New practices in science communication: Roles of professionals in science and technology development

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Abstract

Currently, Science Communication (SC) professionals who are working in the context of science and technology development, have various jobs at universities, government agencies, NGOs and industry. Their positions have changed in recent years, due to developments in science and technology and to social trends. Increasingly, SC practitioners play a role as mediator in participatory processes, or facilitator of stakeholder meetings. These roles require decisions in difficult to manage processes and in situations that are hard to overlook. A decision support system would be able to help them. In this paper we describe the changing role of SC practitioners and the context in which they make decisions. Then we argue which requirements decision support systems must meet in order to support SC practitioners in their decision making processes. Our paper is based on a literature review on professionalization and in-depth interviews with science communication professionals. Our main conclusion is that a decision support system should not only support the SC practitioner's instrumental decisions, but should

also support him in ethical issues. Decision support systems must challenge the professional to reflect on his tasks, the uncertainties involved, and on his knowledge, skills and personal identity. All of these factors are of importance for the SC practitioner to make informed choices and to professionalize.

Introduction

SC professionals who are involved in science and technology development are working at universities, in government, but also in industry or NGOs. Their job titles vary widely; from SC advisor, manager or consultant, to dialogue coordinator or 'science in society' officer to innovation or valorization advisor. And their daily tasks differ as well (Wehrmann, 2010). But what do the science communication professionals have in common? What kind of problems do they face in daily practice? What kind of demands imposes the context in which they work? And: how can tools like support systems help them to make decisions? What requirements must these systems meet?

In this paper we address the above questions. We briefly outline some relevant developments in science and society and describe the impact of these developments on the work of the SC professional, and the decisions he has to make. Then we will discuss the concept of professionalism and show what SC-professionals need in order to make informed choices. Finally, we discuss what requirements support systems must meet in order to support professionals well.

Methodology

This paper is based on a literature review on professionalization in general and specifically on SC, and on in-depth interviews with 15 science communication practitioners in the Netherlands, all of them actively involved in science and technology development, working in various organizations (Wehrmann, work in progress). Interview questions focused on the tasks the practitioners perform in daily work, the problems they encounter, their motivation to professionalize and the pathways they prefer in achieving professional growth.

Developments in science and technology

Science and technology development are uncertain processes. Although the goals are often obvious: a new drug, an electric car, the introduction of the care robot, the road towards the innovation is no paved path. At various moments in scientific research there are deviations: experiments and methods can fail or surprising unexpected discoveries bring researchers on a new track. But in addition to scientific and technical uncertainty (Pollack, 2005; Auyang, 2006), there are other aspects that influence the changes in science and technology development. Consider for instance economic aspects: due to privatization a university is not any longer the only party that performs research. Increasingly science must try to maintain in a competitive market. Political and social influences are as well decisive for technology development. Individualization has led to greater independence and empowerment of citizens and to less authority for the traditional institutions, like government or knowledge institutes (Dijkstra, 2008). Citizens have countless possibilities to obtain information easily, directly and quickly, and social media make it possible to share information and connect people. Because of this almost unrestricted access to information the general public can influence major decisions. In Europe, for example, the tentative revival of nuclear power is stopped after the tragedy in Fukushima (Goodfellow et al., 2011). In Germany, social unrest has even resulted in complete relegation of nuclear power.

Many science and technology developments are taking place in a network of scientists, engineers, representatives from industry, government and interest groups, and - in some cases - citizens (for instance in the role of consumers, civilians or patients). All actors - with similar or conflicting interests - are connected in different ways and for different reasons during the various stages of the innovation process. Networks are typically skewed and asymmetrical in that some actors in the network are more emotionally involved in the technological development than others, and because connections between the various stakeholders can be weak or strong. This "socio-technical" network is a dynamic entity which constantly changes in shape and composition by spontaneous events and because people in the network are communicating or not communicating (Littlejohn & Foss, 2007; Bailey, 1994).

Although there are several stages in the development of technology the process is difficult to overlook and therefore difficult to manage from a e.g. social responsible and communication point of view (Flipse et al, 2013). This applies not only to the actors involved in the development, but is a general phenomenon. Because of 'bounded rationality', we can only focus on one part of a problem, while missing another part. Communication within such a dynamic network for the development of science and technology is an 'ill -defined wicked problem'; a complicated problem that is a difficult to grasp, to indicate or to describe. 'Ill-defined' is a term from the world of design (Friedman, 2003; Cross, 2002) and 'wicked' was introduced by Rittel and Webber, 1973).

The changing role of the science communicator

From the 15 interviews we recently performed we learned that SC professionals who are involved in science and technology development are employed by universities, industry, government and NGOs. They all take part in the complex socio-technical system where stakeholders and technology come together. Communicating about the development has become a challenge for most of them. An editor of a knowledge institution 'who just wanted to publish a press release about the collaboration between "her" institution and other partners', described that she needed to have agreement on the text of all institutions involved: a difficult and time consuming process. And a dialogue coordinator who would like to organize a meeting with stakeholders, spent most time on "analyzing the interests and goals of all actors, and to anticipate on possible sensitivities between the parties involved" (Wehrmann, in progress).

As a consequence of the current developments, the role of science communication professionals tends to focus more on mediating between the different parties (Meyer, 2010) on facilitating communication processes and on coaching and encouraging participants in the communication process. In addition, science communication professionals still have informative and sometimes educational tasks. So, the SC practitioner has a variety of tasks; some of them new and relatively time consuming. In performing these tasks, he must constantly be aware of his surroundings and has to adapt his communication to the dynamic environment of science and technology development. From our interviews it became clear that he often works in a small team, and as a result,

should combine tasks at the strategic or tactical level with operational tasks as writing a press release. Therefore he has to be able to switch quickly between the various tasks (Wehrmann, 2012). At the same time, the science communicator has to decide on his role in each communication process. We can distinguish different roles; similar to the roles of the scientist in the policy process, science communicators can act as an impartial translator of scientific information, take the role of an 'honest broker' that accompanies the parties in making policy choices without substantive influence on the outcomes, or act as a representative of a stakeholder with specific interests. Besides, each SC practitioner represents 'his' institution, and that is why he must take the values and interests of his employer into account. But the extent to which he allows these interests affect his tasks, varies. This choice partly depends on his personal values.

Professionalization

Personal values are of main importance in professionalization of SC practitioners. In literature on professionalization one differentiates between 'instrumental' and 'normative' professionalization (Moynihan, 2002). Someone's professional identity is not only determined by knowledge and skills to perform his tasks well ('instrumental professionalism') but also by who he is and what he thinks is valuable and important ('normative professionalism'). Ethical awareness is an important prerequisite for normative professionalization.

In science communication particularly, practical decisions often go together with ethical dilemmas. A few examples of main ethical questions in our field: Does everyone needs to know everything? When is an innovation ready to be presented to society? Should everything that is known also to be told to everyone? Who is responsible for the consequences? (Drenthen et al., 2005). A SC professional who works in the context of innovation is often confronted with similar ethical questions. Sometimes codes of conduct are available, for example for (medical) journalists (Drenthen, p.178), but those guidelines are general and do not always provide guidance in specific situations. Moreover, it is important for a SC practitioner to determine his own values within the given frameworks, for ethical dilemmas are conflicts of values. In health communication

for instance, the value of health and economic values easily collide in debates on costs of care.

So, ethics plays a role in the choices a science communicator makes, in terms of what to communicate and the points of view he has to take. But also in choices regarding the targets he want to achieve, or in choice of communication means. Does he prefer a dialogue, and thus a transaction approach, or does he favour the transmission approach?
To take informed ethical decisions, a professional needs to be aware of the extent and the way his personal values influence or determine his choices and actions. In this context it is important for a professional to reflect on how his personal vision, motivation and values affect the way he performs his tasks as a professional. What is his view on society? What ideals does he have? What does he want to achieve? Reflection allows practitioners to get a good picture on their personal values in relation to the profession. Obviously reflection is also important for achieving instrumental professionalism, for example by asking whether or not your goals have been met, and why, and what that might mean for the future situations. And reflection can help to grow personally, and to develop a vision on a the profession (Wehrmann & Henze, 2014).

Until now, there is not much research available on professionalization of science communication practitioners. However, there are several models available from the Education domain on the personal professional development of teachers (Clarke & Hollingsworth, 2002). One of the key points of the Model of Professional Growth, is that new insights from 'stimuli' (reading, courses, or training) affect our knowledge, attitudes and beliefs. But especially by applying this new knowledge in practice, to discuss the insights with colleagues, and to reflect, we are able to constantly develop ourselves and the profession.

Decision support systems

From the previous paragraphs we learned that science and technology development proceeds via complex processes in a socio-technical system with a lot of potential but uncertain and sometimes unexpected results. Within this system, the SC professional thinks of the various communications solutions, but is limited by a bounded rationality allowing him to view only a small part of the socio-technical system. A SC

practitioner has to choose a point of view to solve communication problems, has to take into account the interests of his employer, but also has to deal with social responsibilities and ethical dilemmas. To understand this complexity and to learn from his experiences and to grow as a person and as a professional he has to reflect and discuss his dilemmas, experiences and insights with colleagues.

Then what could be the added value of a decision support system in the practice of this professional? We have argued that the SC professional has various tasks, he has to be able to decide quickly and he often works in small teams. He has to be able to adapt to new situations quickly and switch between various tasks. Time pressure is often considerable, and the opportunity to consult colleagues is not always there.

Decision support systems are generally based on (survey) data and contain a scenario repository with a reason engine that allows for the comparison of possible decisions and their consequences. A user interface depicts the various possibilities and their resulting uncertainties. Decision support systems would be a good tool for a SC professional to get a grip on the multiple uncertainties in the science communication process. Decision support systems provide insights into the various possible communication decision scenarios and their possible impact.

We envision that such tools can strongly contribute to professionalization of the science communication practice, because decisions would be well-informed. But an important condition for decision support systems to help SC professionals, is that they do not only focus on 'instrumental' decisions, but also on ethical aspects of the decisions the professional has to make, and in this way doing justice to one of the complicating aspects of decision making in the context of technological innovation. In our view a decision support system should also challenge the SC professional to evaluate his decisions; to reflect on his choices, the uncertainties involved, and on his knowledge, skills and personal identity relevant for this decision. All of these factors are of importance for the SC practitioner to make informed choices and to professionalize. A major step forward would be if the decision support systems would be able to interact with the science communication professional, to gain knowledge based on the experience and reflection of the practitioner and to make the new insights available to new situations.

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