad cow disease", or the controversies on the effects of electromagnetic radiations on public health and the experiments with stem cells as a new therapeutic strategy. It is then when we turn to them demanding immediate solutions, without having previously developed and facilitated suitable policies for their development and appraisal.

According to Steven Pinker, society would appreciate much more the achievements in science and technology if more scientists shared their enthusiasm with the general public and would take more seriously, the very hard job of making it perceptible.

Thus, it is necessary to convince politicians about the design and application of a Plan for Science and Society which should take into account, among others, the following recommendations:

Promotion of education and scientific culture with the government taking the necessary measures for a better education and training of students, and a suitable preparation of the educators.

To bring science policy closer to the citizens, for which there is a need for the cooperation of the press and social communication media, who should be suitably informed to make accessible to society the scientific advances in a rigorous and clear manner. It is, therefore, advisable to encourage from the public sector, the inclusion of science issues in television, radio, newspapers and magazines.

Science and technology have to be considered as priorities in the political activity due to their social and economic impact. Thus, it is advisable to establish " help desks" to provide scientific information for the parliament and government following the examples of other European countries and the US, in order to guarantee the transformation of scientific and technological advances into direct social benefits.

Measures must be taken to progress towards gender equality. Women represent half of the student population in our universities whereas they hold only 13% of senior positions in academia and even a lower percentage in industry.

Scientific indicators concerning social impact of science should be introduced in all institutes and centres of statistics studies (INE, CIS..).

In short, we must encourage the participation of citizens and the social society in debates concerning science, technology and innovation in order to capture their thoughts and interests. Within this context, this forum represents an important initiative in the long road for a true dialogue between science and society.

Parallel Session 26: Interactions between science communication and science policies

SCIENCE INFORMATION NEEDS OF U.S. POLICY MAKERS

Rick E. Borchelt[1] *Melissa L. Withers*[2]

[1] *Office of Communications and Public Affairs, Whitehead Institute for Biomedical Research. 9 Cambridge Center, Cambridge, MA USA 02142. Tel: +1-617-258-5183. Fax: +1-617-258-8848. E-mail: borchelt@wi.mit.edu*

[2] *Office of Communications and Public Affairs, Whitehead Institute for Biomedical Research. 9 Cambridge Center, Cambridge, MA USA 02142. Tel: +1-617-258-5183. Fax: +1-617-258-8848. E-mail: withers@wi.mit.edu*

Abstract

Science policy leaders heavily rely both on traditional print and online versions of the same or similar media. Although science policy leaders report using a wide array of information sources, they have differential levels of trust in various sources. For example, reports from the U.S. National Academy of Sciences or articles in Science or Nature are widely trusted. In contrast, science policy leaders report a low level of trust in news reports on CNN or a network news show. There is a strong trend toward the use of online resources for finding and obtaining policy-relevant information.

Key words: policy, communication, internet

Text

While working for the Office of Science at the U.S. Department of Energy (DOE), the corresponding author commissioned a study of information needs of science policy decision makers and policy makers. This paper explores a few of the principal findings of that study, the 2002 National Science Policy Leadership Study, conducted via contract with Professor Jon Miller at Northwestern University. The overall methodology of identifying science policy leaders and decision makers is more fully explained by Miller (2003).

For the formulation of science policy, the number of primary decision-makers rarely exceeds 100 (Miller and Prewitt, 1982). A second level of policy involvement is a collection or network of non-governmental policy leaders, including leading scientists and engineers active in research universities and selected corporations; the leadership of major universities, corporations, and organizations active in scientific or energy-related work; scientific, engineering, and other professional societies relevant to science and engineering; and the leadership of other relevant voluntary associations

In 2002, these two groups comprised approximately 7,946 individuals. A smaller sample of 633 leaders was selected and each individual received a letter describing the study and asking for his or her cooperation. A total of 331 science policy leaders completed a questionnaire on paper, online, or in a telephone interview, producing a cooperation rate of 63 percent. The survey addressed, among other items, information-seeking behaviors related to science policy.

Nearly 80 percent of the policy leaders studied a newspaper every day and an additional 14 percent read a newspaper most days. Ninety-five percent of science policy leaders reported that they read one or more magazines or journals regularly to obtain science information. Sixty-four percent of science policy leaders reported reading one or more books relevant to science policy during the last year. By any measure, science policy leaders are well connected electronically. Virtually all science policy leaders reported using an office computer for e-mail and Internet searching.

Each science policy leader included in the smaller study group of the 2002 study also was asked to assess the level of confidence they would have in science information from a set of major information sources. The results again display a high degree of discrimination. Science policy leaders expressed the highest level of confidence in a report from the U.S. National Academy of Sciences. On a zero to 10 scale, science policy leaders gave a report from the NAS a mean score of 8.6 (see Table 2). An article in Science or Nature was the second most trusted source. A report from a national laboratory was the third most trusted information source. The three most trusted sources all are characterized by a high level of expertise and a tradition of independence from short-term partisan causes.

Science policy leaders reported a moderately high level of confidence in Nova, the New York Times, an EPA report, a DOE report, the Wall Street Journal, and a report from a Congressional committee on science and technology, with mean scores in the 5.8 to 6.5 range.

Science policy leaders express markedly less confidence in information from the mass media and from advocacy groups. Science policy leaders expressed the lowest level of confidence in information from a network television news show, with a mean rating of 3.4. This is especially ironic since 90 seconds on the evening news has long been the cherished dream of information officers in government, universities, and industry.

Table 1: Sources of Information about Global Warming or Climate Change, 2002.

	Two Major Sources Used In Last Year	Source of Additional Information
Professional journals	49%	15%
Internet and online sources	41	49

Newspapers	23	1
Colleagues, personal conversations	17	12
Magazines (other than professional journals)	16	1
Books and reports	14	5
Non-governmental organizations (including firms)	6	2
Libraries	5	4
Television (including news and documentaries)	3	0
Government agencies (including national laboratories)	2	2
Radio (including NPR)	2	0
Number of leaders	331	331

Table 2: Confidence in Selected Science Information Sources, 2002.

	Mean	Median
A report from the National Academy of Sciences	8.6 (.07)	9
An article in Science or Nature	8.4 (.07)	9
A report from a national laboratory	7.5 (.09)	8
An episode of the television show Nova	6.5 (.11)	7
A story in the New York Times	6.2 (.12)	7
A report from the Environmental Protection Agency	6.2 (.12)	7
A report from the Federal Department of Energy	6.1 (.12)	6
A story in the Wall Street Journal	5.9 (.12)	6
A report from a Congressional committee on science & technology	5.8 (.12)	6

A story in Time or Newsweek	4.7 (.12)	5
A report from the Sierra Club	4.6 (.14)	5
A story on CNN	4.2 (.12)	4
A story on a network television news show	3.3 (.11)	3
Number of leaders	331	331
( ) = standard error of the mean		

References

Miller, Jon D. (2003). The Conceptualization and Measurement of Science Policy Leadership. Presented at the 169th Annual Meeting of the American Association for the Advancement of Science, February 18, 2003.

Miller, J.D. & Prewitt, K. 1982. A National Survey of the Non-governmental Leadership of American Science and Technology. A Report to the National Science Foundation. DeKalb, IL: Northern Illinois University, Public Opinion Laboratory.

Parallel Session 26: Interactions between science communication and science policies

IDENTITY AND COMMUNICATION: WHO COLLABORATES IN COLLABORATIVE RESEARCH?

Michelle Riedlinger[1], Susan McKay and Cindy Gallois

[1]The University of Queensland QLD 4072 Australia. Tel: +61 7 3365 1413, Email: michelle@econnect.com.au

Abstract

Research collaborations involving stakeholder communities outside the research area are believed to produce more innovative and useable outcomes, and increase the support of external stakeholders and community groups for research. Yet social researchers also report that members of diverse research teams have a genuine inability to collaborate due to poor communication. Using concepts gathered from social identity theory (SIT), this paper examines the identity processes that enhance or inhibit communication between researchers and external stakeholder communities in areas of collaborative research. Participants highlighted communication activities associated five goals and all were associated with the management of social identity. The practical applications of these findings will be discussed.

Key words: Collaborative research, communication, Social Identity Theory (SIT), external stakeholders

Text

Support for industry and end-user-relevant research is on the increase internationally (Adams, Chiang, & Starkey, 2001) and the Australian government offers many incentive programs encouraging research-industry partnerships and rewarding organisations that promote the uptake of technology. These collaborations are believed to produce more innovative and useable outcomes as the research has been "guided" by external stakeholders during its development. These collaboraitons are also thought to increase the support of external stakeholders and community groups for research.

A number of studies have found, however, that diverse research groups often fail to collaborate due to poor intergroup communication (e.g., Oliver & Blakeborough, 1998; Tushman, 1982). Social identity theory (SIT) (Tajfel, 1982), has already demonstrated its usefulness in examining group processes in organisational contexts (Ashforth & Mael, 1989; Kramer, 1991; Mael & Ashforth, 1992; Northcraft, Polzer, Neale, & Kramer, 1995), including the role of stakeholders (Hogg & Terry, 2000) and is the theoretical approach adopted for investigating communication between research groups and external stakeholders in this study.

Aim

Researchers and communication practitioners often want to know how effective communication activities are at influencing external stakeholders.

This is a complex question, as communication is often mediated by the level of identification between the organisation and external stakeholder groups. Thus, it may be more fruitful to ask, How do communication activities aimed at external stakeholders reflect issues of identity and identification?

Method

This study aimed to explore perceptions of stakeholders in Australian Cooperative Research Centres (CRC0. Participants were 17 communication professionals (12 male and 5 female). They represented all sectors of CRC activity (three agriculture and rural-based manufacturing, nine environment, two medical science and technology, two mining and energy and one information and communication technology). In-depth individual interviews were chosen as the method of data collection and constituted semi-structured conversations with prompt questions to guide participants. Participants were asked to describe their CRC's communication activities with external stakeholders and to explain what they were trying to achieve with their external stakeholders through communication. The interviews were recorded and the transcripts were analysed iteratively (Strauss & Corbin, 1990) by looking at themes relating to issues of communication between the CRC and stakeholders.

Findings

The communication activities with external stakeholders discussed by communication professionals centred around five goals. These goals were (1) developing source credibility for the CRC; (2) facilitating constructive contact between the CRC, CRC researchers and external stakeholders; (3) using boundary spanners in intergroup communication; (4) accommodating to the needs and values of stakeholder groups, with a focus on group differences between the CRC and external stakeholder groups; and (5) raising awareness among stakeholders about CRC needs and values, including actively engaging in agenda setting.

Communication activities focused on influencing the homogeneity of stakeholder groups, as well as encouraging these groups to think and act in terms of their group identity and the associated values, norms and behaviour. Other activities acknowledged the importance of understanding the group identity issues of the diverse group participants in order for communication activities to be effective. Some communication activities, however, showed a lack of understanding of the needs and values of all groups, and were often driven by the needs of one dominant group of internal or external stakeholders. There remained an idea among some CRC members that external stakeholder groups need to be "educated" rather than demonstrating a commitment to the collaborative process.

In summary, this study points to the pitfalls of a top-down approach to collaboration with stakeholders in collaborative research organisations, but it also highlights the opportunities to facilitate communication among stakeholder groups. Both the pitfalls and the opportunities are related to the management of social identity in these collaborative research organisations. Social identity theory, thus, provides a useful way to understand communication in such organisations, which are so important to solving important problems at the present time.

References

Adams, J. D., Chiang, E. P., & Starkey, K. (2001). Industry-University Cooperative Research Centres. Journal of Technology Transfer, 26, 73-86.

Ashforth, B. E., & Mael, F. A. (1989). Social identity theory and the organization. Academy of Management Review, 14, 20-35.

Hogg, M, & Terry, D. (2000). Social identity and self-categorisation processes in organizational contexts. Academy of Management Review, 25(1), 121-140.

Kramer, R. M. (1991). Intergroup relations and organizational dilemmas: The role of categorisation processes. Research in Organizational Behavior, 13, 191-228.

Mael, F., & Ashforth, B. E. (1992). Alumni and their alma mater: a partial test of the reformulated model of organizational identification. Journal of Organizational Behaviour, 13(2), 103-123.

Northcraft, G. B., Polzer, J. T., Neale, A. M., & Kramer, R. M. (1995). Diversity, social identity, and performance: emergent social dynamics in cross-functional teams. In S. E. Jackson & M. N. Ruderman (Eds.), Diversity in Work Teams: Research Paradigms for a Changing Workplace (pp. 69-96). Washington: American psychological Association.

Oliver, N, & Blakeborough, M. (1998). Innovation networks: The view from the inside. In J. Michie & J. Grieve-Smith (Eds.), Globalization, growth and governance (pp. 146-160). Oxford: Oxford University Press.

Strauss, A, & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park: Sage.

Tajfel, H. (1982). Social psychology of intergroup relations. Annual Review of Psychology, 33(1), 1-39.

Tushman, M. L. (1982). Managing communication networks in R&D laboratories. In M. L. Tushman & W. L. Moore (Eds.), Readings in the management of innovation (pp. 349-362). Boston: Pitman.

Parallel session 26: Interactions between science communication and science policies

REPRESENTATIONS OF SCIENCE IN THE KNOWLEDGE SOCIETY

Brian Trench

Dublin City University, Dublin 9, Ireland; brian.trench@dcu.ie

Abstract

The emergence of "the knowledge society" as a guiding concept for public policy has reshaped the context and content of public communication of science and technology. The widespread adoption of "the knowledge society" as a social goal may at the same time enhance the social and political standing of science and give preference to particular, perhaps restrictive, conceptions of its value and roles.

Key words: knowledge society; public policy; functions of science

Economists and sociologists have offered plausible accounts of the ever-greater emphasis on mental work, of the increasingly specialized skills required to maintain economic processes, and of the increasing social contextualization of the production of knowledge (Nowotny et al, 2001). Whether this merits the redefinition of advanced economies is unclear.

Two elements of the current "knowledge society" discussion should advise us to be cautious in using this phrase:

1. it is less than a decade since the argument about the primary role of knowledge in individual enterprises was translated into one about the character of the economy; this elision from enterprise to economy has potentially dangerous consequences.
2. it is also only a decade since the concept of "the information society" was commanding the attention now accorded to "the knowledge society".

The rapid turnover and unsteady usage of key phrases reveal both a desire in policy circles to find the "mobilizing metaphors" that can help orchestrate change, but also uncertainty about what is really going on. We should be careful about using "the knowledge society" as if it referred to a given, proven entity. We may be talking about a proposition, a metaphor, an aspiration.

Ireland represents a striking case of a country that promotes research and development with the aim of building a competitive science base. Many countries see Ireland as a model of a rapidly developing knowledge-based economy.

In four years since its establishment, Science Foundation Ireland (SFI) has allocated over €600 million to research and attracted both Irish émigrés and non-nationals to establish significant research teams in Ireland. Universities have received a further €600 million over the same period to support research centres.

There is a consistent pattern to policy documents, ministers' speeches and other formal statement of the arguments supporting this new departure: scientific research, commercial competitiveness and innovation capacity are mutually dependent; in combination, they deliver economic development. Education and training and advanced telecommunications underpin these relationships.

SFI director-general William Harris, for example, has argued that universities need to evolve "a competitive system of intellectual development [which] is essential to boosting the credibility of Irish research in the world community". He derives his definition of a knowledge society from the observation of companies' competitive success.

The dominant discourse is clearly recognisable and is echoed in the editorial columns of the generally independent-minded newspaper, The Irish Times: "The government … wants to foster a knowledge-based economy, one that makes the new discoveries and develops the innovative products as a way to protect our economic future."

In this dominant discourse the public is an object, rather than a subject, of social processes: policy initiatives seek to persuade parents and students of the benefits of studying science.

There is evidence of an awareness in policy circles of a possible different approach: the Minister for Enterprise Trade and Employment last year spoke about a "civic science", that is, "a science engaged with and invited into the national dialogue", "a science responsive to the public and worthy of the public trust". But this challenge remains unanswered.

Elsewhere in Europe, the dominant policy discourse of the knowledge society takes similar forms. Patricia Hewitt, the UK Trade and Industry Secretary, declared: "We still need to get science out of the labs, into our companies and on to the balance sheet".

Among the new EU member states Estonia aims to develop "a new knowledge-based economy, based on investment in research and development to generate science-rich technology or products"; it persuaded the European Union to allow it use new EU development funds to support research.

Finland declared as long ago as 1996: "Finland is *a knowledge-based society*". A recent report on that country stated baldly: "In the knowledge society welfare and competitiveness are obtained through innovation. Education and R&D act as catalysts for innovations".

It has been observed that in "the knowledge society", "technology and instrumental technical knowledge becomes not merely the means but … the key measure and goal of societal development" (Preston, 2003). Educationalist Alison Wolf has questioned the assumed relations between educational investment and economic growth that underlies "knowledge society" strategies (Wolf, 2002).

From the point of view of science communication, we also have reason to be concerned about what the push for a "knowledge society" is doing to science and to prospects for its mainstreaming in culture. At one level, "the knowledge society” appears as an answer to the prayers of the science communication community; science may be higher now on political agendas than it has ever been.

But the push for “the knowledge society” presents knowledge and science in reductionist and instrumentalist frames: science is supported for its capacity to deliver improved products, processes and skills; the privileged attention given to techno-scientific knowledge marginalises other forms of creative, critical and analytical knowledge. “The knowledge society” may be promoting a bureaucratic and technocratic “encapsulation” of science.

If science communication has to do with talking about science in a democratic framework of broad social access, balanced dialogue, respect for diversity, and cultural completeness, “the knowledge society” is as much a threat as an opportunity.

References

Nowotny, H. et al (2001): Re-Thinking Science – knowledge and the public in an age of uncertainty (Cambridge: Polity Press)

Preston, P. (2003): European Union ICT Policies – neglected social and cultural dimensions, in J. Servaes (ed.): The European Information Society – a reality check (Bristol: Intellect)

Wolf, A. (2002): Does Education Matters? Myths about education and economic growth (London: Penguin)

Parallel Session 26: Interactions between science communication and science policies

FINDING COMMON LANGUAGE

Jill Nelson and Fiona Barbagallo

The BA (British Association for the Advancement of Science), Wellcome Wolfson Building, 165 Queen's Gate, London SW7 5HE, UK. Tel: +44-20-7017-4938, Email: fiona.barbagallo@the-ba.net and jill.nelson@the-ba.net

Key words: common language, dialogue

Introduction

Increasingly in the UK issues that involve science are high on the public agenda and there is a willingness to involve the public early in the debate. Early involvement of the public will help scientists and decision makers to understand and respond to public views, and by helping people more generally to appreciate that they can influence the progress of science and technology democratically.

But how early can members of the public become engaged in emerging science and technology? Can members of the public express 'informed' views and opinions before interacting (interfacing) with applications of science?

The Finding Common Language project aims to identify language, stories and frames of reference that will stimulate mature public discussions about scientific research, and issues arising from scientific research.

Background

The BA has a long track record in science communication and during the past three years has experimented with different formats for a range of target audiences. The purpose of the BA's science in society programme is to connect publics, policy makers and other decision makers, and the scientific and business communities by providing opportunities where issues involving contemporary science can be discussed. However, the BA and its target audiences increasingly recognise the need for public groups to be involved in discussions of science and technology in the early stages of funding and development.

The BA, in partnership with the UK's Office of Science and Technology (OST), is piloting a project—finding common language—to explore at what stages in the process of emerging scientific ideas to their application the public should be involved in discussing the possibilities offered from any particular area of research.

The OST, the government department that oversees much of the (public) science funding in the UK, facilitates a Foresight Programme which aims to provide challenging visions of the future for either a key issue where science holds the promise of solutions, or an area of cutting edge science where the potential applications and technologies have yet to be considered and articulated[i].

The area of cognitive systems is one of several emerging from the Foresight Programme which aims to crystal ball gaze new areas of science and technology and their implications for funding and for society.

The area of cognitive systems has been defined by the OST as artificial or natural systems that can sense, act, think, feel, communicate, learn and evolve.

The finding common language project is using cognitive systems as the area of science to:

(a) learn how public engagement can be used in the very early development stages of science

(b) explore and identify possible common language that could be used to stimulate mature public discussion

(c) get a snapshot of opinions and thoughts of both the public members and scientists

If the pilot proves to be successful the process will be further developed to apply it to the other areas in the foresight programme.

Method

Three workshops were organised in early May 2004 involving 10 scientists, 4 professional science communicators and 10 members of the general public. The first workshop involved scientists from the life sciences and the physical and engineering sciences, and two science communicators. Two different science communicators were involved in the second workshop with members of the public that had been recruited by a market research company.[ii]

Initially, scientists and members of the public met separately to explore and become familiar with the content of the cognitive systems project. Each facilitated workshop lasted two and a half hours.

Scenarios where presented in the six areas of applications, identified by the scientists involved in the Foresight Programme, which are: business and commerce; health, well-being and performance; transport; arts, entertainment and companions; education; and military.

Participants were asked to consider the risks, uses and moral implications of each of the applications.[iii]

The third workshop involved all the participants and is where the 'common language' was identified.

Observations

Independently, members of the public and scientists proposed similar discussion points and there were common themes running through the uses, risks and moral implications.

Both groups raised issues involving shifts in responsibility, quality of life, loss of social skills, and issues of control including where decisions are made about public funding policies both within science and across society as a whole.

This would indicate that if public engagement is handled appropriately, scientists and members of the public can have a mature conversation very early on in the development of science and technology.

The similarity of expression exhibited suggests that a degree of empathy was experience by all parties. The scientists were talking about their area of research with non-experts on an equal footing. They were concentrating on areas of discussion (uses, risks and moral implications) where specific technical knowledge was not necessary. Some of the scientists commented that they had not previously thought about their work in this way and had found it enlightening. Something approaching a dialogue perhaps?

What this project has not explored at this stage is whether or not there will be a willingness to listen to public opinions when deciding on allocation of funding resources and policy making.

Notes

---

[i] For more details about the OST Foresight Programme visit www.foresight.gov.uk

[ii] Men and women, aged 20-60 years, who have an interest in science but rarely find the time to read/watch science stories.

[iii] The decision to explore the risks, uses and moral implications was based on the research conducted by the Biotechnology and the European Public Concerted Action group in 1997. Nature 387 p845-847

Parallel Session 26: Interactions between science communication and science policies

SCIENCE COMMUNICATION AT THE LOCAL LEVEL: AN EVALUATION OF LOCAL AUTHORITY COMMUNICATION STRATEGIES

Emma Weitkamp[1]*, Frank Burnet*[2]*, Jim Longhurst*[3]*, Clare Beattie*[4] *and David Gibbs*[5]

[1] *Graphic Science Unit, Faculty of Applied Sciences, University of the West of England, Bristol, BS16 1QY. Tel: 0117 32 82081, Fax: 0117 32 83919, E-mail: emma.weitkamp@uwe.ac.uk*

[2] *Graphic Science Unit, Faculty of Applied Sciences, University of the West of England, Bristol, BS16 1QY. Tel: 0117 32 83756, Fax: 0117 32 83919, E-mail: frank.burnet@uwe.ac.uk*

[3] *Air Quality Management Resource Centre, Faculty of Applied Sciences, University of the West of England, Bristol, BS16 1QY. Tel: 0117 32 83825, Fax: 0117 32 83360, e-mail: clare.beattie@uwe.ac.uk*

[4] *Air Quality Management Resource Centre, Faculty of Applied Sciences, University of the West of England, Bristol, BS16 1QY. Tel: 0117 32 83692, Fax: 0117 32 8290, e-mail: james.longhurst @uwe.ac.uk*

[5] *Department of Geography, University of Hull, Tel: 01482 465330, Fax: 01482 466340 , email: d.c.gibbs@hull.ac.uk*

Abstract: The authors have devised a theoretical model of the influence of complex science within the Local Air Quality Management consultation process in the UK. The model (Diagram 1) identifies key stages where the nature of the scientific information to be presented has an impact on the mode of presentation, the way in which stakeholders are included in the process, stakeholder interpretation of scientific information and incorporation of lay knowledges of the issues. The model can be used to enhance and identify the value-added parts of the consultation process, in relation to science communication.

Key words: Local environmental issues, consultation process, stakeholder involvement

Introduction:

In line with this trend toward engaging the public in science-based policy initiatives, UK local authorities have recently embarked on one of the largest science communication initiatives undertaken in the UK. As part of the air quality management process local authorities are now required to consult with relevant stakeholders (Schedule 11, Environment Act, 1995) during the air quality management process. While the Environment Act itself specifies statutory stakeholders who must be consulted, UK local authorities are being encouraged to include a wide range of groups in the consultation and policy development process, such as residents, the Highways Agency and the Environment Agency (Defra and National Assembly for Wales, 2003, NSCA, 1999). The Local Air Quality Management consultation process has been used to develop a model of the role of the communication of complex science in the formulation of local environmental policy.

Dialectic approaches allow for a range of different consultation mechanisms to be conceived, including both consultative and participative oriented approaches. Consultation based approaches are routed in two-way communication about policy making, but stop short of involving stakeholders in policy formulation. Thus, policy formulation is still the sole domain of the local authority. Participative approaches, in contrast, are defined by the active involvement of all participants in the decision making process and arise from Habermas' theory of communicative action (Habermas, 1987; Palerm, 2000). Participative approaches incorporate local knowledge and may make the process more relevant to local stakeholders. In terms of involving 'lay' stakeholders, UK Government guidance recommends setting up participative workshops or forums to make stakeholders feel part of the consultation process (para 4.27, PG(03) (Defra and the National Assembly for Wales, 2003).

The Consultation Model

The model (Diagram 1) outlines the consultation and communication processes undertaken for air quality management. It can be used to explore the role of science communication in consultation about environmentally-oriented policy initiatives and identify those aspects of the process which offer added value to either the local authorities or the consultees. The model takes into account four key aspects of the consultation process where the nature of the complex scientific information to be presented has an impact on the process:

- Mode of presentation
- Stakeholder inclusion
- Stakeholder interpretation of scientific information
- Incorporation of lay knowledges

The way the technical information is included in the consultation process may disadvantage non-expert stakeholders (Irwin, 1995). Thus, the model focuses on the development of science communication messages and their interpretation by stakeholders. In the case of the Air Quality Management Process, this involves communication of the complex science involved in measuring air quality and incorporation of data from air quality models. Thus, judgments must be made by local authorities about stakeholders' levels of expertise and ability to interpret scientifically complex information.

It is likely that local authority views of different groups will inform the extent to which informative, consultative and participative approaches are used during the consultation process. Thus, the model can be used to understand how lay knowledge is included in the consultation process and to test the extent to which such 'lay' knowledge is valued and included during policy formulation. This allows clusters of approaches to be identified that capture both the approach taken to science communication and the nature of the stakeholders involved.

Stakeholder involvement in the process can be further evaluated by investigating how the input was incorporated into policy. Choice of consultation method provides an initial distinction between informative/consultative and participative approaches. This can be further investigated by determining the extent to which stakeholder input via informative and consultative approaches was incorporated into policy.

Conclusion

The model presented of the way that complex science is incorporated in the policy making process provides a basis from which to evaluate the consultation process. This can be used to develop and evaluate clusters of approaches with a view to identifying those aspects of the process which offer added value (both to the local authorities and to consultees). Although developed specifically for the UK Air Quality Management process, the model is applicable to a range of locally based environmental policy issues.

References

Defra and National Assembly for Wales. (2003) Part IV of the Environment Act 1995. Local Air Quality Management. Policy Guidance. LAQM. PG(03). Defra Publications, London.

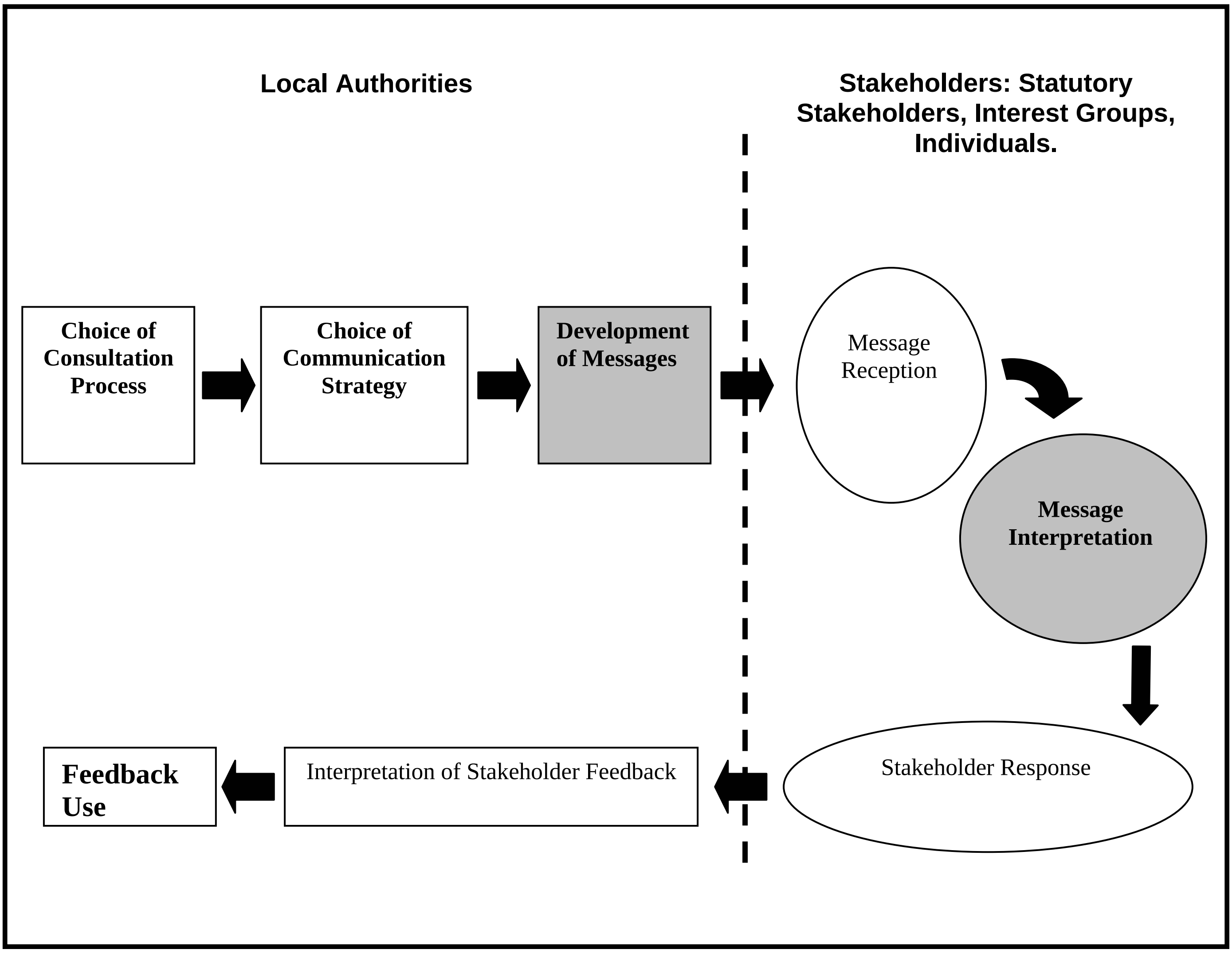
Habermas, J (1987), *Theory of Communicative Action*, Polity, Abingdon, Oxon.

HM Government (1995) *The Environment Act 1995*. Her Majesty's Stationary Office, London.

Irwin, A (1995) *Citizen Science*. Routledge, London.

National Society for Clean Air (NSCA) and Environmental Protection (1999) *The How to Guide: Consultation for Local Air Quality Management*. NSCA, Brighton.

Palerm, JR (2000) An empirical-theoretical analysis framework for public participation in environmental impact assessment. *J. Environmental Planning and Management* **43(5)**:581-600.



Pathway of process for consultation on scientifically complex issues such as air quality management. Dark arrows indicate pathway of process, striped gray indicates stages where local authority views of stakeholders determine how local knowledge is incorporated, solid gray highlighted stages are where science has the greatest influence on interpretations.

Parallel Session 26: Interactions between science communication and science policies

"STRANGE BEDFELLOWS AND USUAL SUSPECTS":

MAPPING THE EMERGENT COMPLEXITY OF 'SOCIAL MOVEMENT SOCIETY' ENGAGEMENT WITH HUMAN GENETIC TECHNOLOGIES.

Dr Alexandra Plows

ESRC Centre for the Social and Economic Aspects of Genomics plowsa@cardiff.ac.uk http://www.cesagen.lancs.ac.uk/ Project: 'Emerging Politics of Human Genetic Technologies', Principal Investigators Dr Ian Welsh welshi@cardiff.ac.uk and Dr. Rob Evans evansrj1@cardiff.ac.uk

Abstract

Qualitative field data from year one of this three year project is used to map UK public modes of engagement, core discursive frames, in the context of human genetic technologies (genomics).

The ways "civil society" engages with genomics can be understood as the behaviour of a "social movement society" (Meyer and Tarrow 1998). Actor groups cannot be seen as completely "pro" or "anti" biotechnology; their responses are more sophisticated and context- dependant. Mobilisation is fragmented, shifting and complex; cross cutting frames emphasise the diffuseness of boundaries between actor groups ("ethno epistemic assemblage"- Irwin and Michael 2003) with implications for theories of social movements and "collective identity" (Melucci 1996).

Key words: genetics, public, globalisation

Text

Social Movement (SM) theory as a tool for understanding emergent public engagement

1) "Social Movement Society"

"Social movement modes of action may be becoming part of the conventional repertoire of participation…used to represent a wider range of claims than ever before"

(Meyer and Tarrow 1998 p4)

A predisposed population, informed by diffused cultural practises, will mobilise given the right sets of circumstances (issues, POS, existence of social networks etc).

2) latency

Melucci (1996) defines latency as a period where 'submerged' networks of actors are less visible, but engaged in a crucial exercise of constructing meanings. These 'submerged networks' are predominantly constructed as predisposed actors well placed to see thematic links between the issues they previously mobilised over, and (in this instance) genomics:

> *what we need to get to is not a new politics of… human genetics…it's the politics of new technologies…how new technologies impact on society…they're playing on the sidelines, as they have in the nuclear energy debate, in the toxic chemicals debate…*

"Mike": activist in interview 2004

See Welsh (2000) Nelkin (1995), Plows (2004), Doherty Plows and Wall (2003). This discursive linkage is also occurring in "conservative" groups and networks such as pro- lifers, and "pro" genetics patient and advocacy groups. Latency is also relevant for the "social movement society"- who are starting to engage over issues like biobanks, screening, sex selection of embryos etc.

> *I think there will be in practice a lot of resistance taking place in quiet ways... you know whether it be no I don't want that test, no I tried that drug and it didn't work I don't want any more of it, that will happen day to day*

"Katie", activist in interview 2004

<u>3) "Early Risers" (Tarrow 1998)</u>

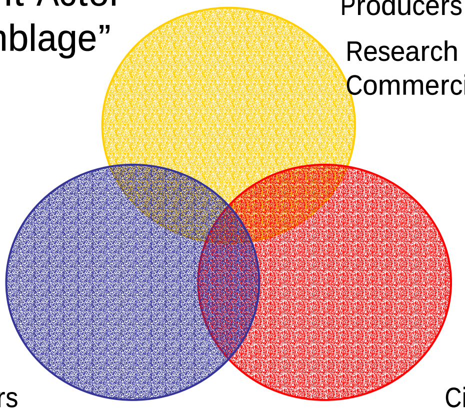
"Early risers" are core actors who spark off new waves of mobilisation. Given the diffuseness of the terrain, actor groups of all types mobilising over genomics issues will be finding it hard to identify clear lines of engagement and to attract key allies and support- again, apart from some very clearly identified 'usual suspects'. 'Early risers' can fail to wake other people up. Yet there is an increasing amount of mobilisation, though it is important to recognise that this is predominantly happening in latent networks; though there are signs that critical masses are starting to form.

<u>4) Frames/ Framing</u>

Framing (Snow and Benson 1992, Steinberg 1998)- is the production of meaning by actor groups, as an ongoing part of the mobilisation process and the construction of "collective identity". It is in the spaces where meanings are struggled over that movement starts to build, targets, allies and 'enemies' are identified, leading ultimately to the taking of action. Whilst 'pro' and 'anti' are generally unhelpful categories, there are of course also clear, important, lines of contention drawn in what are otherwise very shifting sands.

<u>5) "Assemblage" and Collective Identity</u>

"ethno- epistemic assemblage" (Irwin and Michael 2003). Cross-cutting networks, the dissolution of categories and actor identities.



Thus: Dependent on the context (frame or issue raised, existence or lack of Political Opportunities and so on), interaction (oppositional activity, alliance clusters) occurs (a) between actor groups within each 'sphere', and (b) between spheres.

There is a blurring of boundaries in terms of actor identities (see Jasanoff 1990)- "strange bedfellows". A range of commentators identify the "scientific citizen" (eg Irwin and Michael 2003); it is also possible to identify the "citizen scientist".

Is Melucci's (1996) definition of collective identity, and Diani's (1992) definition of a social movement, still robust enough to account for genomic assemblage? Yes and no, and it is telling that it is in the arena of the "anti globalisation movement" that thinking about the collective identity of such a complex group of social actors has produced a similar ambivalence (McDonald 2002). It is of course important to distinguish between sets of social interactions, which can even include mobilisation, and a social movement, although in this period of latency/ emergence it is hard to tell which is potentially which.

Conclusion

<u>'The network(ed) genome'</u>

The fluidity and interactive-ness of the genome (and the proteome) is mirroring the fluidity and interactions of the human actors concerned with it, which could be conceived as a series of network relationships. Overall, we should hardly be surprised that human engagement is as complex as the genomic interactions themselves. For social movement theories regarding emergent mobilisation and the nature of movement collective identity, the impact, and implications, of globalisation and the status of genomics as a complex set of issues and applications, are crucial and will be kept under review by the project.

Bibliography

Doherty, Plows and Wall (2003) 'Studying Local Activist Communities Over Time: Direct Action in Manchester, Oxford and North Wales 1970- 2001- paper given at European Sociological Association, Social Movements stream, Murcia September 23-27 2003.

Diani, M. (1992) 'Analysing Social Movement Networks', in Diani, M. and Eyerman, R. (eds) Studying Collective Action, London: Sage

Irwin, A and Michael, M (2003) Science, Theory and Public Knowledge Maidenhead, Oxford university Press

Jasanoff, S (1990) The fifth branch-science advisers as policymakers Cambridge, Mass: London: Harvard University Press

McDonald, Kevin (2002) 'From Solidarity to Fluidarity: social movements beyond 'collective identity' - the case of globalization conflicts' in Social Movement Studies Volume: 1 Number: 2 Page: 109 -- 128

Melucci, A. (1996) Challenging Codes: Collective Action in the Information Age Cambridge University Press.

Meyer, D. and Tarrow, S. (1998) 'A Movement Society: Contentious Politics for a New Century' in Meyer, D. and Tarrow, S. (1998) (eds) The Social Movement Society: Contentious Politics for a New Century, Oxford: Rowman and Littlefield.

Nelkin, D (1995) 'Forms of Intrusion:comparing resistance to information technology and biotechnology in the USA' in Bauer , M (ed) Resistance to new Technology: Nuclear Power, Information Technology and Biotechnology, pp 379-90 (Cambridge: Cambridge University Press)

Plows 2004 'Activist Networks in the UK: Mapping the Build-Up to the Anti-Globalization Movement' in Anti-Capitalist Britain eds Carter, John and Morland, Dave New Clarion

Snow, David and Benford, Robert (1992)'Master Frames and cycles of Protest' pp137 in Aldon D Morris and Carol Mueller (eds) Frontiers in Social Movement Theory London, New Haven . Yale University Press
Steinberg, M. (1998) 'Tilting the frame: Considerations on collective action framing from a discursive turn', Theory and Society, 27, 6: 845-872.

Tarrow, S. (1998 2nd ed) Power in Movement: Social Movements, Collective Action, and Politics, New York, Cambridge University Press.
Touraine, A (1981) The voice and the eye: an analysis of social movements Cambridge: Cambridge University Press

Welsh, Ian (2000) Mobilising Modernity: the Nuclear Moment London, Routledge

Parallel Session 26: Interactions between science communication and science policies

SCIENTISTS AND POLITICIANS: THE NEED TO COMMUNICATE AN UPDATE SINCE PCST GENEVA 2001

Wendy Parsons

Communication Specialist. 10 Bromell Circuit, Wanniassa 2903. Canberra, Australia. Ph:02 6231 6342. parsnips@cyberone.com.au

Abstract

At PCST Geneva 2001 I described a successful program of communication with members of parliament then being run by CSIRO National Awareness. Since then, as an independent communication specialist, I have refined the techniques used in the original program and have been running programs on behalf of two other organisations. This paper outlines the work and results over the last two years.

Key words: Politicians communication techniques

Text

Development of techniques

In the last two years I have been using the communication techniques developed by CSIRO National Awareness in programs for two other organisations – the Co-operative Research Centres and the Grains Research and Development Corporation.

I have established specific databases for the research areas covered by each organisation in which the industries and interests of politicians' electorates are matched up with research being done . For example, I have defined all politicians with electorates where wheat is grown and target wheat research stories to them.

The stories come from media releases prepared by science journalists working for the two organisations. The most effective delivery mechanism for busy politicians seems to be very short (3-4 paragraph) emails with informative headlines and phone, email and web contact details for those seeking the full details.

Here's a very recent example from a Co-operative Research Centre:

PLASTICS PROMISE A SWEETER FUTURE FOR SUGAR

Scientists predict there will be a brighter future for Australia's hard-hit sugar industry as it becomes a producer of bio-plastics.

Bio-plastics are just one of a number of diversification opportunities for the sugar industry, according to researchers from of the Cooperative Research Centre for Sugar Industry Innovation through Biotechnology (CRC SIIB).

"Every household will be using bio-degradable plastic bags, bottles and containers, every car will have bio-degradable plastic dashboards and fittings, fine clothing will be crafted from these

biopolymers to replace petrochemical plastic and nylon with bio-nylons and bio-fabrics all made from renewable resources," says the CRC's Dr Steve Brumbley.

Dr Brumbley says that research being carried out by the CRC is building on an already proven process for making plastics from sucrose, needing only a minor shift in economics for the process to become a market leader. In this lies Australia's opportunity, he says.

Full version of story from parsnips@cyberone.com.au

Contact: Dr Steven Brumbley, CRC SIIB

07 3331 3370

http://www.crcsugar.uq.edu.au

This story was strategically placed within a national issue already under much public and political debate – the threatened future of Australia's sugar industry. Politicians whose electorates are affected by the state of the sugar industry are very keen to have presentations from this scientist, and within the next month or so, he will make a presentation to a Government Industry Policy Committee. As well, there has been considerable media coverage – one politician brought a journalist to the briefing. This is an ideal situation because it not only produces media coverage, it also has the scientist and the politician communicating in front of journalists.

There are several other examples of this kind of outcome, that is, immediate response from politicians in particular electorate, invitations to give personal briefings, and media coverage. This tells me we are hitting targets.

With about one story per week coming out from each of the organisations mentioned above, I am aiming for as many as possible to become the subject of follow-up briefings and to be used by politicians in their committee and legislatory debates as well as for extended media coverage.

Evaluation

This is done mainly by email survey with ongoing phone checks. An example of an email survey is:

Dear (polician's name)

Over the last few months I have been sending to you via email stories about work of Australia's Cooperative Research Centres. The latest item, DETECTING SECURITIES FRAUD was sent to you on 6 February. Other stories ranged from better avocadoes and beef tenderness tests to help for ageing power stations and pollution checks for the aquaculture industry.

I'd like to find out :

1.Do you wish to be kept on the email list?

Has the material been useful? In what way?

2.Is it in a friendly format for you? Should we make changes?

How?

3.Would you appreciate personal briefings on work relevant to your electorate or State? Any subject in particular?

Currently I do not have the resources to do a detailed survey of politicians' attitudes to research, of the kind that was reported at Geneva for CSIRO. But it is clear from wide media coverage and comment from politicians that the way Australian research is being funded is a controversial issue in 2004, election year.

Just a few days ago (13 May) the upper house of the parliament debated for two hours the mechanisms for deciding which Cooperative Research Centres would continue to receive funding. There is particular debate about those doing "public good" research and whether government policies on such things as fossil fuels versus alternative energies are affecting the search for sustainable energy. Such a debate is very unusual and it was interesting to hear a number of the senators using some of the very words used in CRC media releases.

I would be happy to provide further details of my programs to PCST colleagues.

Parallel Session 26: Interactions between science communication and science policies.

A HURRICANE OF CHANGE

REDEFINING THE GOALS OF PARTICLE PHYSICS RESEARCH

Neil Calder

Director of Communications. Stanford Linear Accelerator Center. 2575 Sand Hill Road, MS: 58. Menlo Park, CA 94025. Phone: 650-926-8707. neil.calder@slac.stanford.edu

Abstract

For the last to decades the goals of frontier high energy physics research have remained the same. This paper outlines the initiative to redefine the goals of the field in response to new understanding of the structure of the universe and the need to build new, very expensive, research installations. The challenge was daunting. The physicists themselves had to be convinced to alter their perception of their own field and policy makers and funding agencies had to be convinced of the excitement and worth of the research.

Key words: Particle physics, policy, communication

Context

For over 20 years the main aim of frontier high energy physics has been the discovery of the Higgs boson. Billions of dollars have been spent on the Large Electron Positron Collider at CERN, the Superconducting Super Collider planned in Texas, Tevatron Run II at Fermilab and soon the Large Hadron Collider at CERN. The Higgs remains elusive.

There is international agreement that the next major installation should be a 30 km linear collider costing some $6 billion. Can funding agencies be persuaded to spend this money using the same arguments as have been used over the last 20 years? I doubt it.

Concurrently, in a development that some have compared to Copernicus's recognition that the earth is not the center of the solar system, the quest to answer the most basic questions about the universe has reached a singular moment. As the 21st century begins, physicists have developed a commanding knowledge of the particles and forces that characterize the ordinary matter around us. At the same time, astrophysical and cosmological observations of space have revealed that this picture of the universe is incomplete—that 95 percent of the cosmos is not made of ordinary matter, but of a mysterious something else: dark matter and dark energy. We have learned that in fact we do not know what most of the universe is made of. A hurricane of change is blowing through particle physics.

Understanding this unknown "new" universe requires the discovery of the particle physics that determines its fundamental nature. Powerful tools exist to bring the physics within reach. With astrophysical observations, we can explore the parameters of the universe; with accelerator experiments we can search for their quantum explanation. Energies at particle accelerators now approach the conditions in the first instants after the big bang, giving us the means to discover what dark matter and dark energy are—and creating a revolution in our understanding of particle physics and the universe.

Objective

The communications challenge is first to convince the physics community of the need for change and to produce a manifesto of this revolution to convey the excitement to policy makers and funding agencies. The style and level of content of this document would be crucial to its success.

Methods

After several presentations at physics conferences1 by Neil Calder and Judy Jackson, the High Energy Physics Advisory Panel HEPAP formed a committee to prepare a report on the scientific challenges facing particle physics. The Committee was made up of leading American physicists and cosmologists, and in the recognition of the importance of the document in communicating to policy leaders, the heads of communication of Fermilab and SLAC, the two major U.S, particle physics laboratories. The aim of the whole group was to produce something different - a scientific report written at a level that non physicists can not only understand but also be enthused by. The final report Quantum Universe2 revolved nine basic questions grouped in three themes, that are very different from those asked 10 or even 5 years ago.

Einstein's Dream of Unified Forces

Are there undiscovered principles of nature: new symmetries, new physical laws?

2. How can we solve the mystery of dark energy?

3. Are there extra dimensions of space?

4. Do all the forces become one?

The Particle World

5. Why are there so many kinds of particles?

6. What is dark matter? How can we make it in the laboratory?

7. What are neutrinos telling us?

The Birth of the Universe

8. How did the universe come to be?

9. What happened to the antimatter?

The layout, graphic design and illustration of Quantum Universe are also very different from traditional science reports. There is a coordinated program to now present Quantum Universe to the leading policy makers within the United States and to give talks on the report at the world' leading physics laboratories.

Conclusion

There has been a major communication initiative to make policy makers aware of the excitement of this new era in particle physics. The Quantum Universe experience has set a new precedent in involving communication specialists in the preparation of policy documents from their inception.

References

1.WHAT'S IT FOR? High Energy Physics Advisory Panel, Washington September 29-30 2003 Neil Calder, www.interactions.org/pdf/whatfor.pdf

Quantum Universe is available on line, http://www.interactions.org/pdf/Quantum_Universe.pdf

Parallel Session 26: Interactions between science communication and science policies.

IDENTITY AND COMMUNICATION: WHO COLLABORATES IN COLLABORATIVE RESEARCH?

Michelle Riedlinger

The University of Queensland

Abstract

Internationally, science and technology funding for collaborative research involving external stakeholder communities is on the increase. Funding bodies consider these collaborations will be able to produce more innovative and useable outcomes, and may increase the support of stakeholders and community groups for research. Yet social researchers report that members of diverse research teams have a genuine inability to collaborate due to poor communication.

Using concepts gathered from social identity theory (SIT), this paper examines the processes that enhance or inhibit communication between researchers and stakeholder communities in areas of collaborative research. Communication professionals from 17 Australian Cooperative Research Centres discussed communication between researchers and stakeholder communities (landholders, industry groups and urban community groups etc.) in collaborative projects within their organisations. Results show that issues of group identity - including loyalty, bias and adhering to group norms - impact significantly on communication, and hence, collaboration. Specifically, participants highlighted factors including establishing source credibility, the impact of the values and norms of the different groups, group boundaries, the role of boundary spanners, and identification with the research organisation.

Participants also provided many suggestions for improving communication in these arrangements, and many suggestions acknowledged the importance of understanding the group identity issues of the diverse group participants. However, some suggestions and current practices exhibited a lack of understanding of intergroup relations and the collaborative process, and were often driven by the needs of one dominant group. Underlying these suggestions was a pervasive attitude that, rather than a commitment to the collaborative process, less prestigious groups needed to be `educated`.