



Training on Citizen Engagement in Policy-relevant Science, Technology and Innovation

Sarajevo 12 -13 October 2017

@ Rektorat, Univerzitet u Sarajevu

Obala Kulina Bana 7/II, 71000 Sarajevo, BiH

2017

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Agenda

12 th October 2017		13 th October 2017	
08:30	Registration	09:00	Module 3: Methodologies Exercise 4
09:00	Welcome and Introduction to the training	10:30	Break
09:10	Introduction of participants	11:00	Module 4: Planning citizen engagement Group work
09:45	Module 1: Concepts and perspectives on engagement I	12:30	Lunch
		13:45	Module 4: Group work (Cont.)
10:15	Break	15:15	Presentations and discussion
10:45	Module 1: Concepts and perspectives on engagement II Exercise 1	17:00	END
12:30	Lunch		
13:45	Exercise 2		
14:45	Module 2: Institutions of engagement		
15:45	Break		
16:00	Module 2: Cont. and Exercise 3		
17:00	Discussion		
18:00	END		

All lectures take place @ Rektorat, Univerzitet u Sarajevu Obala Kulina Bana 7/II, 71000, Sarajevo

Organisation

Organising Committee

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European Commission

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INTRODUCTION

The Joint Research Centre (JRC), the European Commission's science and knowledge service, is playing an important role in providing scientific and technological support for the European Union enlargement and integration process by giving scientific and technical support to countries on the road towards EU membership, New Member States and Associated Countries to the Research Framework Programmes.

In the framework of its Enlargement and Integration Action, JRC is organizing in collaboration with the Ministry of Civil Affairs of Bosnia and Herzegovina this "Training on citizen engagement in Policy relevant Science, Technology and Innovation", in Sarajevo on 12th-13th October 2017.

Creating the conditions for genuine engagement of citizens and other societal actors in matters of their concern where science and technology are relevant is an issue of increasing political attention; not least because the diffusion of "low cost" and "low tech" media through which citizens can, like never before, express opinions and concerns calls for institutional reflexivity.

Yet, such background does not guarantee that citizens are actually engaged or their voices accounted for. There has been an effort at institutional levels to walk the talk of societal engagement. For example, European regulatory frameworks increasingly ask for citizens to be engaged in the policy practices of their institutions, and emerging styles of governance include the call for more societal engagement. For example, the Responsible Research and Innovation (RRI) discourse that permeates the Horizon2020 research framework recognises excellence of science, technology and innovation dimensions that are beyond the traditional framings of excellence.

Public engagement is one of the pillars of the RRI lemma, together with Ethics. This training course responds to a concrete lack of genuine and legitimate places whereby institutions can explore insights, expectations and imaginaries of citizens in matters of concern to all. This training is concerned with the science for policy realm where engagement of citizens is needed and relevant to ensure quality of policy formulation processes in situations described in the framework of "post-normal science" where "facts uncertain, values in dispute, stakes high and decisions urgent". This training will look into participatory approaches to discuss science and technology developments as well as discuss what makes trustful relationships between the scientific community and the public trustworthy.

In a nutshell this training offers a hands-on reflection on the theoretical and regulatory basis as well as methods of citizen engagement. It aims at any practitioners that work at the interface of science, society and policy.

Activities:

The course is grounded on developments and insights in the field of Post-normal Science and Science and Technology Studies.

The approaches that we will present and discuss can help different practitioners (scientists, policy makers, etc.) to address many challenges by providing techniques for re-thinking in a deliberative and participatory manner the social and ethical underpinnings of their work.

STS makes use of a range of – primarily - qualitative formats for doing this. It is guided by principles that have been developed, in part, in the context of fostering citizen participation and deliberation.

The training will start by looking at the practice of public engagement in Europe, in all its forms from invited to non-invited forms, including emerging movements such as citizen science, do-it-yourself research and community based initiatives, as well as discursive and material methods to engage citizens in dialogues about science and technology.

The training is organized into 4 main modules:

1. Engagement in perspective
2. Institutions of engagement
3. Methodologies
4. Planning

The participants will work on a case throughout the course that interests the region in which the course is held.

Welcome to Sarajevo!

Ângela Guimarães Pereira, Thomas Völker and Alessia Ghezzi

October 2017

Notes:

Module 1: Engagement in perspective

Concepts and perspectives on engagement I & II

Currently the need for a change in science-policy-society relations is high on the agenda of governance and research institutions. Current ideas of how, when and why to engage citizens, however, build on several decades of discussion and several shifts in focus. In this module we will introduce these debates and its main arguments by asking two broader questions:

1. Why do we need engagement?
2. How to understand citizen engagement/public participation?

Asking these questions the module will touch on several debates and literatures to introduce different ways in which the need for citizen engagement activities as a part of governance has been justified and established. Additionally the module will introduce different approaches towards engagement to show the multiple ways in which citizens can become part of decision-making processes in science and governance.

This module will finish with two hands-on group exercises in which the participants can put the different concepts and ideas discussed in this module to use.

Exercise 1 will focus on policy papers about citizen engagement. The participants will discuss a range of different policy documents from different time periods and different government bodies. After a close reading of selected segments of these documents they will discuss different implicit conceptions of citizens, scientists, experts and policy makers as well as their relation to the governance process.

In **exercise 2** the participants will examine a range of engagement projects. They will discuss the different foci, strengths and potential weaknesses of the approaches. Additionally they will look for different conceptions of what 'participation' means within the approaches towards engagement manifest in the projects.

Readings:

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of planners*, 35(4), 216-224.

Chilvers, J., & Kearnes, M. (2015). *Remaking participation: Science, environment and emergent publics*: Routledge.

Epstein, S. (1998). *Impure science: AIDS, activism, and the politics of knowledge (Vol. 7)*: University of California Press.

Felt, U., & Fochler, M. (2010). Machineries for Making Publics: Inscribing and De-scribing Publics in Public Engagement. *Minerva*, 48(3).

Funtowicz, S., & Ravetz, J. (1992). *Three Types of Risk Assessment and the Emergence of Post-Normal Science*. Westport: Praeger.

Funtowicz, S., & Ravetz, J. (1993). Science for the Post-Normal Age. *Futures*, 25(7), 739-757.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (1994). *New Production of Knowledge: Dynamics of Science and Research in Contemporary Societies*. London, Thousand Oaks, New Delhi: SAGE Publications.

Hessels, L. K., & Lente, H. v. (2008). Re-Thinking New Knowledge Production: A Literature Review and a Research Agenda. *Research Policy*, 37(2008), 740-760.

Michael, M. (2012). "What Are We Busy Doing?" Engaging the Idiot. *Science, Technology & Human Values*, 37(5), 528-554.

Michael, M. (2009). Publics performing publics: of PiGs, PiPs and politics. *Public Understanding of Science*, 18(5), 617-631.

Marres, N. (2012). *Material participation: technology, the environment and everyday publics*: Palgrave Macmillan.

Nowotny, H., Scott, P., & Gibbons, M. (2001). Re-thinking Science. Knowledge and the Public in an Age of Uncertainty. Cambridge: Polity Press.

Rabeharisoa, V., & Callon, M. (2004). Patients and Scientists in French Muscular Dystrophy Research. In S. Jasanoff (Ed.), *States of knowledge: The co-production of science and social order* (pp. 142-160). New York: Routledge.

Module 2: Institutions of engagement

This module will delve on current regulation and spaces that call for citizen engagement in processes where science and specialised information are relevant.

President Juncker's inaugural guidelines called for deepening the dialogue between society and European institutions, vowing to be "a President of social dialogue"¹. The communication from the Commission on "Better regulation for better results - An EU agenda"² can be seen as a response to this call. It appeals for openness, scrutiny, deeper and more effective stakeholder consultation, new forms of engagement processes of relevant actors and more proximity to European citizens when it comes to design policies that affect us all.

The current regulatory wave very much attempts to include citizen engagement but the institutionalisation of engagement is not a straightforward endeavour – see for example the (OECD, 2009)³. As expressed in an expert group to the EC, "citizens have a right- and are expected- to be involved in the crucial decisions of what their futures will look like and how science and technology can contribute to its betterment"⁴. Yet, citizens' disbeliefs that their voices might be unheard are a sign for institutions to work on their promises and commitments.

This lecture will give insights into European regulation framework and initiatives where public engagement is suggested or mandatory. We will discuss both positive and negative examples of it, through different EU directives and other initiatives, such as for example the Responsible Research and Innovation lemma of the current EU Framework of research, Horizon 2020.

This module will include exercises and discussion on this topic.

Readings:

Burall, S., Hughes, T. & Stilgoe, J. (2013). Experts, publics and open policy-making: Opening the windows and doors of Whitehall. Sciencewise report.

Bussu, S. (2015). The public's voice on regulation. Sciencewise report.

Colbourne, L. (2008). Different approaches to engagement: How much do we need, When? And how much does it cost? DEFRA

De Marchi, B., Funtowicz, S., Guimarães Pereira, A. (2001). From the right to be informed to the right to participate: responding to the evolution of European legislation with ICT. International Journal of Environment and Pollution, 15(1): 1-21.

EU documents:

¹ http://ec.europa.eu/priorities/docs/pg_en.pdf

² SWD(2015) 110 final

³ OECD, 2009. The Next challenge for Citizen Engagement: institutionalization. Available at: <http://www.oecd.org/gov/focusoncitizenspublicengagementforbetterpolicyandservices.htm>

⁴ "The Role of Community Research Policy in the Knowledge-based Economy", p.37

Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions (2015) 215. Better regulation for better results- An EU agenda.

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC

Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks

Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment Text with EEA relevance

The European Citizens' initiative: <http://ec.europa.eu/citizens-initiative/public/welcome>

Horizon 2020. Call for integrating Society in Science and Innovation: <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/public-engagement-responsible-research-and-innovation>

Rome Declaration on Responsible Research and Innovation in Europe: https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf

Module 3: Methodologies

The third module of this training will focus on methodologies to engage citizens. It will draw from examples in the literature. It is intended to be very practical, explaining with examples where such methodologies have been experimented, exploring ideas of *situatedness* and degrees of citizen power. It will have a special focus on material deliberation methods. Exercises will be carried out.

Readings:

Boucher P., Nascimento S., Vesnic Alujevic L., Guimarães Pereira, Â. 2014. *Ethics dialogues. Experiencing Ethics through 'things': Open IoT, Civil Drones and Wearable Sensors*. Publications Office of the European Union. EUR 27060. Available at: <http://publications.jrc.ec.europa.eu/repository/handle/JRC93162>

Broadwood, J. 2012 *Arts & Kindness*. People United, London. (pages 18-25)

<http://www.pdsw.org.uk/assets/Uploads/Breathe-Arts-Kindness-Report-People-United-report-2012.pdf>

Cohen-Cruz, J. 2012 *Engaging performance: Theatre as call and response*. New York: Routledge. http://www.amazon.co.uk/Engaging-Performance-Theatre-call-response-ebook/dp/B008SA2FOS/ref=sr_1_1?ie=UTF8&qid=1433761434&sr=8-1&keywords=Cohen-Cruz%2C+Engaging

Fals Borda, O. (1985). *Knowledge and people's power: Lessons with peasants in Nicaragua, Mexico and Colombia*. In *Knowledge and people's power: lessons with peasants in Nicaragua, Mexico and Colombia*. Indian Social Institute.

<http://multiworldindia.org/wp-content/uploads/2010/05/Knowledge-and-peoples-power1.pdf>

Fricker, M. *Epistemic Injustice: Power and the Ethics of Knowing*. New York: Oxford University Press, 2007. Podcast at: http://philosophybites.com/2007/06/miranda_fricker.html

Guimarães Pereira, Â., Wakeford, T., Crespo, I., Curvelo, P., Davies, S., De Marchi, B., Vesnić-Alujević, L., *Public Engagement in Science and Technology – Setting the Scene*. European Commission. JRC 87275⁵

Lee, C 2015 *Do-It-Yourself Democracy: The Rise of the Public Engagement Industry* [Kindle Edition]

http://www.amazon.co.uk/Do---Yourself-Democracy-Engagement-Industry-ebook/dp/B0000URMUC/ref=sr_1_1?ie=UTF8&qid=1433761359&sr=8-1&keywords=lee+public+engagement

Midgley M 2014 *Science and the imagination: Interview by Tom Wakeford*, Podcast at <http://coventryuniversity.podbean.com/category/critical-thinking/>.

Nascimento, S., Guimarães Pereira, Â., Ghezzi, A. 2014. *From Citizen Science to Do It Yourself Science An annotated account of an on-going movement*. Publications Office of the European Union. EUR 27095. Available at: <http://publications.jrc.ec.europa.eu/repository/handle/JRC93942>.

Pimbert MP, Barry B, Berson A, Tran-Thanh K: *Democratising Agricultural Research for Food Sovereignty in West Africa*. IIED; 2010. Available at: <http://pubs.iied.org/pdfs/14603IIED.pdf>

⁵ This report is available at request form jrc-sts@ec.europa.eu and contains comprehensive bibliography on public engagement.

Selin, C. and Pillen Banks, J. 2014. Futurescape City Tours. A Novel Method for Civic Engagement. CNS-ASU. Available at: http://www.cynthiaselin.com/uploads/4/6/5/7/4657243/futurescapes_full_web_r4.pdf.

Strand, R., Spaapen, J., Bauer, M.W., Hogan, E., Revuelta, G., Stagl, S., Paula, L. Guimarães Pereira, Â. 2015. *Indicators for promoting and monitoring Responsible Research and Innovation*. Report from the Expert Group on Policy Indicators for Responsible Research and Innovation. Publications Office of the European Union. EUR 26866 EN. Available at: http://ec.europa.eu/research/swafs/pdf/pub_rri/rri_indicators_final_version.pdf.

Science Communication Unit, University of the West of England, Bristol. *Science for Environment Policy In-depth Report: Environmental Citizen Science*. Report produced for the European Commission DG Environment, December 2013. Available at: <http://ec.europa.eu/environment/integration/research/newsalert/pdf/IR9.pdf>

Visvanathan, S. 2009 The search for cognitive justice.

http://www.india-seminar.com/2009/597/597_shiv_visvanathan.htm

Wakeford T, Pimbert M: **Opening participatory democracy's black box: Facilitation as creative bricolage**. In *Problems of Participation: Reflections on Authority, Democracy, and the Struggle for Common Life*. Edited by Noorani T, Blencowe C, Brigstocke J. Authority Research Network; 2013: 69-82. Available at: http://www2.warwick.ac.uk/fac/soc/sociology/staff/academicstaff/blencowe/participation/problems_of_participation.pdf

Notes:

Module 4: Planning citizen engagement

In this module we will talk about issues to take into consideration when organising citizen engagement. This will be a very practical module, where participants will be divided into groups and work in a case, preferably a case where they might be interested.

Biosketches

Ângela Guimarães Pereira has been at the Joint Research Centre of the European Commission since 1992. She leads the ‘Science and technology studies’ project, contributing to European projects focused on environmental and societal policy issues, future-oriented activities and public engagement. Post-normal science inspires her work on governance of and dialogues about science and technology. She has authored many peer-reviewed publications and contributed to many books such as Arizona State University’s Consortium for Science, Policy and Outcomes *The rightful place of science: science on the verge of 2016*. Her interests lie in intersections of science with other forms of knowledge, such as the arts. Her favourite story is Hans Christian Andersen’s *The emperor’s new clothes*. she concluded her PhD with the New Univ. of Lisbon on environmental issues in 1998.

Thomas Völker is a Science and Technology Studies scholar and a postdoctoral researcher at the JRC. In his PhD-thesis he focused on practices of producing and circulating anticipatory knowledge in transdisciplinary sustainability research. Before that he has worked on questions of quality in science and on issues of mobility. Prior to joining the JRC Thomas worked as a postdoctoral researcher at the Department of Science Communication and Higher Education Research in Vienna. Before that he spent nearly a year at the RWTH Aachen as a guest researcher. During his time in Aachen Thomas finished his PhD-thesis, most of which was done at the Department of Science and Technology Studies of the University of Vienna as a part of a three-year research project called ‘Transdisciplinary as Culture and Practice’. Thomas current research interests include the spatialities and temporalities of participatory and collaborative research practices, future-making in science and technology and the role of anticipatory knowledge in decision-making processes. Apart from that he is fascinated by Science Fiction novels and the multiple associations of SF and emerging technoscientific fields.

Alessia Ghezzi works at the European Commission’s Joint Research Centre. Since graduating from the Sapienza University of Rome with a bachelor’s degree in Archival Science and a Master’s degree in Semantic Cataloguing and indexing, Alessia has worked as a librarian and an archivist at the state archives in Rome, at the Vatican Library and at the Constitutional Court. In the past decade she has worked on ethics of information technologies, namely on digital memories and their ethical implications, as well as Right to be forgotten. She is currently working on the ‘Science and technology studies’ project at JRC where she develops and deploys methods of citizen engagement in policy making around different societal issues.

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ANNOTATED BIBLIOGRAPHY

This is a short snapshot of interesting bibliography in cases of citizen engagement.

Barns Ian 2000. "What Do You Think about Genetic Medicine?" Facilitating Sociable Public Discourse on Developments in the New Genetics

Source: Science Technology Human Values Summer 2000 vol. 25 no. 3 283-308

Abstract and annotation: An important aspect of any meaningful public discussion about developments in gene technology is the provision of opportunities for interested publics to engage in sociable public discourse with other lay people and with experts. This article reports on a series of peer group conversations conducted in late 1996 and early 1997 with sixteen community groups in Perth, Western Australia, interested in gene therapy technology. With the case of cystic fibrosis as a particular focus, and using background resource material as a stimulus for discussion, the participating groups explored a range of value issues arising from the new genetic medicine. This more discursive context enabled participants to express a number of background or life-world concerns about genetic medicine, concerns that are often obscured by the dominant biomedical and bioethical discourses.

Bell, Sarah 2006. Concerned scientists, pragmatic politics and Australia's green drought

Source: Science and Public Policy, Volume 33, Number 8, 1 October 2006 , pp. 561-570(10)

Abstract and annotation: The Wentworth Group of Concerned Scientists formed in Australia in 2002 in response to calls to 'drought-proof' the continent. Their model of engagement between science and public policy involves: clear simple science communication, which keeps scientific uncertainty and debate out of public view; pragmatic politics, which works within rather than challenges the dominant political agenda; and a focus on providing solutions rather than describing problems. This model has been successful in achieving policy reform at the expense of more participatory and critical approaches to ecological science and politics.

This paper goes beyond the "Public Understanding of Science" model of involving society in scientific debates.

Brulle, Robert J.. 2010. From Environmental Campaigns to Advancing the Public Dialog: Environmental Communication for Civic Engagement

Source: Environmental Communication: A Journal of Nature and Culture. Volume 4, Issue 1, 2010, Pages 82 - 98

Abstract and annotation: This essay examines the claims of environmental identity campaigns regarding the issue of climate change. Identity campaigns are based on the idea that more effective environmental messages developed through the application of cognitive science by professional communications experts can favorably influence public opinion, and thus support legislative action to remedy this issue. Based on a review of the sociological and psychological literature regarding social change and mobilization, I argue that while this approach may offer short term advantages, it is most likely incapable of developing the large scale mobilization necessary to enact the massive social and economic changes necessary to address global warming. Specifically, theoretical and empirical research on the role of the public sphere, civil society and social movements shows that democratic civic engagement is core to successful social change efforts. However, identity campaigns focus on a communications process that centers on elite led one way communications, which falls to allow for any form of civic engagement and public dialogue. This undermines the creation of a democratic process of change and reinforces the professionalization of political discourse, leading to a weakening of the mobilization capacity over this issue of global warming. The essay concludes with the outlines of an environmental communication process that aims at enhancing civic engagement and democratic decision making.

Bucchi, Massimiano. 1996. When scientists turn to the public: alternative routes in science communication

Source: Public Understanding of Science October 1996 vol. 5 no. 4 375-394

Abstract and annotation: This paper argues that both the traditional normative models and the more refined ('continuity') models of public communication of science fail to account adequately for cases of 'deviation', i.e. those cases when scientists address the public directly by skipping the usual stages of scientific communication. It is hypothesized that most of such cases are related to crisis situations and to the definition of scientific boundaries. Therefore, at least two modalities of public communication of science should be distinguished: one is the routine, generally unproblematic itinerary of a scientific idea through the different levels of communication as presented by the continuity models; and the other is the dramatic (re)assessment of boundaries and professional competences in the public arena that is required by marginal situations. Continuity models need to be supplemented by a multilevel, multivariate model which enables us to explain this second modality and to understand in more detail the role that the level of *public* communication plays when such a modality is activated.

Carvalho, Mónica, Carvalho, Ana Sofia, Araújo, Joana, Brites, Marta. 2010. Between scientists and public: reframing public participation in science through bioethics

Source: IAMCR CONFERENCE, COMMUNICATION AND CITIZENSHIP, Braga, Portugal, 18-22 July, 2010 - Book of Abstracts: [WG] Ethics of Society and Communication. Paper available at <http://iamcr.org/conference-abstracts>

Abstract and annotation: Discourses and techniques about the relationship between science and the public have remarkably developed in the past four decades. Science communication has become an important issue for the scientific governance. Public confidence in science, decision-making and support to democracy have changed the predominance of a top-down communication model, from scientists to public, to a more participative one – the Public Engagement with Science (PES). The Institute of Bioethics at Portuguese Catholic University, in Oporto, is doing research in the role of science in society issues and the aim of this paper is to discuss the relevance of Bioethics to improve PES. The bioethical issues seem to draw people's attention to certain scientific facts, confronting them with the consequences of science and improving their skills in deliberating on scientific issues. Moreover, ethics influences the way one understands public engagement, "scientific citizenship" or "science governance". The role of ethics is not to re-edit the old fashionable deficit perspective, which usually focuses on the impact of science and technology from the perspective of non-experts. Ethics is a theoretical and practical reference for changing the science-making in the near future, and it makes us consider the public as playing a more important role than that of mere spectators with lack of scientific knowledge or with emotional concerns. The ethical reflection could redefine the non-experts place in the context of science, involving people with science, making them not simply aware of scientific issues but also involved in the process of decision-making. On the other hand, bioethics can also contribute to the participation of scientists in the ethical reflection that takes place outside the labs, broadening their role as citizen scientists.

Davies, S. R. 2008. Constructing Communication. Talking to Scientists About Talking to the Public

Source: Science Communication June 2008 vol. 29 no. 4 413-434

Abstract and annotation: Recent work has started to explore "scientific understandings of publics" alongside public understandings of science. This study builds on this work to examine the ways in which public communication is talked about by scientists and engineers. The author identifies a range of ways of talking about the purposes and content of science communication to the public, arguing that the dominant framework for these is one-way communication, and that, in addition, such communication tends to be constructed as difficult and dangerous. However, the author further identifies a range of minority discourses that understand public communication in more complex terms.

Davies, S., Ellen McCallie, and Elin Simonsson. 2009. Discussing dialogue: perspectives on the value of science dialogue events that do not inform policy

Source: Public Understanding of Science May 2009 vol. 18 no. 3 338-353

Abstract and annotation: While theoretical work and empirical research have examined science policy-informing “dialogue events,” dialogue events that do not seek to inform public policy are under-theorized and under-researched, even though they are common and growing in popularity in the UK. We describe how, from a critical perspective, it may initially appear that such events cannot be justified without returning to the deficit model. But with this paper, we seek to open up a discussion about these non policy-informing events by arguing that there are in fact further ways to understand and frame them. We deliberately draw on different literatures and seek to make use of practitioner expertise within our discussion, in order to display several perspectives on the value of non-policy dialogue on science as sites of symmetrical individual or small-scale learning—rather than institutional learning—through social processes .

Delgado, A., Lein Kjølborg, K. and Wickson, F. 2010. Public engagement coming of age: From theory to practice in sts encounters with nanotechnology

Source: Public Understanding of Science May 11, 2010

Abstract and annotation: In this paper, we present a study of Science and Technology Studies (STS) perspectives on public engagement, specifically focusing on the gap between theory and practice. In aiming to develop a conceptual map of this gap, we identify five top topics of tension. These are related to the general questions of: “Why should we do public engagement?,” “Who should be involved?,” “How should it be organised?,” “When should it be done?” and “Where should it be grounded?” We employ nanotechnology as a paradigmatic case to help us explore these tensions. In practice, the choices one makes in relation to one topic of tension may influence the choices available for others. Enhanced awareness of the presence of these tensions, as well as their interconnections, can help build reflexive capacity and make visible the various alternative routes available for STS practitioners working in the “age of engagement.”

Durant, John. 1999. Participatory technology assessment and the democratic model of the public understanding of science

Source: Science and Public Policy, Volume 26, Number 5, 1 October 1999 , pp. 313-319(7)

Abstract and annotation: It seems that the general public is somewhat disillusioned with science and technology and is demanding greater participation in important decisions as to their application in everyday life. Ideals of equality between scientists and non-scientists and of informed public debate as the preconditions for forging socially sustainable public policies need to be translated into new processes of deliberative democracy.

Gregory, J. and Simon Jay Lock. 2009. The Evolution of 'Public Understanding of Science': Public Engagement as a Tool of Science Policy in the UK

Source: Sociology Compass. Volume 2, Issue 4, pages 1252–1265, July 2008

Abstract and annotation: This historical review surveys the evolution of the science–society relationship in post-war Britain. It observes the transformation since the 1980s of the idea of 'public understanding of science', in which scientists and laypeople differ by virtue of the scientific knowledge they have, into the idea of 'public engagement with science', in which scientists, laypeople and policy makers negotiate policy for future science and technology. We survey recent critiques of public engagement which draw attention to the ways in which it constructs particular publics, and which question its capacity to contribute to policy-making.

Hails, Rosie & Julian Kinderlerer 2003. Science and society: The GM public debate: context and communication strategies

Source: Nature Reviews Genetics 4, 819-825 (October 2003)

Abstract and annotation: Science communication is developing a new approach that promotes dialogue between scientists and the public. A recent example is the debate on the possible introduction of genetically modified crops into the United Kingdom. As this exercise in public engagement draws to a close, we consider the context in which this debate has taken place, and the challenges of developing such interactions between science and society.

Hellsten, I., James Dawson, Loet Leydesdorff. 2010. Implicit media frames: Automated analysis of public debate on artificial sweeteners

Source: Public Understanding of Science September 2010 vol. 19 no. 5 590-608

Abstract and annotation: The framing of issues in the mass media plays a crucial role in the public understanding of science and technology. This article contributes to research concerned with the analysis of media frames over time by making an analytical distinction between implicit and explicit media frames, and by introducing an automated method for the analysis of implicit frames. In particular, we apply a semantic maps method to a case study on the newspaper debate about artificial sweeteners, published in the New York Times between 1980 and 2006. Our results show that the analysis of semantic changes enables us to filter out the dynamics of implicit frames, and to detect emerging metaphors in public debates. Theoretically, we discuss the relation between implicit frames in public debates and the codification of meaning and information in scientific discourses, and suggest further avenues for research interested in the automated analysis of frame changes and trends in public debates.

Irwin, A. 2008. Risk, Science and Public Communication: third-order thinking about scientific culture. In Handbook of Public Communication of Science and Technology. London & New York: Routledge.

Abstract and annotation: This chapter explores some different ways of thinking about science communication and risk management. In certain contexts, there has been a transition from 'first order' (or deficit) models of science-public relations to a greater emphasis on public engagement and dialogue (discussed here as 'second order' thinking); The chapter especially addresses certain problematic and challenging aspects of this partial movement between first and second order approaches. 'Third order' thinking about risk, science and public communication asks fundamental questions about the underlying relationship between 'first' and 'second' order approaches, the changes that have taken place (both in theory and practice) and the future direction of scientific governance and science communication; It is important to emphasise that first, second and third order thinking are not presented here as distinct historical stages nor as an inevitable sequence. This is not a story of one way of thinking inevitably giving way to the next and then the next. Instead, the situation in most national and local contexts is of these different 'orders' being mixed up (or churned) together. The deficit model co-exists with talk of dialogue and engagement. While some organisations and individuals look for quick and easy solutions to communication problems, others have begun to reflect upon the inherent limitations, contextualities and conditionalities of both deficit and dialogue; Importantly, not all parties will agree on any particular categorisation: what one party might view as 'engagement' can often be seen as top-down communication by another (especially if disappointed with the outcome). Thus, social experiments in 'public engagement' very often lead to accusations that the exercise was too restricted, too short and insufficiently democratic. From the perspective of this chapter, such accusations do not invalidate initiatives but can represent an essential resource within the public scrutiny of socio-technical change; This chapter presents the public communication of science and technology as more than a matter of communication style. Instead, through the device of 'third-order thinking', we confront basic issues of the shaping and direction of socio-technical change, the frameworks within which communication takes place, cultures of governance and control (especially relating to the institutions of science) and the choices which are available to citizens within modern democracies.

Kahan, Dan 2010. Fixing the communications failure.

Source: Nature 463, 296-297 (21 January 2010)

Abstract and annotation: The author argues that people's grasp of scientific debates can improve if communicators build on the fact that cultural values influence what and whom we believe. In a famous 1950s psychology experiment, researchers showed students from two Ivy League colleges a film of an American football game between their schools in which officials made a series of controversial decisions against one side. Asked to make their own assessments, students who attended the offending team's college reported seeing half as many illegal plays as did students from the opposing institution.

Leydesdorff, Loet and Lina Hellsten. 2005. Metaphors and Diaphors in Science Communication - Mapping the Case of Stem Cell Research.

Source: Science Communication September 2005 vol. 27 no. 1 64-99

Abstract and annotation: "Stem cell research" has become a subject of political discussion in recent years because of its social and ethical implications. The intellectual research program, however, has a history of several decades. Therapeutic applications and patents on the basis of stem cell research became available during the 1990s. Currently, the main applications of stem cell research are found in marrow transplantation (e.g., for the treatment of leukemia). In this study, the various meanings of the term stem cell are examined in these different contexts of research, applications, and policy debates. Translation mechanisms between contexts are specified, and a quantitative indicator for the degree of codification is proposed.

Libutti L. and A. Valente. Science Communication, Information and Participatory Methodologies: Key Success Factors in a Public Debate on the Freshwater Crisis.

Source: The Open Information Science Journal, 2008, 1, 10-14

Abstract and annotation: The article considers how discrete disciplines such as documentary research, participatory methodologies and the public communication of science can, if used synergistically, provide the necessary elements for a public debate on a scientific issue of current interest. In this instance, the debate formed part of a CNR- British Council, Rome branch and the Civil Protection Department project for the communication of science to young people, and the theme chosen for discussion was the freshwater crisis. It is important to ensure that schools offer suitable learning environments and provide innovative teaching techniques to encourage students to explore the social dimensions of the scientific issues they are dealing with.

Macnaghten, Phil, Matthew B. Kearnes and Brian Wynne. 2005. Nanotechnology, Governance, and Public Deliberation: What Role for the Social Sciences?

Source: Science Communication December 2005 vol. 27 no. 2 268-291

Abstract and annotation: In this article we argue that nanotechnology represents an extraordinary opportunity to build in a robust role for the social sciences in a technology that remains at an early, and hence undetermined, stage of development. We examine policy dynamics in both the United States and United Kingdom aimed at both opening up, and closing down, the role of the social sciences in nanotechnologies. We then set out a prospective agenda for the social sciences and its potential in the future shaping of nanotechnology research and innovation processes. The emergent, undetermined nature of nanotechnologies calls for an open, experimental, and interdisciplinary model of social science research.

Nisbet, Matthew C. and Dietram A. Scheufele. 2009. What's next for science communication? Promising directions and lingering distractions.

Source: American Journal of Botany 96: 1767-1778

Abstract and annotation: In this essay, the authors review research from the social sciences on how the public makes sense of and participates in societal decisions about science and technology. We specifically highlight the role of the media and public communication in this process, challenging the still dominant assumption that science literacy is both the problem and the solution to societal conflicts. After reviewing the cases of evolution, climate change, food biotechnology, and nanotechnology, we offer a set of detailed recommendations for improved public engagement efforts on the part of scientists and their organizations. We emphasize the need for science communication initiatives that are guided by careful formative research; that span a diversity of media platforms and audiences; and that facilitate conversations with the public that recognize, respect, and incorporate differences in knowledge, values, perspectives, and goals.

Pace, Michael L, Stephanie E Hampton, Karin E Limburg, Elena M Bennett, Elizabeth M Cook, Ann E Davis, J Morgan Grove, Kenneth Y Kaneshiro, Shannon L LaDeau, Gene E Likens, Diane M McKnight, David C Richardson, and David L Strayer. 2010. Communicating with the public: opportunities and rewards for individual ecologists.

Source: Frontiers in Ecology and the Environment 8: 292–298.

Abstract and annotation: Many ecologists are interested in communicating science to the public and addressing societal concerns about environmental issues. Individual ecologists need to consider whether, when, and how this should be done. We propose that public outreach activities can be beneficial for ecologists at all stages of their career. There are diverse opportunities for such involvement, and these can vary enormously in terms of time and expertise required. Trends within the science of ecology, especially research focused on social–ecological systems, are likely to promote increased interactions with stakeholders and policy makers. To be effective in these interactions, ecologists should consider new approaches to communication and be aware of the potential roles scientists can play in public policy debates. Professional ecologists need to engage with non-scientific audiences; a review of such activities should be included in considerations for promotion, recognition, and awards, while also acknowledging variations in the inclinations and abilities of individual scientists. There are, however, few current standards for how much time ecologists should commit to public outreach, how time allocation might change over a career, or how to evaluate the quality of such activities. We ask ecologists to consider ways to evaluate the quality of interactions with the public and how to reward these efforts appropriately.

**Priest, Susanna Hornig 1994. Structuring Public Debate on Biotechnology
Media Frames and Public Response.**

Source: Science Communication December 1994 vol. 16 no. 2 166-179

Abstract and annotation: A study of themes arising within focus group discussions of U.S. lay publics (both student and nonstudent adults) in response to newspaper coverage of biotechnology is consistent with the assertion that media frames and reader schemas interact to produce an understanding of a newly emerging issue. Newspaper coverage heavily dominated by institutional sources and dealing with only a narrow range of issues may be limiting the terms of public debate in an unhealthy way. Readers reason by analogy with related and sometimes unrelated developments in trying to understand biotechnology, based on schemas reflecting their general understanding of science.

Schäfer, M. S. 2008. From Public Understanding to Public Engagement: An Empirical Assessment of Changes in Science Coverage

Source: Science Communication November 26, 2008

Abstract and annotation: Science communication is said to have changed in the past decades. It is widely assumed that science is no longer merely transported and translated by the mass media to a passive audience, but “medialized”: Many authors believe that scientific issues are discussed extensively in the mass media nowadays, that these discussions are plural in its participants and in the arguments used, and that the issues at stake are evaluated controversially. It is still unclear, however, if this change applies to all science topics or only to some. The article at hand argues that science issues from different epistemic cultures can be expected to be “medialized” to different extents, and analyzes mass media coverage on stem cell research, human genome research, and neutrino research to underline this claim. The findings show that the described change only applies to some issues, and that further differentiation of the concept of “medialization” is necessary.

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