

**A role for communication professionals
in support of responsible innovation practices**

Steven M. Flipse

Delft University of Technology, Faculty of Applied Sciences
Science Education and Communication

S.M.Flipse@TUDelft.nl

Maarten C.A. van der Sanden

Delft University of Technology, Faculty of Applied Sciences
Science Education and Communication

M.C.A.vanderSanden@TUDelft.nl

Abstract

Currently, the role of many Science Communication (SC) professionals is still to transfer the outcomes of Scientific and Technological knowledge development to a larger audience in an understandable way. We advocate that SC professionals can also have an important role *during* the development of S&T. They could support Socially Responsible Innovation (SRI) by sensitizing S&T actors with public values, based on the same methods that they currently employ to transfer knowledge to a larger audience.

This article describes SRI as a ‘wicked problem’ in which SC professionals can play a role to untangle the social complexity in innovation networks. This could safeguard the emergence of innovations that are better attuned to social and political needs, values and opinions, further improving an organisation’s innovative capacity. Based on the notions of knowledge brokering, mediation and nudging, S&T actors could be stimulated and encouraged by SC professionals to take social and ethical considerations into account, thereby stimulating SRI practices.

Introduction

Currently many Science Communication (SC) activities focus on initiating and establishing public or political discourse about the role of S&T in society. These encompass various forms of public dialogue and Technology Assessment (TA), including science cafes, science centers and museums, conferences, focus groups, consensus workshops, etc. While these activities do not always explicitly aim at letting the public become more acquainted with new science and technology, there usually is a larger focus on information flow to the public (*Figure 1*: bold arrow) then the other way around: from public values to S&T.

Noted, some activities also aim to let S&T become inspired with public values. E.g. Technology Assessment in Social Context has been explicitly designed to “*increase democratic input into decision making*” about S&T, and also seeks to ‘shape’ not only technology but also social settings and the way people think about technology and society (Russell *et al.* 2010:110). Integrative TA (Berloznik & Van Langenhove 1998) aims to let researchers in S&T reflect on and if possible study the societal *consequences* of their research. Real Time TA even aims to “*elicit values and explore alternative potential outcomes,*” to “*enhance communication and identify emerging problems,*” rendering innovation “*more amenable to understanding and, if necessary, to modification*” (Guston & Sarewitz 2002:98). However, while such activities seem to also leave room to enrich the development of S&T with public values, the actual link with on-going Research and Development (R&D) work has remained “*fuzzy and unclear*” (Wilsdon & Willis 2004:18).

In many, if not most occasions, scholars from the social sciences and humanities have organized the described engagement activities, sometimes also involving SC professionals. This article aims to propose a new vacancy for SC professionals explicitly, for the support of *on-going* innovation practices (*Figure 1*: dashed arrow). So far, the role of SC professionals in S&T has focused largely on (corporate) communication of innovations that were almost ready to market. Some consider this as an undesirable form of SC, acting only as the ‘midwives’ of S&T in society. Yet support in S&T by SC professionals from the beginning of innovation trajectories, could support S&T actors in

becoming more receptive of and responsive to societal context, thereby increasing and improving Socially Responsible Innovation (SRI) and the quality of its outcomes.

This article is structured as follows. *Section 2* focuses on the value of enriching S&T with societal context and how this could be done. *Section 3* describes which current SC professional's skills are relevant for SRI establishment. *Section 4* describes how contextualization of S&T can be considered a wicked problem and what SC professionals can do to 'disentangle' some of their wickedness. *Section 5* concludes this paper with a new vacancy for SC professionals.

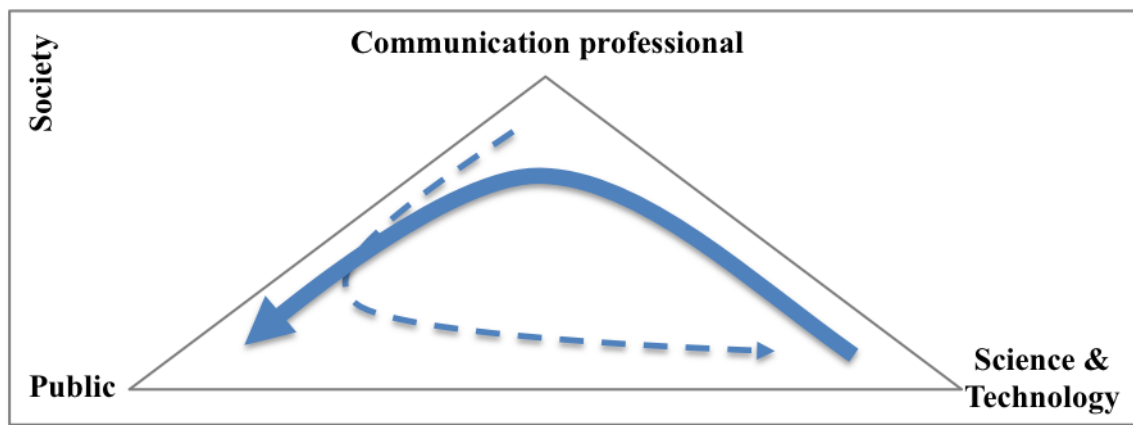


Figure 1: the connection between the public and science and technology in society, via communication professionals. The bold arrow depicts the currently largest information flow. The dashed arrow depicts the proposed role for communication professionals to support the contextualization of science and technology.

Enriching science & technology with societal context

Our proposed opportunity for SC professionals builds on experiences from the humanities in Socio-Technical Integration Research (STIR, Fisher *et al.* 2006), in which new and emerging S&T practice is contextualized in collaboration between researchers from the social and natural sciences. S&T innovations based on nanotechnology, information technology and life sciences can raise societal and political concerns. Policy makers advocate that S&T actors consider relevant social and ethical aspects of S&T, allowing innovations to become more aligned with public values, supporting SRI

practices (21st Century Nanotechnology R&D Act 2003; European Commission 2011). Such alignment between S&T and society could support both the public adoption and acceptance of future innovations, providing both academic and private S&T institutes with incentives to adopt SRI (Flipse & Osseweijer 2012).

The question is how SRI can be installed in actual R&D practice, since S&T actors frequently do not automatically do so explicitly by themselves (Patra 2011). Short and one-time interactive moments (as is proposed in most TA and public dialogue activities) between members of the public, and researchers and engineers are possibly not as successful in SRI installment as prolonged ‘exposure’ to social and ethical aspects. The latter has been demonstrated to allow S&T actors, including scientists and engineers, to critically reflect on public values, and to do ‘something’ with such considerations in their on-going laboratory practices (see e.g. Schuurbiens 2011).

STIR is an example of a prolonged interactive research approach, in which researchers from the social and natural sciences collaborate to elevate S&T to the next level through active consideration of social and ethical aspects. STIR provides a protocol (Fisher *et al.* 2006) to shape such collaboration within ‘collaborative spaces’ at the S&T actor’s natural ‘habitat,’ i.e. the laboratory floor. Since its conception in 2006, roughly 30 studies have been carried out. Generally, these indicate increases in ‘reflexive awareness’ of both the S&T actor (on the level of public values) and the social scientist (on the level of S&T considerations). Collaboration generates more and better research options, goals and priorities, through integration of social and ethical aspects that would otherwise have been overlooked (Flipse *et al.* 2012a).

One of the keys of the success of STIR lies in its potential to contextualize research and development activities, i.e. allowing S&T actors to critically reflect on the societal context of their work. Still, involvement of critical outsiders is often viewed as something that can decrease and organization’s innovative capacity, delaying research and development practices. In the past, ethicists have focused on a backward looking responsibility perspective, indicating which kinds of research should *not* be done. Nevertheless, the current forward looking perspective (with regard to SRI) is very much appreciated by some researchers, who occasionally have even stated that increased

sensitivity to societal context is something that all S&T actors should acquire (Flipse *et al.* 2012b).

The role of SC professionals in Socially Responsible Innovation

Science and technology studies and innovation management studies have acknowledged the important role of communication and social aspects (Taatila *et al.* 2006) for the outcome of innovation processes. Yet, the question remains how the SC professional can support SRI in a constructive manner. Considering the role of social scientists / humanists play in STIR to stimulate SRI, we feel that SC professionals possess the same necessary skills to invoke critical reflection on S&T in researchers through e.g. knowledge brokering, mediation and nudging.

Starting from the role that SC professionals can play as knowledge brokers in Science Centers and Museums, they could use the same skills and expertise to link public values to S&T environments (see e.g. Dobbins *et al.* 2009) within innovation networks. Similarly, starting from the principle of mediation, SC professionals could help bring public values into S&T actors' view, instead of the other way around. Starting from 'nudging' methods (see e.g. Cohen 2013) for behavioral change, SC professionals could use similar approaches to allow S&T actors to more actively consider social and ethical aspects during their work, thereby simulating and facilitating SRI practices.

Disentangling the 'wickedness' of Socially Responsible Innovation

Still, what emerges from STIR-related studies, is that installing SRI practices on the laboratory floor can only be characterized as a challenging 'wicked problem.' The starting point for the SRI challenge's wickedness is its social complexity, which is a function of the number and diversity of different players involved in the installment of SRI in S&T practice. Following Conklin's (2006) interpretation such problems, below we describe why this is the case and how SC professionals can help disentangling the wickedness of SRI through e.g. knowledge brokering, mediation and nudging at the laboratory.

First, a wicked problem cannot be fully understood before a solution is developed. This is very much the case for STIR, which has been posited as a possible solution for

SRI integration in S&T practice. Policy makers and researchers from the humanities can easily say that S&T should include more and broader societal values and context. But only by frequently interacting with S&T actors, the difficulties of a more inclusive S&T environment can be fully understood. For SC professionals, this means that when they interact with natural sciences and help them with contextualizing S&T (in a similar way as in STIR), together they establish common ground onto which the foundations of SRI can be laid. This also means that methods for reflection of the role of S&T in society cannot be devised 'outside' the places where such reflexive awareness is desired. Should SC professionals get a role in this, they should actively engage S&T and collaborate with researchers from the natural sciences to collaboratively devise methods for the required contextualization.

Second, wicked problems have no stopping rule. This indicates that SRI is not at some point 'done.' There should be a sustained, continuous integration of social and ethical aspects at natural scientists' laboratories to label S&T practices as 'SRI.' Frequently, SC professionals have the desire to first oversee processes from A to Z before they develop a well-founded communication strategy, e.g. regarding the communication some S&T based process or product. But since there is no 'Z' in SRI (both literally and metaphorically), they have to make due with limited knowledge of these S&T processes. SRI then follows based on regular consideration of societal context, which could be inspired and steered by critical outsiders such as SC professionals, who in turn also more thoroughly understand the S&T with which they themselves are engaged.

Third, solutions to wicked problems are not right or wrong. This implies that there is no 'best practice' for SRI that has a 'one size fits all' character. In turn, this implies that what entails SRI is dependent on the laboratory context in which it is installed, as well as the societal context in which laboratory work takes place. This means that those who enable SRI (e.g. SC professionals via STIR-approaches) should be sensitive to the environment in which it is installed. This requires a trial-and-error approach, in which a (semi-) standardized method for SRI is gradually integrated in S&T practice, tweaked to the preferences of all those involved. Then, in time, one can speak of a 'better,' 'good enough' or 'not good enough' approach.

Fourth, every wicked problem is essentially unique and novel, making every wicked problem into a one-shot operation. We cannot fully understand the problem until trying solutions (see first point), yet every solution has (possibly unintended) consequences, which either brings us closer to a more desirable state or spawns new wicked problems that further complicate the situation. Once done, one cannot go back and try an alternative solution. This requires a great deal of both creativity and judgment on the part of the SC professional who guides S&T actors towards SRI.

The new vacancy for SC professionals

Above we hypothesized how SC professionals could help understanding the wickedness of SRI. In such a new role for SC professionals, they do not facilitate communication of S&T to the public once S&T outcomes are already known (see *Figure 1*). Their communication is not ‘about’ S&T, but ‘within’ and ‘in support of ‘S&T’ by contextualizing the role of S&T in society. To do so effectively, engagement with S&T actors should not limit itself to single moments in time in e.g. workshops, lectures, etc., but should be longer term and interactive, following the STIR example. This requires an active role on the part of the SC professional, to become interactively involved in the challenge of SRI in actual S&T practice. Only then can a relationship be built up between the SC professional and the S&T actor in which critical yet constructive views are not only possible, but also valued by both parties.

References

21st Century Nanotechnology Research & Development Act. (2003). Public Law 108-153.2003.

Berloznik, R. & Van Langenhove L. (1998). Integration of Technology Assessment in R&D Management Practices. *Technological Forecasting & Social Change* 58(1-2), 23-33.

Cohen, S. (2013). Nudging and informed consent. *The American Journal of Bioethics* 13(6). 3-11.

Conklin, J. (2006). *Dialogue mapping – Building shared understanding of wicked problems*. Chichester (UK), Wiley & Sons Ltd.

Dobbins, M., Robeson, P., Ciliska, D., Hanna, S., Cameron, R., O'Mara, L., DeCorby, K. & Mercer, S. (2009). A description of a knowledge broker role implemented as part of a randomized controlled trial evaluating three knowledge translation strategies. *Implementation Science* 4(23). 1-9.

European Commission. (2011). *Horizon 2020 – The Framework Programme for Research and Innovation*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, 1-14.

Fisher, E., Mahajan, R.L. & Mitcham, C. (2006). Midstream Modulation of Technology: Governance from Within. *Bulletin of Science, Technology & Society* 26(6), 485-496.

Flipse, S.M. & Osseweijer, P., 2013. Media attention to GM food cases: an innovation perspective. *Public Understanding of Science* 22(2). 185-202

Flipse, S.M., Van der Sanden, M.C.A. & Osseweijer, P. (2012a). The Why and How of Enabling the Integration of Social and Ethical Aspects in Research and Development. *Science & Engineering Ethics* 19: 703-725.

Flipse, S.M., Van der Sanden, M.C.A. & Osseweijer, P. (2012b). Midstream Modulation in Biotechnology Industry – Redefining What is 'Part of the Job' of Researchers in Industry. *Science & Engineering Ethics* 19: 1141-1164.

Guston, D.H. & Sarewitz, D. (2002). Real-time technology assessment. *Technology in Society* 24(1-2), 93- 109.

Patra, D. (2011). Responsible Development of Nanoscience and Nanotechnology: Contextualizing Socio-Technical Integration into the Nanofabrication Laboratories in the USA. *Nanoethics* 5(2), 143-157.

Russell, A.W., Vanclay, F.M. & Aslin, H.J. (2010). Technology Assessment in Social Context: The case for a new framework for assessing and shaping technological developments. *Impact Assessment & Project Appraisal* 28(2), 109-116.

Schuurbiers, D. (2011). What happens in the Lab Does not Stay in the Lab: Applying Midstream Modulation to Enhance Critical Reflection in the Laboratory. *Science & Engineering Ethics* 17(4), 769-788.

Taatala, V.P., Suomala, J., Siltala, R. & Keskinen, S. (2006). Framework to study the social innovation networks. *European Journal of Innovation Management* 9(3), 312-326.

Wilsdon, J. & Willis, R. (2004). *See-through Science. Why public engagement needs to move upstream.* London, Demos.