

Science communication and the issue of trust

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Abstract

Science communication, whether internally or to the general public depends on trust, both trust in the source and trust in the medium of communication. With the new 'ecology of communication' this trust is endangered. On the one hand the very term of science communication has been captured by many different actors (e.g., governments, PR experts, universities and research institutions, science journalists, and bloggers) apart from scientists themselves to whom science communication means different things and whose communication is tainted by special interests. Some of these actors are probably more trusted by the general public than others. On the other hand, the channels that are used to communicate science are also not trusted equally. Particularly the widespread use of social media raises doubts about the credibility of the communication spread through them.

Keywords

Science and media; Science and policy-making; Science communication: theory and models

Science communication — too many meanings for too many actors

Science communication has its historical roots in the popularization of science in the 19th century, when science began to become so specialized as to need 'translation' in order to be understood by an interested public. This public, ranging from an upper class bourgeoisie to the shopkeeper, the craftsman, and the worker, was fascinated by and truly interested in what science had to offer. Thus, popularization was, for a while, a parallel network of professionals who — most important in this context — shared the devotion to general enlightenment and to the production of (true) knowledge for the common good [Bensaude-Vincent, 2001]. Although we lack any polls from that time, it can be assumed that the popularizers were trusted the same way as was science. However, this idyllic state of affairs no longer exists.

Over the last two or three decades science communication has developed into an industry. It is no longer just the well-meaning activity of a few prolific scientists and science journalists, let alone professional popularizers, who engage in informing an interested public about the latest advances in research and their broader implications for society. Instead, science communication has become an arena in which many different stakeholders battle for attention and the power of

definition, because there is money in the game, there are jobs to be captured, and there are professional identities at stake. It is no surprise, therefore, that even the definition of 'science communication' itself is embattled.¹ A plethora of definitions of science communication are being traded and contested [Burns, O'Connor and Stockmayer, 2003; Schäfer, Kristiansen and Bonfadelli, 2015]. The tools used in the field range from science journalism to institutional communication via social media, to public relations (PR) and marketing, to museum exhibitions, science events organized by cities and countries (with the help of marketing and event management firms), to science centers, science cafés and science slams, to science blogs, and so on. Even good old scientific advice to policymaking is now re-branded as science communication [Gascoigne, 2008]. What makes this term so attractive to so many parties?

The boom in science communication has several interrelated causes. One is the drive for the democratization of science. What started out as the rebellious post-68 advocacy of scholars of science and technology studies, was usurped by official science policy and is now part of its politically correct discourse designed to demonstrate that science departments and research councils are at the forefront of political innovation. One element of democratization is 'engagement with the public', another one of the soothing terms that are suggesting that scientists are now coming out of their ivory tower and interacting with the common man and woman. This has led to the demand — mostly articulated by a growing science PR community — that scientists *have* to communicate to as many people as possible. This demand has attained tremendous popularity, because it appeals to the advocates of 'democratization' and, at the same time, it is in synchrony with both political legitimization strategies (strive for voter majorities) and institutional PR (reach as many people as possible).

Science is the ultimate reference, at least in principle, when reliable knowledge is at stake. As an institution it is oriented to the common good and transcends political ideologies and/or economic interests. In modern societies there is no other institution to turn to, especially when issues become politicized. If the communication of scientific knowledge is tainted by interests, if it is conflated with persuasive communication, if one constantly has to be suspicious of bias, this may not only create problems for making the decisions at hand but adversely affect the institution as a whole. Put more concretely: if the average citizen has reason to doubt and cannot rely anymore on information about the health risks and benefits of vaccination, he/she will not be able to come to an informed decision, but has to rely on faith or speculation. Science communication, in the general sense of the term, is the crucial link between the world of knowledge production and the general public. Thus, the credibility of science is actually dependent on the credibility of *science communication*.

¹To give an example: looking at the development of the German Wikipedia website about science communication between October 2015 and now, one can see that this definition has been changed and captured since to be synonymous with science PR. Since October 2015 the German Wikipedia site defines: "Science communication (synonym science PR) is a new field of public relations and describes the management of public communication about science." Before that it was broader, stating: "Science communication describes the various forms of communication of scientific topics", which was more in line with the English version: "Science communication generally refers to public communication presenting science-related topics to non-experts. This often involves professional scientists (called 'outreach' or 'popularization'), but has also evolved into a professional field in its own right. It includes science exhibitions, journalism, policy, or media production."

Science communication actors and their interests

Therefore, the boom in science communication raises some questions: first, who are the main actors in science communication today and what are their specific interests, and second, which sources and which media can be trusted in science communication to what extent? As we will argue, not all actors deserve the same amount of trust nor can all media be considered trustworthy.

The scientific information that the public receives can come from various actors and sources (e.g., scientists, science PR, science journalists) via various media/channels (e.g., newspapers, TV, press releases, social media). It is assumed that actors involved in public science communication have their own interests when communicating science; thus, in the following some of the main actors will be introduced separately.

The decisive force that drove the public understanding of science program in the 1950s in the United States was the government's interest in obtaining public support for NASA's moon program and at the same time attracting young students into mathematics and engineering to close the perceived gap with the Soviet Union. Since then, *governments and politicians* have become prominent players in science communication. However, their motives have become more varied. Apart from attempting to generate interest in science among the general public in the hope that this will lead to acceptance of controversial technological projects, there is also an interest in securing legitimacy for expenditure in a policy arena that is fairly remote from the public eye. Equipped with comparatively generous funds, some science ministries hire event management firms (or have established companies) to stage elaborate events such as the German 'Nano-Truck' or the 'MS Wissenschaft' (a science exhibition traveling by boat to different cities). Activities like these are labelled science communication, they have an educational component, but they clearly are politically motivated propagandistic communication of science at the same time. They demonstrate that government officials and administrators are one group of stakeholders, and event management firms with their marketing and exhibition specialists are another.²

With the shift to 'new public management' and their withdrawal from micromanaging science organizations, governments' engagement with science communication has taken yet another turn. The problem of legitimizing science funding has been deferred to universities and research centers that have to document the quality of their outputs and their efficiency in spending taxpayers' money. The pressure to comply is executed under the obligation of 'public accountability'. "The absolute requirement for science to present itself in public is now simply assumed to be obvious and a matter of course [...]. External communication of almost any kind and amount is considered useful and desirable per se — indeed, it is often already understood as being a genuine component of academic activity" [Marcinkowski and Kohring, 2014, p. 3]. Mistakenly taken to be a democratic duty, accountability is translated by the relevant organizations into the expectation of 'outreach' and competition for attention. Insofar as the expectation of outreach is directed to scientists it could (and sometimes does) lead to science communication in the original meaning of the term: report on research

²To mention just one example: the German science ministry frequently uses the marketing and consulting agency Scholz & Friends for its campaigns.

that is either pertinent to practical problems and/or of educational interest. But this function has been relegated to the sidelines by the organizations' fixation on attention. Instead, they communicate to an undifferentiated public in a 'push communication'-mode [Marcinkowski and Kohring, 2014].³ This type of activity counts as science communication, as the PR experts and press officers do, in fact, take over from the scholars of their institutions some of their communication to the public. There are different reasons for that: some scientists do not want to spend the time needed to communicate and PR offers professional expertise which the institutions find necessary to control communication to the outside. But, inevitably, this communication conflates information about science with institutional propaganda, since it is primarily motivated to achieve image building, branding, and marketing. For this purpose, universities and research centers have expanded their press and PR departments (in some cases tenfold) and thus created yet another stakeholder group of science communication: *press officers and PR specialists* engaged in institutional communication on behalf of academic institutions.

Although, as Kohring et al. [2013] found in their comprehensive study on the practice of science communication in the German higher education system, the executive influence of university's PR departments is still considered marginal, the administrative decision makers differ in their assessment from their counterparts on the academic boards. The former, who also have more contact with PR managers than the latter, attribute more influence to their PR departments which "implies that the executive influence of PR managers might increase as the power within universities shifts from academic to administrative decision makers" [Kohring et al., 2013, p. 176]. In some institutions, all communication to the outside is controlled by the press officers [Peters, 2013]. This has at least two implications: (1) It assumes that scientists are not capable of communicating appropriately with the general public so that this should be left to communication professionals, and (2) that PR is the best format for science communication. If that were to become the general pattern, it means that PR professionals are taking over the communication of science to the general public from the scientists because that public is considered receptive to PR communication only.

Together with universities, the *scientists* themselves have come under the pressure of 'accountability' and have increasingly engaged in science communication. A host of studies have been undertaken to gauge if and why scientists engage in public communication activities and have found that they do so "more often than is commonly assumed [...] and reveal positive shifts in scientists' valuing of PCST" [Dudo, 2013, p. 278]. In addition, funding institutions now frequently require efforts in science communication to be part of the proposals they are to fund.

While one would assume that scientists are the best communicators of their own research and also to be the proper addressee of expectations of the public, that premise may be mistaken if the motive for that communication is tainted by incentives to compete for undifferentiated attention from as many people as possible. Indeed, some scientists who actively engage in popularization do achieve considerable visibility amongst the public. Their status as 'visible scientists' is not just owed to their particularly interesting discoveries, but also to controversial positions, or their flamboyance when playing out their status as public figures

³On the motives and growth of press departments in universities, see Kohring et al. [2013].

[Goodell, 1977]. Carl Sagan, Richard Dawkins or Craig Venter are cases in point, not just being scientists but also accomplished PR professionals.

Several studies have shown that on the collective level the traditional norms of science are still in place to create a certain ambivalence toward media visibility [Peters, 2013; Rödder, 2012]. In the case of individual scientists, however, it is particularly difficult to distinguish between the motive to genuinely communicate to the public and self-promotion. Performance measures ('outreach') incentivize them to communicate with the public, and social media is the powerful and easily available dual use technology that allows them to do both simultaneously. The performance indicators, above all citation counts and impact measures, suggest that reputation can be reduced to and expressed in simple numbers which make it comparable across disciplinary boundaries. As such, they have been embraced by large sections of the natural sciences communities. This logic of quantified reputation has been enhanced with the widespread use of social media and the dramatic increase of (potential) reach via the Internet as well as the expansion of quantitative indicators to so-called altmetrics. With that technological development, communicating to gain as widespread attention as possible has become an objective for a substantial share of scientists in its own right.⁴ The conflation of the democratic motive and the motive of self-promotion is perfect because outreach via Facebook, Twitter, Youtube, or Blogs, is propagated as direct communication with no intermediate gatekeeper involved and, thus, as the most genuine type of communication and thereby allowing scientists to fulfill their accounting duty effectively by engaging eye to eye with the general public. The question whether the undifferentiated public is the appropriate audience and if communication via social media is of the same or at least sufficient quality and credibility as, for example, communication via the traditional mass media, is rarely asked. Nor is there reflection of the fact, as mentioned above, that widespread uncritical use of social media under the reign of data capitalism follows the logic of both politics (attention of as many potential voters as possible) and the advertising industry (attention of as many potential consumers as possible), a logic that was foreign to science [Marcinkowski and Kohring, 2014, pp. 4–7]. It is astonishing to observe how Internet-based communication technology has escaped critical assessment almost entirely.⁵

Another professional group to be mentioned as having a stake in science communication are *science journalists*. Science journalism has succeeded popularization and has, since the early 1900s, undergone various changes in philosophy and underlying economics, from translators of novel developments to advocates and promoters of science and on to critical observers and commentators [Fahy and Nisbet, 2011]. These styles of communication reflect to some degree the contemporary place of science in society. Perhaps more so than ever before, the role of science journalists has changed, basically because of two interrelated developments: digitization has thrown the classic business models of the print mass media into turbulence, and through the raise of the Internet and social media has both deprived journalists of their gatekeeping role and created an entirely new 'ecology' of communication between science and the public. This has led to a

⁴The numbers are growing even though they differ between disciplines and between countries [Peters, 2013].

⁵There are, of course, some exceptions. Most succinct are the analyses of Lanier [2013] and Zuboff [2014].

shrinking job market for science journalists [Brumfiel, 2009], many of whom are now practicing as freelancers or have moved into the safer and better paid PR departments in science institutions, and it has brought about a diversification of functions which go far beyond that of the 'conduit' who explains the latest research results to an attentive public [Brossard, 2013; Fahy and Nisbet, 2011].

The journalist in general and the science journalist in particular is probably still considered generally the most disinterested (in the sense of independent from special interests), and thus the most credible source of scientific information (next to the scientists themselves), at least in theory, because the press is considered the 'fourth estate' in any democratic society. This is exemplified in roles such as the 'investigative reporter', the 'watchdog', the 'curator' and the 'convener'. However, science journalism is under increasing pressure to make use of material supplied by interested press and PR departments (often a result of the sheer lack of other resources) leading to blurred demarcation lines between different sources of information. This leads to phenomena such as 'churnalism' (uncritical use of PR material). Further, the economic pressure under which the mass media operate drives journalists to use well-known 'news values' such as sensationalizing, personalization, and use of emotion to 'sell' stories. Sometimes economic interest is translated into political bias as in the case of climate change and the attempts of the oil industry to influence reporting [Oreskes and Conway, 2011]. If the science journalists are still the most trusted source of information about news on science, it remains an open question how long that will be the case when their increasing reliance on institutional communication content becomes widely known.

Finally, a group that cannot be demarcated unequivocally, because it is mostly defined by the medium of science communication, are *bloggers*. Bloggers may be scientists themselves, or journalists, but they may also be independent laypersons. It is not possible to attribute a specific interest to them, making it also impossible to gauge the trustworthiness of their communication. There are no gatekeepers, communication via blogs is direct, with no quality control other than critical voices mobilized in respective discussions. Bloggers gain their credibility in particular networks that believe in their communications. The formation of such networks may be a self-reinforcing effect, i.e., the larger the network, the more interesting and credible the blogger's communication may appear. The problem with this process is that audiences of followers develop and grow if the communications coincide with their convictions. These are the so-called 'echo chambers'. Scholars who use blogs for 'internal' information retrieval usually rely on conventional indicators of credibility such as names of colleagues or institutions [Rieh and Danielson, 2007]. The general public does not have such clues.

Trust in the medium and credibility of the message

One of the significant steps in the evolution of societies occurred in the late 18th century, when *trust* in the communication of scientific knowledge gradually shifted from people, mainly members of the aristocracy or the gentry, to institutions, such as academies. The generalization of trust beyond circles of people known to one another is a correlate of highly differentiated societies. Institutions that are associated with general values such as 'justice' and 'commonwealth', or orientation to the 'common good' — e.g., constitutional courts and science — command a particularly high level of trust. Without this trust in institutions, the modern organization of society with its manifold interdependencies across generational and

geographical divides would be impossible [Lang and Hallman, 2005; Luhmann, 1973; Shapin, 1995]. That is why people often use trust or the perceived credibility of a messenger as a heuristic or information shortcut when they have to form opinions/attitudes or decide whether to accept a message or not [Brewer and Ley, 2013; Nisbet and Scheufele, 2009]. Especially in cases where people have limited knowledge, they need to rely on trust in social actors and experts [Critchley, 2008; Kohring and Matthes, 2007]. It is then, in general, perceived that trust varies from one source to another [Brewer and Ley, 2013], and that trust is not assessed in a vacuum, but is rather assessed in social contexts characterized by “contested interests and battles over claims of expertise” [Lang and Hallman, 2005].

With remarkable stability over time and nationalities, medical doctors, teachers, judges together with scientists are on the top of the scales when asked whom to trust most — all professions that are perceived to serve the common good — while politicians and industrialists are near the bottom [e.g. Ipsos MORI, 2016; see also Lang and Hallman, 2005; Nisbet and Scheufele, 2009]. Politicians in democratic societies have to make promises they may not be able to keep, they have to strike compromises that are not necessarily the most rational decisions, and they constantly have to maneuver in their actions in order to secure their legitimacy with their constituency. Industrialists may contribute to the wellbeing of society but this happens indirectly. It is by virtue of competition that jobs are created which, in turn, produce income. But success in competition is built on the pursuit of self-interest. Thus, self-promotion, if necessary by making one’s products or services ‘look good’, is expected of them. The advertising industry is largely built on making things look good [Gioia and Corley, 2002; Shipman, 2015].

What counts for institutions and professions in general is relevant for science communication in particular. There seems to be some trend that deference to science and trust in scientists is decreasing [Peters, 2015]. In addition, wherever special interests are involved, trust tends to be withheld. This is most obvious in the case of public trust in science proper as compared to trust in scientists in industry [Critchley, 2008].⁶ Of course, to conclude that this is evidence of distrust in institutional science communication is only possible by inference, but fairly strong inference, nonetheless. As far as the credibility of *sources* is concerned, it may be assumed that science communication originating from governments, PR offices of universities and science organizations, as well as other interested actors is and will be perceived as less credible than science communication originating from academic scientists in universities and science journalists.⁷

Another problem is posed by the spread of *social media*. The call for science communication has been energized by the advent of social media as now a considerable share of science communication by scholars, universities and research institutes, is performed via social media. This pertains to the type of social media now prevalent, i.e., formats and platforms like Twitter, Facebook, YouTube etc. These platforms have been hailed by science communication activists as well as by

⁶This runs counter to the widespread demand for closer ties between science and industry or for the demonstration of the social relevance of science in general. Peters [2015] diagnoses “unavoidable trust problems.”

⁷While the general trust attributed to journalists may not be high [Ipsos MORI, 2016], in a study by Brewer and Ley [2013], science television programs were perceived as the most trustworthy sources when it comes to sources about environmental issues. However, the same was not true for GM food [Lang and Hallman, 2005].

institutions with enthusiasm about their potential for participation and democratization, immediate two-way communication with the targeted audience without interference of a gatekeeper and reach particularly to the younger age cohort. This fascination with and popularity of the new communication technology and its apparent attraction for science communication [Brossard, 2013] has eclipsed the question of how credible communication via this medium is.

Recently, more critical observers have pointed to the downside of the technology. While not denying its opportunities and beneficial uses even and particularly in science and in science communication, several caveats have to be raised. First of all, and most fundamentally, it has to be stressed that the major social media platforms are based on income by advertisement fees. That means that the logic of the advertisement industry is to some degree inscribed into the very technology on which communication via social media is based. To the extent that that may also be said about the traditional mass media, especially newspapers, the crucial difference is that journalists can keep their independence vis-à-vis a multitude of advertisers while social media operate on the basis of algorithms that supposedly 'optimize' (i.e. personalize) and, thus, select communication according to the logic of consumer preferences. This logic is actually antipodal to that of science communication: while communication via social media tends to follow the majority opinion creating 'echo chambers', science communication is supposed to inform about new developments and initiate critical thinking on the part of the recipient. The naively held assumption that social media platforms are neutral intermediates has been shattered since Facebook has (though indirectly) admitted its active influence on 'trending news'.⁸ This information has been aggravated by a growing suspicion that about 20% of all Twitter users are machines, so-called social bots. While usually applied to spread political propaganda or commercial advertisement, given the interests involved in science communication there is no reason to believe that such bots could not be put to use in this realm as well.

There are some derivative problems with social media in science communication. The almost unlimited access to the medium and the hitherto complete lack of a quality control raise the question of trust in the medium/channel, apart from the issue of trust in the source [Metzger et al., 2003]. As social media also become the most important source of information about science [Brossard, 2013], one can hypothesize that the technology does not interfere with the credibility of the message as long as the source is known and considered credible. When scientists increasingly use social media to keep informed about progress in their field, they usually know who the sources of that information are. For the layman to distinguish between fact and opinion in reading a blog, or the press release of a research institute, or the glossy magazine of a university's PR department, is already much more difficult and often impossible. "Not knowing the source of information or its intent makes it difficult to know whether to trust it" [Metzger et al., 2003, p. 295]. To put it more generally: if the 'contemporary media environment' is characterized by the disappearance of trusted gatekeepers who used to have the task of quality control as well as by the "convergence of genres of information, particularly the blending of advertising and informational content" [Metzger et al., 2003, p. 295], neither trust in the medium nor credibility of the

⁸See Mark Zuckerberg on Facebook [Isaac, 2016]. Following Kohring and Matthes [2007], trust in news media (and journalism) is actually the trust in specific selections. Transferred to trust in social media, selectivity should generally be under question.

message is likely to occur. Credibility of communication and trust in the communicator are highly important in connection with science, arguably even more important than in any other area of social life.

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