Amateur Versus Professionals: Politics, Citizenship and Science

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Abstract

Scientific and technological expertise is currently experiencing a crisis. The public shows a growing distrust in many aspects related to the techno-scientific development. The birth of that suspicion begins after World War II but has transformed in the past few decades. In this paper, the authors examine how that doubt has specific features in the present moment. Also, there is a reaction to propose another way to make scientific and technological research where there is a more participative spirit. These changes reshape traditional ideas on science, technology and progress. Amateur efforts in science and technology maybe are opening the possibility of a change for these activities and information technology seems to support these efforts. If these can be considered, a consistent trend is difficult to predict.

Distrust knowledge!

2nd World War showed what unleashed scientific and technological development could produce. Reactions among intellectuals, scientists and technicians produced at least some more cautionary approach to this endeavor. Pughwash movement, environmentalists, STS activism, consumer's associations and academic work among others count as more reflexive ways to deal with something that improved human condition but at the same time threatened the existence of human species itself. Conviction that progress does not happen spontaneously become more and more accepted. But last decades have changed in an important way. Take for instance the pertinence of STS studies. In 1994 Ivan Illich, one of the most important thinkers in this field, suggested that STS programs had no reason any longer. The rationale for that claim was based in different arguments. First activism abandoned STS a long ago. Every university, college or higher education institution had a STS program already so there was little room for activism since STS was transformed into an academic question (Duden, 2003). Main goal for STS also was achieved; there is a general distrust for Science and Technology among the public but at the same time the idea we do not have more opportunities than those given by Science and

Technology themselves. Illich characterized for foreseeing future scenarios such as education and lack of proportion in our technological society. And some facts seem to support his claims. An interesting survey made by the European Union (Euro barometer) showed how Europeans distrust biotechnology in a significant degree: 54 % of Europeans consider that those technologies will not improve their lives. Also about 90% of the Europeans believe that we are about to confront a deep environmental crisis and we are feeding the problem with present consumption system. There is a vast array of technologies that create concern among the public: reproduction technologies, bioengineering and genetic modified organism, pollutants, nanotechnologies, relaunched nuclear energy programs and so on. There is a diffused and general idea that we will confront new problems according to the emergence of new technologies. So progress and wellbeing is not something that happens automatically. But somehow it seems effortless to fight against those facts. The same way there is something as a diffuse environmental worry everywhere also there is the conviction that science and technological advancements do not translate into a promising future.

Experts are under suspicion, many cases have revealed a lack of honesty or accuracy and science and technologies are seen more a more as the first place where problems take place. Chernobyl for instance is one of these paradigmatic cases in the public mentality. The idea that nuclear risks could be managed vanished in 1986. Chernobyl polluted more than Nagasaki and Hiroshima bombs together and the core of one of the affected reactor was about to melt (Burlakova & Naidich, 2006). Experts do not agree on the final result on that accident but it seems that almost all Western Europe received radiation, from Sweden to Spain. So if 1989 was the end of communism (the demolition of the Berlin Wall), before general public experienced how certain catastrophic claims made by supposedly amateur experts such as ecologists, could become true. Facts developed in a frantic way around the Ukrainian nuclear power plant. Each new coming from the extinct URSS showed a madness dealing with potentially one of the biggest civil accident in history. Even today experts contradict about how dangerous has been and how to measure the amount of victims. After Chernobyl, things changed.

Expertise has its inner problems; an expert can be well trained and credited inside labs but nothing guarantees the same qualification outside the lab, in the middle of public and political life. Lack of confidence grows when more and more experts become part of corporations and groups of interest (something that Rachel Carson tried to fight in the far sixties). Public manifests its worries about the lack of information and a growing distrust on governments and experts. One recent case is the A flu virus and all the campaigns and discussions. According to statistical sources 80% of Europeans manifests do not trust either in governments or in experts. It is an old dispute how to achieve objectivity and if experts are the real source for such. Sometimes fights among different opinions transform expert's report in part of the problem. As a result the distance among the technological elite and lay people grows. For instance, a number of world meetings dealing with the global climate change have transformed scientific data into bitter wars among experts, environmental groups, companies and so on. For instance, Kyoto, Johannesburg and Rio do Janeiro meetings are evidences of that struggle. Scientists, politicians, activists, journalists etc., take part on discussing the evidence of the climate change; journals, articles, data etc. Scientific theories do not relay in a balanced and calm discussions. Many times arguments are accusation of fraud or vested interests or hidden political agendas. There are parties that fight each other in the media or in political terms. Therefore it is extremely difficult to consider science only as

something done in labs, isolated from society completely. Wall labs become diffuse; inside and outside merge. Somehow the impression is as if a global experiment is being carried out where we are part of that experiment. So it is easily understandable why so many people want to take part in its design. If this is true there is another consequence that follows: traditional split among nature and culture becomes more and more difficult: where ends one and begins the other. Nature used to be the place for objectivity and culture for opinion and human action. And this is another question that makes present science and technology more difficult to deal with. Science is culture somehow because implement also human action.

Experts and scientists are under attack but this does not mean to dismiss expertise as a whole. Transforming science and technology in a matter of polls of opinion does not help to clarify present situation. Techno-phobia and science-phobia do not lead anywhere; both activities are human and we need them to survive in this world. Then, that would be a dangerous path that leads to conflicts or, what is known as "scientific wars". Maybe the most representative case of those science wars is evolution. As it is widely known, Darwin's theory is not accepted in the US. According to Gallup only 35 % of American population considers evolution as a contrasted and valid scientific theory. Against evolution there is a pure ideological proposal -intelligent design- framed as an alternative. What is interesting is how this proposal acquired notoriety via the mass media. Michael Behe, a well-known creationist was able to publish in prestigious newspapers such as *New York Times* and *US Today* (Behe, 2007). Both newspapers did not pay any attention to traditional and respected institutions of American science such as the National Academy of Science and The American Association for the Advancement of Science. Both institutions manifested their support to Darwin's theories due to the huge amount of evidences and dismissed creationist point of view just because the lack of any proof. Tolerance, political correctness and open-minded positions do not translate so easily into science and technology where there exist hard facts. As supposedly senator Moynihan stated: *Everyone is entitled to his own opinion, but not his own facts*.

Intelligent design against evolution presents, according to some researches similarities with the global warming debate. In this battle there are skeptics that consider the theory of the global climate change as something without any evidence or experimental support. Also according to opponents this theory is a major threat for the economy and foreign policy. Again Moynihan's statement fits here. Even the debate adopts low profile ideological discourses: defenders of the global climate change are the foreign agents that try to destroy US as a superpower. This reminds Bill Gates' dictum comparing hackers as the new communists. They appear experts with no previous background starting a bitter discussion against basic evidences supporting the global climate change. Steve McIntyre's case is very symptomatic. McIntyre became a notorious figure on climate-change studies publishing even at the Wall Street Journal, a newspaper that paid no attention to that up to the moment. McIntyre's paper tried to show how models for the increase of temperature were full of wrong data so there would not support evidence for a warming up. Immediately politicians entered into the dispute. Senator James Inhofe recruited McIntyre and invites him to a deliver a paper at the Marshall Institute (a foundation supported by the petrol corporation ExxonMobil) and, according to the *Financial Times*, became a major scientist of that discipline. Other politicians entered in the dispute; congressman Joe Barton demanded Michael Mann (the main source attacked by McIntyre and one of the most relevant scientist in this field) explanations about methods, measures and data. Scientific community -*Nature,* the AAAS the NAS- defended Mann and supported the evidence of a rapid warming. Pseudo-scientific

and expertise dictums against evidence are all around. One interesting case

is but at the same time there are rapid changes on the question if there is or not a global climate change caused by human activities. Suddenly acceptance of that issue becomes opportunities for new business such as geo-engineering or nuclear produced energy. Therefore different sectors that denied global climate warming are using that incontrovertible fact as a way to advance new possibilities. Then experts seem to move from a place to another and public's trust decreases. Scientific and technical consensus moves from labs and higher education institutions towards media coverage. The invisible academy is somehow gone and those ethical principles inherent to scientific practice -as Thomas Merton underlined- seem to vanish in most cases.

Money and expertise

Big companies and corporations are funding scientific and technological research. For the first time in history, private money is taking over research and public funds are under. According to some statistics funds from private sectors into scholarly research has grown an 800 %. Young researchers must work for low wages and big workloads: there is a proletarization of science. Effects of that fact are important. Results sometimes contradict private expectations. As a result 15% of scientists accept to have modified findings in order to fit sponsor's requirements (Martison, Anderson, & De Vries, 2005). Somehow this is not a new fact but has adopted an intricate shape. For instance, scientific media coverage transforms into news simple communiqués by experts paid by pharmaceutical companies. Also there has been a flourishing of institutions, foundations and research centers that are funded by private interests. They offer reports trying to fight back other reports given by activists, against what they call "junk science". As Rampton and Stauber (2001) put it: "*Junk science* first emerged in the courtroom as a disparaging term for the paid expert witnesses that attorneys hire to testify on behalf of their clients. In many cases, of course, an expert witness is unnecessary. If one person shoots another in front of witnesses, you don't need a rocket scientist to know who is responsible. During the twentieth century, however, courts expanded the system of tort law under which personal-injury lawsuits are filed in order to cover cases in which proof of causation is somewhat more complicated. Many of these cases require a scientist's testimony particularly when the injury in question comes from environmental or toxic causes-for example, cancer in army veterans subjected to radiation from atomic bomb tests; asbestos-related mesothelioma; Reyes Syndrome caused by taking aspirin; or the link between swine flu vaccinations and Guillain-Barre Syndrome. By expanding the system of tort law, courts made it possible for people injured through these sorts of causes to collect damages from the companies responsible". Then environmental associations, consumer's groups and alike are considered as lacking accuracy or excess on their positions. In fact it is necessary to collect these organizations that present themselves as non-profit organizations but they are not. Scientists have organized themselves and as a result there is a web place called "Integrity in Science" that tries to clarify these suspicious ties among industry and scientific research. Some of the hot topics that this site underlies are for instance: pharmaceuticals, tobacco or chemical industry. But also this organization manifests its fears the increasing ties among industries and researches that lead to hide results, mistrusts on evaluating new substances and procedures and so on.

Some branches of research are more vulnerable to this new situation and also to new procedures. Medicine and private interests are transforming reliability on experts and tests. Conflicts on interests are in the media and threaten the system as a whole.

Daniel Haley qualifies this conflicts as authentic "drug wars" and R Horton, editor of the most prestigious journals in medicine, *The Lancet,* accuses The Drug and Food Administration (FDA) of malpractice. The FDA was for sure one of the most respectable and powerful authority on the approval of new procedures and medicaments. There are other ways to corrupt expertise; big investment companies pay researchers to know beforehand if a new product will work. Later these companies trade in the stock market. According to the media there are 26 cases of fraudulent information concerning new medicaments. But estimations suggest about 60.000 bio-doctors informing groups like Wachowia Securities, UBS and alike. This fraudulent knowledge goes beyond corruption; they jeopardize the test system as a whole because protocols are not followed. Real medicaments and placebos are used for tests and researchers should not know if a patient is being treated with which one. Also to assure effectiveness, different hospitals take part in the trial and number of individuals accessing data tends to be small. Those who sell information do not respect those basic protocols and corrupt the whole system that protects future users.

Layperson's Revolt

There are many cases of scientific fraud and technological malpractice. There is possible to identify particular persons behind them but somehow the problem seems to go deeper. Maybe what happens is that free market and private initiative is corrupting the system, maybe there is something structural about how things go wrongly. It is possible to pile up more cases but what is needed is some reaction from the public. Science and technology are human essential activities required for our survival therefore they have a political and ethical element that should be considered seriously. Being so important the public should adopt the position of techno-citizens: individuals that enter into the public debate about science and technology. This is an old idea repeated many times in history but never achieved. Illich suggested that this idea has failed; STS was one of the most important efforts to reach that goal through education. But somehow STS transformed into a simple part of academic curricula losing the activist or political element. But maybe it is important to look around and try to identify what in fact can be qualified as a public intervention in science and technology design. Maybe amateur science and technology can offer a response about how it is possible to see things from other perspectives. Against free market and profit there has been other ways to make science and technology in the last decades. Beginning with free software there has been a tendency to consider knowledge in a complete different perspective. Instead of privatization, quick profit and commoditization of knowledge there has been a bet for sharing, collaboration and freedom to distribute. Interestingly enough this movement represents vast amount of resources, volunteering, and money. It has been a silent revolution, completely unexpected that can change many aspects of our society.

How big this change is can be estimated with some basic data: SETI project uses more than five million particular computers around the world to analyze radio signals from outer space. Free software GNU/Linux operating system required the cooperation of more than 100,000 developers. Now there are more than 20,000.000 registered users (but some free software pieces like Mozilla Firefox is becoming the most used web browser). There is a strong volunteering movement that only in European Community is a 20% of population (this goes for all kind of NGOs). A classical study on this rise of the amateurs show interesting facts (Ledbeater & Miller, 2004): in UK there are 6 million people involved in environmental activities,

4.500 independent archeologists work in different research projects, the Royal Horticultural Society alone counts with 350.000 volunteers. There are about 23 million volunteers working in different areas and the sum of time devoted is about 90 million hours whose value is about 45 billion euros. Another interesting fact is what is known as "blogsphere". There are millions of all kinds of blogs ranging from political issues to scientific and technological ones. Of course there is a wide range of quality but what is interesting about them is how the create communities. Kevin Kelly, former editor of Wired Magazine, points out some basic features for that blogsphere and its political consequences. Social web has promoted an active user instead of passive ones that traditional mass-media produce. Also sharing has become an intrinsic value for these social networks on-line. Internet technologies promote easiness to publish, transmit, collaborate and share. The web does not explain by itself these growing social movements of all kind especially in technology and science. Previous movements like environmental groups or science activists like Pugwash were the social awareness from the sixties. What the social web has added is the easiness and quick speed to organize, inform, share and distribute. For sure this is a side effect of this technological system, impossible to predict. In this sense something has emerged, what specialists like Christopher Allen denominates as "social software". There is a set of software tools that associate certain practices and goals that help amateur efforts. 40 % of the Internet flux is commercial but there is a big 60% left ranging very varied activities. Again, blogging has become a frequent activity; there are more than 50 million and about a 30% of American net users access regularly some of them (this is about 49.5 million persons only in US). Reason for that success could be explained for the social nature of blogs. They create communities instead of shaping public opinion. Also there is a new economy behind that fact; the gift economy. Reward is not money but recognition and visibility, that is, to find a place inside different communities. That is the reason to develop free software but at the same time to spend time, effort and intelligence to set up and update a blog. Also this non-money profit reason explains how blogs can create public opinion and favor citizen's activism.

Adding both elements, the activist movements from sixties and seventies and the use of social software, it is possible to analyze important cases such as the AIDS social intervention. Consumer's activism, environmental groups and wild life associations showed distrust in science and technology in that time. But they approached to science and technology knowledge. The reason is obvious; there was an ongoing debate and it was necessary to take part on it. The question is now how to discuss with experts and scientists and try to underline the social and political factors in technology and science. As said above, pharmaceuticals and biomedical industry are one of the places where distrust on experts is more common. And somehow AIDS activism transformed into a counter-balance to that fact. Also AIDS activism has become a paradigmatic model for other associations that fight for patient's rights. According to Epstein, the AIDS case shows something new in medical history: "credibility struggles" among doctors, researchers, patients, organizations...; "What difference has it made to have activists involved in issues of AIDS research and drug development? How has biomedical research been reconfigured as a result? Examples prove to be numerous: The arguments of AIDS activists have been published in scientific journals and presented at formal scientific conferences. Their publications have created new pathways for the dissemination of medical information. Their pressure has caused the prestigious journals to release findings faster to the press. Their voice and vote on review committees have helped determine which studies receive funding. Their efforts have led to changes in the very definition of "AIDS" to incorporate the HIV-related conditions that affect

women. Their interventions have led to the establishment of new mechanisms for regulating drugs, such as expanded access and accelerated approval. Their arguments have brought about shifts in the balance of power between competing visions of how clinical trials should be conducted. Their close scrutiny has encouraged basic scientists to move compounds more rapidly into clinical trials. And their networking has brought different communities of scientists into cooperative relationships with one another, thereby changing patterns of informal communication within science" (Epstein, 2004, p. 338-339). This is a clear example how amateurs enter into the expertise domain. The basic component was the concern of suffering people (patients and families) that allowed an organization that grew with time. Organization of civil society influenced experts and knowledge was the product of all the agents.

AIDS began in the pre-internet era but somehow it proposed a model that changed patient-expert system. The Internet has been able to favor other associations like for instance the Brain Talk community. This web site gathers 300 different groups of neurological patients and about 200,000 regular users. They engage in discussing, symptoms, therapy practices, how to identify new pathological signs, side effects of different treatments... Some technical journals such as PlosMedicine consider that these communities can be understood as a promising resource: "I have also learned that an online group like the BrainTalk Communities epilepsy group is not only much smarter than any single patient, but is also smarter, or at least more comprehensive, than many physicians—even many medical specialists. While some postings do contain erroneous material, online groups of patients who share an illness engage in a continuous process of self-correction, challenging questionable statements and addressing misperceptions as they occur. And while no single resource, including physicians, should be considered the last word in medical knowledge, the consensus opinion arrived at by patient groups is usually quite excellent. And if more expert clinicians offered to consult informally with the online support groups devoted to their medical specialties—as I now do—we could help group members make information and opinion shared in these groups even better" (Hoch & Ferguson, 2005). Hoch and Ferguson noted that only a 6% of posts were inaccurate, old fashioned or simply wrong. The reason for that accuracy is the continuous effort made by the community itself checking and correcting. There are two different sides that should be mentioned. First communities like Brain Talk generate a valuable knowledge able to be used. This is the creation of a gift economy against the present trend of privatization and patenting. These "volunteers" continuously test personal experiences, side effects and success of therapies so their knowledge would be used by the bio-industry. Second clinicians change their role with patients. According to Hoch & Ferguson (Hoch & Ferguson, 2005) there is something new, something that can be named as "expert patients". Patients become then normal persons with the right to be correctly informed, self-organized and able to engage in a real discussion with specialists and clinicians. This goes beyond the usual stories about Internet as the preferred place for hypochondriacs and gives some hope to correct a system that has become corrupt in some practices. According to Ferguson: The medical world view of the 20th century did not recognize the legitimacy of lay medical competence and autonomy. Its metrics, research methods, and cultural vocabulary are poorly suited to studying this emerging field. Something akin to a major system upgrade in our thinking is needed, a new cultural operating system for health care in which e-patients can be recognized as a valuable new type of renewable resource—managing much of their own care, providing care for others, helping professionals improve the quality of their services, and participating in collaborations between patients and professionals. Given the recognition and support they deserve these new medical

colleagues may help us find sustainable solutions to the seemingly intractable problems that now plague all modern systems. (Ferguson, 2004, pp. 1148-1149)

And now what?

Surprisingly there are two contradictory currents in knowledge production living together. One tries to privatize under patents, copyright laws and other devices that production. On the other side there is a tendency to open knowledge and allow it to circulate and improve. First one obeys to a free market logic relaying on knowledge as a scarce resource. It requires investment and practices not always legally or ethically acceptable. One of the results is a growing distrust in companies, governments and knowledge elites. Some of the cases analyzed before show why that system somehow is in crisis. Some critics claim that the patenting legal system goes against innovation because has transformed into something different of what it was supposed to be. According to Ruichard Stallman software patents harm the public good in an unfair way: "Software patents don't cover programs or code; they cover ideas (methods, techniques, features, algorithms, etc.). Developing a large program entails combining thousands of ideas, and even if a few of them are new, the rest needs must have come from other software the developer has seen. If each of these ideas could be patented by someone, every large program would likely infringe hundreds of patents. Developing a large program means laying oneself open to hundreds of potential lawsuits. Software patents are menaces to software developers, and to the users, who can also be sued" (Stallman, 2005). As a corollary, only big companies can survive this limiting patent system. Instead of favoring innovation favor economic and legal battles leaving aside the public good that science and technology should pursue. More and more profit is the ultimate goal and public good a secondary target.

On the other hand, as technology always does, there is a crisis about old procedures and mentalities because they are confronting new scenarios. It is interesting to note how previous practices like activism have found a very useful tool in information technologies. New technologies allow sharing and spreading knowledge at a very cheap price. But this is only one aspect. Collective knowledge is able to surpass private resources: communities know more than individuals. Some of the cases mentioned before show that fact. Hierarchical organization of knowledge does not resist other possibilities where individuals organize themselves and create communities of knowledge. There are paradigmatic cases like Wikipedia, GNU/Linux, Open access scientific knowledge etc. Economic foundations for these communities of knowledge are the gift economy. Contributing to a specific community has the sense of being part of that community, have a reputation and having the basic idea that finally there will be a general good for everybody but also for each individual. But this is not something completely new. Apart from being a practice among other peoples and cultures, Western civilization has practiced the gift economy along its history. For instance, science worked with this basic assumption for many centuries. Things have change only in the last fifty or sixty years. So what self organized amateurs show is how things can be made in another fashion. And technology favors this new way of producing knowledge. But these two factors alone do not guarantee a real or rapid change on how things are done. Right now these two opposite tendencies are rivals. What will be the final result it is unclear but there is a window for hope.

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