How Can Science Be More Democratic?

From the Scientific Revolution to Public Participation and Knowledge Co-Production

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Abstract

In this paper, I question the relations between ‹universal› knowledge produced by the scientific community and the local or specific knowledge of citizens, concerned groups, or society at large. I ask how science—and technology—can contribute to what I consider a major universal value: democracy. Starting our journey with the ‹experimental life› emerging in the seventeenth century with the invention of the laboratory, I then describe the standard norms that are supposed to produce the ‹scientific ethos›. I discuss some recent transformations of the relationship between science and society, as well as the conceptions and tools the actors have used during the last thirty years in order to deal with these issues. Briefly, these conceptions have gone from better communication to knowledge co-production. I conclude by presenting some contemporary challenges the academic community has to face in order to maintain science as a common good and to reinforce democracy.

1. Foreword—from where am I speaking?

This paper is a mixture of theoretical and empirical elements based on my current research and on my daily work in the field of public engagement with science. It is also based on my involvement in the domain of participatory technology assessment (pTA) as an expert for the Swiss Centre for Technology Assessment (TA-SWISS)[1] and as the Swiss partner of the European project Citizen Participation in Science and Technology (CIPAST)[2].

I first studied and practiced biology, then sociology. My specialisation is in the field of sociology of science, more often called Social Studies of

Science, or STS, in the academic world. For six years, I have been head of a department called the Science-Society Interface[3] at the University of Lausanne, which is in charge of fostering dialogue between science and the public. For us, ‹science› includes the natural sciences as well as the social sciences and the humanities. ‹The public› means the ‹average citizen›, school pupils, as well as concerned groups like patient organisations or NGOs.

We use many different forms of collaboration and other means in order to achieve our goals: forums, workshops, scientific cafés, conferences, exhibitions, continuous training, and interdisciplinary research. Three years ago, we created a public laboratory called «L'Eprouvette» (The Test Tube), where thousands of people have come every year to experiment on their own and discuss the issues of molecular biology, neuroscience or animal behaviour.

2. Introduction—science[4] and the universal

In this paper, I will discuss the question of how ‹universal› knowledge produced by the scientific community can be linked with the local or specific knowledge of citizens, concerned groups, or society at large. In other words, how science—and technology—can contribute to what I consider to be a major universal value: democracy.

It is quite common to think of the scientific revolution that took place in the sixteenth and seventeenth centuries as the advent of a new kind of universality: a universality stemming from the power of mathematics and the invention of the ‹modern› laboratory where undisputed facts can be produced and reproduced under the gaze of scientific peers. Two historical figures exemplify this major transformation: Galileo Galilei in Italy and Robert Boyle in England.

2.1. Experimental life and the emerging scientific ethos

In their major book *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*, Steve Shapin and Simon Schaffer describe how experimental philosophers around 1650 invented a new way of producing truth using the laboratory setting:

> Boyle proposed that matters of fact be established by the aggregation of individuals' *beliefs*. Members of an intellectual collective had mutually to assure themselves and others that belief in an empirical experience was warranted. […] If that experience could be extended to many, and in principle to all men, then the result could be constituted as a matter of fact. In this way, the matter of fact is to be seen as both an episte-

> mological and a social category. The foundational item of experimental knowledge, and of what counted as properly grounded knowledge generally, was an artifact of communication and whatever social forms were deemed necessary to sustain and enhance communication. […] The establishment of matters of fact in Boyle's experimental programme utilized three *technologies*: a *material technology* embedded in the construction and operation of the air-pump; a *literary technology* by means of which the phenomena produced by the pump were made known to those who were not direct witnesses; and a *social technology* that incorporated the conventions experimental philosophers should use in dealing with each other and considering knowledge-claims.
> Shapin/ Schaffer 1985, p. 25

This configuration of practices, the «experimental life», can still be observed in the contemporary scientific ethos. Of course, a lot of transformations have occurred since the launch of the ancestor of modern scientific journals, *The Philosophical Transactions*, by the British Royal Society in 1665. For example, you do not have to qualify as a gentleman anymore in order to enter the scientific community. The emerging modern laboratory was conceived by Boyle and his colleagues as a machine to produce a universal consensus about facts; it also offered a model for society as a whole for pacifying political, theological and philosophical conflicts among religious factions or for resolving disputes resulting from other knowledge production practices of the time like alchemy. According to this new approach to nature, the use of the laboratory allows to distinguish facts from values, science from mere opinions.

2.2. The Mertonian vision of science

Within modernity, a link between the scientific ethos and universality can be found in the famous paper published by Robert K. Merton in 1942 entitled *The Normative Structure of Science*, re-issued in 1973 in an anthology of the work of this famous American sociologist (Merton 1973). In this text, Merton defines the four norms of scientific practice. Norms are institutional imperatives which reward the members of a community who follow them and sanction those who violate them. For any norm, we can symmetrically define an anti-norm.

Merton called the first norm *disinterestedness* (vs. interestedness), which demands scientists to disengage their interests from their actions and judgments. They must report results fully, no matter what theory those results support. Disinterestedness must rule out fraud, such as reporting fabricated data; so, according to this principle, fraud should be rare in science. The second one is *organised scepticism* (vs. dogmatism), which means that the scientific community tends to disbelieve new ideas until they have been well established. It is implemented at two levels: direct and public questioning of the proponent, and reserved judgment on new claims, accompanied by attempts to duplicate experiments. So, it encompasses the famous «falsification criteria» established by Karl Popper to separate scientific claims from other practices asking for legitimacy, like psychoanalysis.

Then comes the norm of *communism* or *communalism* (vs. individualism). Knowledge—the central product of science—is commonly owned. Results should be publicised in order to allow scientific achievements to be produced cumulatively; science is a social and public activity, which again tends to ensure infrequency of fraud. Finally, there is the norm of *universalism* (vs. particularism), which states that the criteria used to evaluate a scientific claim do not depend upon the identity of the person making the claim, be it race, nationality, religion, class, sex, or other personal qualities. These criteria stress the impersonal character of scientific laws.

Even though the Mertonian vision of scientific practice has been widely criticised, especially by the ‹new› sociology of science, which has developed since the 1970s, it nevertheless represents an inescapable reference point in the debate on the scientific ethos and the infringements it may be subject to. Observers of the dynamics of science have demonstrated that those norms are no more than an ideal-type, or as some would say, a myth. The growing interest in and deontological reflection about scientific misconduct and means to detect and sanction it stand at the centre of this problem. As far as the norm of universality is concerned, empirical studies have shown, for example, that scientific journals and their peer review system do not consider claims made by researchers of different status or age in the same way.

2.3. Public Understanding of Science: the «deficit model»

Since science presents itself as a universal quest for hard facts and truth, it must also demonstrate, as a consequence, that any individual, whatever its social status and profession, must be able to understand and accept its results. This conception can be traced back from the eighteenth century through the Enlightenment and the nineteenth century, as the golden age of progress, to our present time. The nineteenth century was characterised by a major expansion in the popularisation of science. In the social contract established between science and society, a great deal of autonomy was conceded to the former in exchange for economic prosperity, which was supposed to flow out of technological innovation. The advancement of science was to automatically translate into progress via technology. As soon as the notion of progress began to be contested in the second part of the twentieth century, mainly triggered by the unfolding environmental crisis and the advent of the so-called «risk society» (Beck 1992), the institutions in charge of producing scientific knowledge tried to develop strategies to contain emerging distrust in the ‹universal› virtues of science and progress, which was viewed to pose a threat to national prosperity.

The most systematic effort to that effect has probably been the *Public Understanding of Science* (PUS) approach by The Royal Society in the UK. It is an exemplary response from the scientific institutions to what has been interpreted as a growing ‹gap› between science and society, which was first documented by surveys and reports in the 1980s. In their well-known and widely disseminated document published in 1985, The Royal Society states:

> A basic thesis of this report is that the better public understanding of science can be a major element in promoting national prosperity, in raising the quality of public and private decision-making and in enriching the life of the individual. […] Improving the public understanding of science is an investment in the future, not a luxury to be indulged in if and when resources allow.
> The Royal Society 1985, p. 9

Here is a list of some of the main benefits expected from PUS:

- to facilitate national prosperity (competent decision-makers and skilled manpower);
- to reduce hostility and indifference to S&T;
- to favour adequate personal and ‹lifestyle› decisions (diet, smoking, vaccination, safety at home and at work, etc.);
- to help people resist pseudo-scientific information (alternative medicine, beliefs in pseudo-sciences);
- to improve understanding of the technologies used in everyday life;
- to enhance understanding of the nature of risks, uncertainties and probabilities, to ensure more rational behaviour (averting demands for a ‹zero risk› society and increasing acceptance of technical options, such as vaccination, nuclear power stations, seat belts in cars, medical screening, etc.);
- to facilitate cultural assimilation of scientific findings (evolutionary biology, cosmology).

To achieve those goals, PUS promoters recommend many changes in the domains of education, political institutions, the media, industry and the scientific community. To assess the level of ‹scientific literacy› of the population, according to its proponents, PUS should ask the social sciences to conduct surveys on a regular basis. In this construct, an undifferentiated entity called ‹the public› has to be educated and informed to create a more favourable environment in support of innovation and to reduce social resistance to technology. A detailed critique of this asymmetrical vision of the relationship between science and society has been developed in the UK at the «Lancaster School», led by researchers like Bryan Wynne (Irwin/ Wynne 1996). They aptly sum up their view of PUS by qualifying it as a «deficit model», in which laypeople are conceived as passive receptors of information to whom the institutions—be they universities, research centres, mass media, museums or schools—are supposed to provide education.

Any rigorous attempt to tackle the complex issue of the relationship between science and the public should ask the following questions, which are taken for granted by the PUS approach: What constitutes the public we are talking about? What do people mean by ‹science›? What do we mean by ‹understanding›? Those questions must be subjected to thorough empirical investigation, and answers should not be merely based on assumptions made by decision-makers and communicators. At the same time, these questions raise complex sociological, political and ethical issues. As Irwin and Wynne (1996) propose, a more symmetrical perspective would, for example, simultaneously investigate the Public*s*' Understanding of Science*s* and Scientists' Understanding of the Public*s*. What do people mean by ‹science› and ‹scientific expertise›? To whom do they turn to get technical information and advice? What motivates them to do so? How do they select, evaluate and use scientific information? How do they relate expert advice to their everyday experience and to other forms of knowledge?

If science can indeed be considered as a common good, those different critiques are of major interest to the issue raised in this paper concerning the contribution of science to the universal value of democracy.

3. Public engagement with science and the plurality of knowledge

It is common nowadays to speak of a *deliberative* or *participatory turn* (Blondiaux/ Sintomer 2002) in science and technology, or to invoke a move towards *public engagement* in science and technology policy. This situation is itself the result of a complex process involving a changing perception of the ability of representative democracy to address scientific and technological issues. The role of experts and decision-makers in the environmental crisis and in risk assessment and management has raised many controversies. In this context, the controversy about GM crops and food has been a major turning point, since it has provided a frame of reference for both public and private actors; a kind of ‹worst case› to be avoided for the next technologies to come. Learning from the GMOs controversy and moving towards an ‹upstream engagement› with society becomes a master narrative of current public policies. This rhetoric plays a key role in the way private companies and public actors conceive for instance the development of nanotechnology.

The irruption of ‹concerned groups› producing counter-expertise in the domains of environment and biomedical sciences has also played a critical role in promoting a kind of «scientific citizenship» (Rose/ Novas 2005). It sometimes involves knowledge ‹co-production› in which scientists, experts, and laypeople collaborate closely to produce knowledge and solutions to common problems (Callon 1999, Kleinman 2000, Leach et al. 2007). In the Northern hemisphere, some striking and emblematic examples in this respect are the impact of patient organisations on the dynamics of AIDS research and treatment (Dodier 2003, Epstein 1996), activities of the French Muscular Dystrophy Association (Kaufmann 2004, Rabeharisoa/ Callon 1999), and the French initiative CRIIRAD, which provides counter-expertise aimed at measuring nuclear radiation after the Chernobyl accident. In the South, many farmers' organisations have for example brought their local practices and knowledge to bear in opposition against the introduction of GM crops, sometimes succeeding in stopping projects scheduled by local governments and private companies (Wakeford 2004).

The implementation of technology assessment (TA) can be viewed as a consequence of this multi-faceted process. It is useful to distinguish two kinds of TA (Hennen et al. 2004). On the one hand, there is ‹classical TA›, born in the United States and established in form of the well-known Office of Technology Assessment (OTA) (1972–1995). According to this version of TA, TA institutions are supposed to subject the issue at stake to scientific analysis and deliver unbiased and comprehensive knowledge about the technical, legal, ethical and policy aspects to policy-makers. This kind of work can be seen as a peculiar type of expertise in which the final output is a written report. On the other hand, there is ‹public TA› or ‹participatory TA› (pTA), which emerged at the end of the 1980s and gave rise to the well-known consensus conferences developed by the Danish Board of Technology. Here, the process is not only expected to produce useful knowledge, but also to induce a communicative and participatory process in order to contribute to opinion formation by simulating a public sphere corresponding to a kind of Habermasian ideal.

3.1. Why public engagement?

Any attempt to discuss virtues and limits of public participation should start by presenting the arguments that justify public engagement as a worthwhile endeavour. According to Fiorino's assessment of different institutional mechanisms of citizen participation in risk issues (Fiorino 1990), three types of arguments are used to overcome the usual limitations of the technocratic approach to science and technology policy. The first is a *substantive*, or say an *epistemic* argument. It says that laypeople may produce knowledge and may identify solutions to problems complementing expert knowledge. To put it in the language of the economists, participation is seen as a way to deal with the ‹limited rationality› of each type of actor involved. ‹Popular epidemiology› may be viewed as an emblematic case in this respect. Popular epidemiology «is a process by which laypersons gather scientific data and other information to direct and marshal the knowledge and resources of experts to understand the epidemiology of disease» (Brown/ Mikkelsen 1990, pp. 125–126). This argument corresponds to what Callon (1999) put under the umbrella of *knowledge co-production*.

Fiorino brings in a second argument, a *normative* one. It says that in a democratic regime citizens are the best judges of their own interests and must therefore be allowed to have a voice in technological or scientific decisions that can affect their lives or threaten their community. Fung (2006) uses similar arguments speaking of a criterion of *justice* close to the notion of *empowerment*.

A third argument can be qualified as *instrumental*. It relates to a loss of legitimacy of political decision-making. But this context of distrust towards politics and the political class is, at the same time, one of decrease of concern and involvement of citizens in public affairs. The same point is made by Fung (2006) who also insists on legitimacy, yet also emphasises the criterion of *effectiveness* in the governance of public affairs.

3.2. Varieties of public engagement and hybrid forums

Smith (1983) defines public participation as a group of procedures designed to consult, involve, and inform the public to allow those affected by a decision to have an input into that decision. In an attempt to establish a more precise definition of the concept of ‹participation›, Rowe and Frewer (2005) have proposed a typology of the different public engagement mechanisms. Dealing with a fuzzy literature in a blurry landscape, this preliminary though necessary endeavour has identified more than one hundred different methods! They first distinguish three broad categories of public engagement mechanisms.

The first category is of *public communication*: information is conveyed from the organiser or ‹sponsor›—usually a governmental or regulatory agency—to the public. The information flow is one-way: the public listens and gives no feedback on what is communicated. This category is of course very close to the Public Understanding of Science approach and can be compared to what Callon (1999) calls the *model of public education (de* *l'instruction publique)*. It draws together mechanisms such as TV broadcasts, conferences, hotlines, web pages, leaflets, etc.

The second category is of *public consultation*: information is conveyed from members of the public back to the organiser of the initiative. In this situation, the sponsor is ‹listening› to the public and its opinion. This category comprises mechanisms such as public hearings, surveys, focus groups, etc.

According to the authors, only the third category can be characterised as fair *public participation*: information is exchanged between members of the public and the organisers. This means that such devices involve a real dialogue between the parties, aiming at informing, as well as negotiating, and thus at changing the opinions and the framing of the issue at stake (Kaufmann et al. 2004). This category comprises mechanisms such as citizens' juries, citizens' and consensus conferences, planning cells, decisional referenda, etc. It can be partly compared to what Callon (1999) has defined as the *public debate model*. Detailed presentations of the different methods and their use can be found in Gastil/ Levine 2005 and Joss/ Bellucci 2002.

However, a typology based on the theory of communication and procedural criteria is incomplete without cross-examination against ‹dialogical› criteria. Scientific knowledge and technological innovation usually imply a *double delegation* of power: the delegation to political representatives to decide in the name of the citizenry, and, too often kept implicit, the delegation to scientists, experts, and technologists, to find solutions (Callon/ Lascoumes/ Barthe 2001). These two delegations can be put into question within hybrid forums, whatever the form: a public meeting, a consensus conference, or a public controversy at large. Hybrid forums are open spaces where mobilised groups can debate socio-technical choices which affect them. The groups are heterogeneous; they may include experts, elected representatives, technicians, activists, NGOs, and concerned laypersons. The questions at stake and the problems raised imply heterogeneous knowledge and practices (id., p. 36). Note that hybrid forums emerge either spontaneously as public controversies or as organised procedures by stakeholders or the authorities.

The most important change in the public sphere, often referred to as the ‹deliberative or participatory turn›, is probably not just the direct participation of non-experts and citizens. This change cannot be understood, nor can it happen, without the other complementary reforms, namely greater transparency in expertise, as opposed to the long time tradition of «confinement of expertise» (Callon/ Lascoumes/ Barthe 2001), and greater pluralism of the interests represented in expert commissions and decision-making processes. In our view, participation and deliberation is directly linked to this reform of expertise and accountability.

4. Science: a public good under assault

Historically, as mentioned above, scientific knowledge has emerged as a public good. For society to benefit from it, science had to be protected against private and selfish interests. Since the nineteenth century, a ‹social contract› has been established between science and society: scientists are granted extensive autonomy premised on the assumption that scientific knowledge allows industry and the market to develop useful innovations leading to increasing prosperity in return. The French historian of science Dominique Pestre has introduced the enlightening concept of *Regime of science production and regulation* (Pestre 2003). This is a very useful framework for investigating and describing the socio-historical transformations of the relationship between science and society since the scientific revolution.

The author insists on the fact that what is put under the umbrella of ‹science› has not been a stable and clearly circumscribed object along history. Science, or more precisely ‹the sciences› are made up of a complex web of relations involving different kinds of productions (writings, results, techniques), practices (instruments, calculations, simulations), values and norms (epistemological, ethical, behavioural), institutional realities (universities, engineering schools, laboratories, ‹start-ups›), modes of sociability (‹salons› of the eighteenth century, amateur scientists, learned societies), economic and legal elements (technology transfer, intellectual property rights, financing modes), etc.

The fact that those elements combine in different ways along history is crucial; specific regimes can be identified for a given period of time. According to Pestre, a new regime has been established over the last three decades, namely, since about 1970, «we moved from a system of science in society dominated by an equilibrium between science as *public good* and science as *industrial good* to a system in which a financial and market-oriented appropriation of scientific knowledge is now in the ascendant, to science as mainly a *financial good*. This mode of appropriation is both larger in what it includes and rooted in an aggressive extension of property rights […]» (Pestre 2005, p. 29)

This tendency has experienced a major impetus with the advent of modern biotechnology at the end of the 1970s, later followed by developments in genomics and the patenting of DNA sequences. This situation strongly impacts on the worldwide controversy about GM plants and their patented genetic constructions. For a majority of European public opinion, and this is true for several countries of the South as well, this technology, first presented as an emblem of ‹the green revolution› in agriculture, rapidly became a market-driven innovation void of any benefit other than raising large companies' profits. The situation resembles that of the AIDS pandemic or orphan diseases like malaria in the South, which also triggered large social movements and raised criticism of pharmaceutical companies and their research and patenting policy. Accusations of biopiracy are made against companies exploring the South in quest of new molecules in plants or bacteria, or genes in populations affected by rare genetic diseases, in order to find potential treatments to cure the North. This practice has been considered by some as a new kind of colonialism: a scientific one.

Those controversies are key to the issue of scientific knowledge considered as a universal public good. Science can be threatened by private interests and may sometimes become a mere commodity to be exchanged on world markets.

5. Conclusion: science and democracy in a globalised world

I hope this short and somewhat simplistic journey from the scientific revolution to the present offers a better idea of some of the major difficulties science has to face in order to contribute to the universal value of democracy. Those challenges are tackled by authors like Bruno Latour and Isabelle Stengers at the philosophical and anthropological level. They are trying to develop new ways of thinking in order to imagine a «common world» (Latour 1999) or to found an «ecology of practices» (Stengers 2006) in which natural sciences, philosophy, sociology, politics and other worldviews like religion could coexist without disqualifying one another. This effort to find the adequate conditions and institutions for debating different ‹modes of existence› of human and non-human entities (molecules, viruses, plants, animals, atmosphere, oceans, mountains) can be viewed as a new kind of ‹diplomacy› in search of the suitable institutions. Using Stengers's poetical book title, one can ask: how can we design a society in which theological knowledge and social practices necessary to allow the Virgin Mary to appear to pilgrims can peacefully coexist with the ethos, instruments and theories required to make the neutrino become visible to physicists?

As noticed by Stengers, it is not easy to accommodate the ‹universal› claims of science to other kinds of worldviews and local practices, since science presents itself with the following triple-identity: «as the drive for human progress, as the direct and anonymous translation of a definitely rational knowledge production mode, and as the fabric of something that cannot avoid opposing opinions, inertia, habits and traditional values» (Stengers 2006, p. 112). I think that public participation in science and technology or co-production of knowledge can contribute to making science and technology open up to the realm of democracy (Bourg/ Kaufmann

2007). In my view, democracy represents a universal value to which science must contribute by engaging with laypeople, local communities and concerned groups. The European project Citizen Participation in Science and Technology (CIPAST), in which my department is involved as the Swiss partner, is an interesting effort to disseminate participatory procedures throughout Europe and beyond. It aims at building an international network of experts and providing capacity building support to universities, public agencies, NGOs, museums or private companies who want to implement participation in their specific contexts.[5]

Of course, this is not an easy task and we must not be naïve about the virtues of public engagement with science, be it participation or knowledge co-production. As Pestre says, echoing Beck, «decision-making in market democracies depends on a far greater variety of logics than *debate and expertise alone*. […] The sphere of the political is perhaps not *so central* to decision-making because decisions of major importance, in social and environmental terms, are constantly taken ‹on markets›. […] The main actors of the world economy today constitute a meta-power largely dissociated from the sphere of the political. Their strength resides in their capacity to *do* things, to invest where they deem appropriate, and to pull out of any country that contests their approach.» (Pestre 2005, pp. 49–50)

5.1. Political ecology as a new universalism?

The emergence of the environmental crisis and the threat it represents to the future of humankind and the market economy implies a radical shift in perspective on the relations between science and society. The advent of the precautionary principle and the necessity to deal with increasing uncertainties, be they scientific, social or ethical, offer a unique opportunity to negotiate a new contract between scientific knowledge and universal values. Franklin, Lury, and Stacey, analysing the anthropological impact of the photograph of our planet taken by Apollo at the end of the 1960s, show that it represents the dawn of an emergent universalism they call *panhumanity*:

> Panhumanity is united not only by a shared human nature, or family tree, but by a shared culture, composed of images such as the blue planet which convey a sense of vulnerability and risk. The image of the blue planet is thus both a transformative image in its own right, and an icon of an era defined by the «altered consciousness» of the panoptical, heavenly gaze which captures the planet as glowing blue orb. […] Panhumanity is thus defined by a mixture of pride in technological achievement and simultaneous appreciation of its associated risk. […] The counter-icon to the blue planet that has shaped postwar consciousness is the image of the huge mushroom-cloud explosion of the Hiroshima bomb—the atomic threat that could destroy humanity on a global scale.
> Franklin et al. 2000, pp. 30–31

This small place, lost in space, can be seen as a metaphorical *hybrid forum*, made of human and non-human entities, in need of a global political ecology with the appropriate tools and institutions, which are imagined in their complexities in the current work of Bruno Latour (1999).

5.2. Academics and the new universalism: linking universities to civil society

Even if the scientific ethos has emerged as the dominant form of universality in the modern world, it is time for academics to realise that the validity of a paternalistic vision like the Public Understanding of Science is no longer defensible. This kind of approach tends to disqualify laypeople and their local knowledge, and to introduce artificial distinctions between facts and values, science and opinion. The initial social contract between science and society, safeguarding the autonomy of the scientific community in distance to the people, must now be re-assessed. The growing incentives provided to universities to seek funding from industry could endanger this independence and ‹the commons› produced by public research institutions. Incentives should also be provided for research bodies to co-operate with local communities, citizens, and NGOs. That means that part of the research budget from universities should be devoted to investigating topics stemming from social demand. Building such partnerships and links with civil society could be a crucial resource for academics to maintain their beloved autonomy and independence from purely market-oriented research.

At the University of Lausanne, for example, we have launched a new project called «Living Together in Uncertainty» («Vivre Ensemble dans l'Incertain») in 2007. We have conducted an inquiry among the people of our region—the Canton de Vaud—using in-depth interviews and focus groups in order to document their visions of the future and the role their university could play. The results have been discussed and further elaborated in a forum composed of about sixty people representing most sectors of the society: politics, science, religion, culture, sports, industry and the media.[6] On this basis, we will identify themes for new research projects, which will be conducted in the years to come, in partnership with local concerned groups and other actors. Like the science-shop movement, this kind of endeavour certainly represents a kind of ‹cultural revolution› for the academic world. Yet my bet is that besides the criteria of excellence and competitiveness, this trend could progressively become an important endeavour of universities, in order to ensure a sustainable future for public research, its credibility and independence.

Notes

[*] French quotes have been translated by the author.
[1] See http://www.ta-swiss.ch.
[2] See http://www.cipast.org.
[3] See http://www.unil.ch/interface.
[4] In order to avoid any anachronism, I use the term «science». But the reader ought to bear in mind that, in doing so, I will often also refer to technology, or what is called «techno-science». This is especially true today, science and technology being so much interconnected. According to the usual practice of English, I will most often use the word «science» in its singular form. But the reader has to be aware that I am talking about «the sciences», in their diversity, in terms of practices and worldviews.
[5] All information about the project, a database of participatory processes and the training tools (case studies in various scientific and technological domains, background documents) are available on http://www.cipast.org.
[6] Detailed information about the project and all the reports can be downloaded at http://www.unil.ch/vei.

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