Expert Imagination

by Giovanni Carrada

Trust and a favourable "big picture" are essential to good scientific communication.

Professional science communication is undergoing a period of crisis. It was born as a tool to ease acceptance of technologies which had become controversial, or to improve the scientific and technical literacy necessary in a modern economy. The results, as we all know, have been poor at best.

For quite a long time, the consensus was that these problems are due to a lack of "public understanding of science", that is, of scientific knowledge, theories and methods. If only these were translated from specialist terminology into popular language and widely disseminated, controversies would automatically resolve themselves. The public was considered to be a homogeneous and passive audience for the "pure" knowledge produced by scientists or technologists.

This rather simplistic approach to the relationship between science and society, and, therefore, to the communication of science, has shown clear signs of its shortcomings. Transforming citizens into "little molecular biologists" or "little statisticians" is a far more difficult task than can be imagined, and for two good reasons. First, people would need to know too much. In order to understand the possible risks of electromagnetic fields, for example, one should become familiar with electromagnetic radiation, its interactions with living cells, and heaps of epidemiological research. How many areas of expertise should a citizen have to master? The second reason is the lack of sufficient motivation. How many people are willing to invest the time and effort necessary to get a good scientific education?

The idea of changing citizens into little scientists could also turn out to be useless. If we look at survey results, we see no clear correlation between the level of scientific literacy and attitudes and opinions on controversial science or technology.

Establishing a Relationship

After being a label for every type of initiative launched by the scientific community for the general public, public understanding of science is now definitely out of fashion. Today, experts prefer to talk about engagement, bi-directionality, public debate and, above all, dialoguing. The communication of science is no longer simple dissemination.

However, in order to remain an authorative voice, science (or industry) has to keep society's trust, which is obtained through reciprocal understanding and not simple statements of facts, no matter how incontrovertible they are, let alone statements of authority. Instead of asking only "what do people need to know," we should ask "what do people think they need to know," "what will be the effect on people of what we want to say ," "what do they know, or think they already know."

Dialogue is of course a good thing, because communication is not about transferring information from one party to another, but about establishing a relationship. In fact, even more important than the information being exchanged is the quality (patronizing, neutral, personal, empathic, etc.) of the exchange.

Before talking, therefore, we must listen. Not just through opinion polls, but also through the general press, public debates, meetings, even small talk. To make ourselves understood, we must first understand.

Listening and dialoguing are also excellent ways to avoid the so-called "curse of knowledge", the difficulty for experts to see something as all other people might see it and therefore to make themselves understood.

Listening to the public is essential but not enough. Dialogue is useful but often impractical. Maybe the time has come for science and technology communication to take one big step further.

The Power of the Big Picture

The public understanding of science needs the support of a higher level of understanding. We may call it the understanding of the big picture, as opposed to the many scientific and technological facts and details.

In fact, we all primarily understand the world in terms of big narratives, also referred to as public representations, framing, or metaphors. Only at a secondary level are we willing to examine the technical details. A few examples: are cloned animals dangerous because human cloning is bad? Are silicone breast implants dangerous because they are immoral? Never mind what the truth is: in public debates all that has consequences is real.

Before (or instead of) considering the technical details, we often make a judgment on the basis of the big picture we have in mind. Indeed, there is a clear hierarchy between the two levels: the big picture prevails on the technical picture because it is the shortcut our mind tends to take whenever we don't have all the necessary information and expertise. And the less time and less expertise we have, the more we rely on the big picture.

There is also a difference in literary genre between big pictures and traditional science communication: the former are stories, the latter usually have the form of the essay.

A story is the most natural way to absorb information: it is engaging, it fires the imagination, it is easy to remember and makes you act. An essay, on the other hand, though better suited to exchange information, is an unnatural way to communicate. It requires an effort from the public and is often cold and abstract.

In professional science communication we tend to concentrate only on the second level and its associated genre, as if the first one, i.e., the big picture, were not "science communication". Therefore, we often forget to work on, update or change the big narrative of our field, and limit ourselves to the narrower, honest and apparently safer work of explaining facts. The problem is that if the big picture is negative, or just not interesting, we don't get the public's attention in the first place, or we get a negative attention, thus compromising any further understanding.

Sharing a Future

Nuclear power has a very big "big picture", and not the most positive one. It's made of the Bomb, green movements of the 1970s, Chernobyl, technocratic industries and behemoth public administrations. It takes a big communication effort to change a big picture, but a top-down communication strategy is an illusion on both practical and political grounds and luckily, it cannot be done in a mature democratic society. It may also easily backfire.

What you need is a new vision capable of spreading itself through a bottom-up, self-sustaining process. If you can craft a good vision, it will stimulate other people to join your communication effort. Just think about information technology and the army of enthusiastic evangelista it has always effortlessly recruited. This is good for democratic public debate and credibility and multiplies the communication effort. That is, after all, what public relations is all about. It also makes traditional science communication — explaining scientific and technological details — more effective.

Visions, however, cannot be imposed. Besides considering what the technology can deliver, a good vision is just the right interpretation of the stakeholders' material, economic, social, psychological and moral needs. That is why a good vision must go beyond the cold idea of the future that is typical of the technology forecaster, and should let people understand how they can contribute to shape their own future.

In order to craft a good vision, you need to listen and engage in dialogue, but, first of all, you need imagination. A vision is not something that the public can suggest, it is a vivid new story that does not exist yet and must be invented.

In technology, a good vision must be both bold and realistic. Science is difficult to muster, and the most interesting and exciting visions are to be found in the experts' minds. That is why we need expert imagination. We should look for it in the professional community, though outside the mainstream, probably in the younger generations. In people, who usually have little voice in big organizations. But who knows, things may change.

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Science y Tapas by Giovanni Verlini

Barcelona, Spain — "Science for a better life" was the theme of the 2008 Euroscience Open Forum (ESOF), during which the future of nuclear power and the importance of research in the nuclear field was also debated.

"Be it in the development of fusion as a source of energy or in technological advances in fission, it is essential that research in the nuclear sector carries on," said Friedrich Wagner, President of the European Physical Society.

Wagner's view was echoed by Dr. David Ward, a researcher working on fusion at the United Kingdom Atomic Energy Authority in Culham. He pointed to the fact that current investments in energy research and developments (R&D) only amount to the equivalent of less than 0.1 per cent of the energy market value. "Without putting more resources into R&D, we will never reduce our reliance on fossil fuels," he commented.

ESOF 2008 attracted some 4000 participants.

(Credit: ESOF 2008)

The call for renewed investments and efforts in nuclear research came as Sir David King, the former UK Chief Scientific Advisor and conference keynote speaker, warned participants that energy security will become a key factor in tackling the population growth problem, which he described as mankind's main challenge for the 21st century.

"This population explosion will present a series of interconnected challenges that are qualitatively different from those facing humanity at the start of the twentieth century - ranging from food and energy security to increased terrorism and the impacts of climate change," he said.

Two panel sessions organized by the UK´s Institute of Physics looked at future prospects for fission and fusion technologies in Europe and beyond.

Dr. William Nuttall, Senior Lecturer in Technology Policy at Judge Business School, University of Cambridge, spoke of the need for smaller nuclear plants that are cheaper and more flexible to develop as a way to address nuclear's weak points, i.e., high capital costs and lengthy construction times. He noted that Russian plans for a floating nuclear power station, and the Pebble Bed Modular Reactor being developed in South Africa are two examples of nuclear research going in the right direction.

Speaking at a session entitled *Fusion — Will It Always Be 40 Years Away?*, David Campbell, Assistant Deputy Director General for Fusion Science and Technology for the ITER project, illustrated the likely timetable for fusion power development. He said that, according to plans, the experimental, multinational ITER facility to be built in Caradache, France, is expected to be up and running by 2018. After an estimated 20 years of testing, a model fusion reactor called DEMO will then be built, thus inaugurating the era of fusion power.

It might be 40 years or longer before nuclear fusion makes a significant contribution to the world´s energy needs, but if it can be demonstrated that nuclear fusion for power generation is possible, safe and competitively priced it will have been worth the wait, he said.

A conference session was also dedicated to illicit nuclear trafficking and the threat of nuclear terrorism. "Illicit trafficking of nuclear and other radioactive materials and the threat of nuclear terrorism are reasons for serious concern," said Gabriele Tamborini of the European Commission's Joint Research Centre Institute for Transuranium Elements (JRC-ITU).

"Nuclear forensics may provide information on the history, the intended use and possibly on the origin of nuclear material. This scientific discipline is at the interface between physical science, prosecution, non-proliferation and counter terrorism," he added. Tools and tactics that enable teams of atom detectives to do their job have changed profoundly over the last few years.

The IAEA´s Diane Fischer, a senior safeguards analyst, addressed the tools used to detect undeclared nuclear activities, notably environmental sampling techniques. "Today we can say that environmental sampling is key to nuclear forensics," she said. The role of intelligence and international cooperation, however, was also emphasized by the experts taking part in the panel.

ESOF 2008, Europe`s largest interdisciplinary scientific gathering attracted some 4000 scientists, researchers, policy makers and journalists, in Barcelona, Spain, from 18-22 July 2008.