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***1. Why were you initially drawn to philosophical issues concerning technology?***

I am not sure I ever was ... Or rather, I am writing this after twenty-five years in an engineering school—the Ecole des Mines, a French grande école where the elite engineering bodies of France are supposed to be trained. And in a way, what I feel now is my largely failed attempt, over this quarter of the century, to practice the philosophy of technology. So I am afraid what I am going to say may sound a bit self-critical: What I want to understand is why I have failed so utterly. But first, let me make a point about vocabulary: In France, we understand technology as the philosophy, or the reflection, or the science about techniques, in the same way as epistemology is the reflection about science, the science of science if you wish. No one will say about a new particle found at CERN that "it is an epistemology". There is no more reason to say about the newest culinary robot that it is a "technology". It is a technique, to which might be added or not (most often not) a reflection by some scholar.

I insist on this usage because the reason why there is so little philosophy of technology is because it is always thought in relation, or under the shadow, or in the dependence of the philosophy of science. The worst philosophy has been done by people using the word "technoscience" as if the two were the same domain. (I have used the terms however in *Science in Action* and very much regret it) The extreme case being of course Heidegger whose point is to fuse the two inside the notions of domination and thing—thing being conceived as the ultimately mathematized entity. If there are two mistakes not to commit when dealing with techniques, it is to think them as "technologies", that is as "applied

science", or as a sub-case of mathematized objects—and of course to take them as a case of domination "of Man over Matter" as the cliché goes. There is not that much matter to begin with. As to domination ... you really need to be pretty ignorant of techniques to think of them that way. So the best solution to maintain that distance and to shake the weight that epistemology exerts on technology (conceived as the study of techniques) is to keep the word "techniques".

Now to answer your question, I was drawn to technology precisely because of my diffidence for epistemology –learned in science studies – and also because I have lived among engineers since 1979, first at the Conservatoire des arts et métiers – a revolutionary invention and still a marvellous museum of techniques – and then at les Mines. What struck me from day one, was how different techniques were from science and how ill-equipped we were in science studies to deal with issues of technical studies (even though we kept using the same acronyms STS or S&TS). But I have to say that we have in France a very different philosophical tradition which has the great advantage of foregrounding the originality of techniques quite a bit. Apart from Ellul, a moralist who believes that techniques are what epistemologists say they are (domination over matter and over humans), we have a very rich tradition from Diderot, Laffite, Bergson, André Leroi-Gourhan all the way to François Dagognet, a lesser known but quite interesting figure, andCornelius Castoriadis. If you read Leroi-Gourhan, it is not philosophy, but it is technology at its best.[1] And of course Gilbert Simondon, whose book remains one of the few from a philosopher to pay respect to the complete originality of techniques.[2]

I remind you that in his book Simondon connects techniques to a genealogy – he calls it a "genetic", and it is mythical of course – that has the mode of existence of techniques emerging out of magic together with religion, and only later giving birth to science and morality with the arts doing the mediation and philosophy the synthesis. Quite amazing! His whole idea is that you don't understand techniques if you don't understand magic and religion and the ways forms and background are distributed.

All of this to say that for a French philosopher entering engineer-

[1] Leroi-Gourhan, A. (1993). *Gesture and Speech.* Cambridge, Mass, MIT Press.

[2] Simondon, G. (1958). *Du Mode d'existence des objets techniques*. Paris, Aubier.

ing school with a science studies background, it was not surprising that the complete originality of techniques would have struck me enormously. And of course, when I entered the field, Michel Callon had already started his pioneering study of the electric vehicle. So I had no real merit. Then I met Wiebe Bijker and the whole thing developed. Don MacKenzie published his masterpiece on guidance system.[3] We connected with Tom Hughes and the historians of technology. And of course I did *Aramis or the love of technology* – to this day, my favourite book – and I was drawn into it. Is this what you would call philosophy of technology? I am not sure. I believe in philosophy, but not in philosophy "of" something, so I am not sure I have contributed anything to that field.

***2. What does your work reveal about technology that other academics, citizens, or engineers typically fail to appreciate?***

Well, you should ask them for that, not me! ... If there is one thing a writer is unable to say it is what his work "reveals", because to reveal you need to be two and even three: you, what you are talking about, and who you are talking to. You can say "look here! how wonderful!", but if the one you address is looking the other way, you can be marvelously perceptive, no one else will notice... My general feeling is that when I have talked about the importance of techniques, people looked the other way, except if they are fans of that very narrowly defined technique, like railway people, or plane buffs, or computer wanks, etc. In other words, there is no general conversation about techniques as such, either it is very specific or when it is generalized it is taken over by epistemology and then you have empty clichés about "technology overpowering its masters" etc. People have not even been able to quote the Frankenstein's myth faithfully ... When you talk about science and epistemology, people at least notice because they have attached so much morality and politics to them that any change in the theory of science makes them reach for their guns, but not to techniques?! You will notice that there has been a "science war" (a pretty silly one), but no "techniques war". Maybe it is just my experience, but I have not met much success.

Anyway you cannot lump all of those groups together, and you

[3] MacKenzie, D. (1990). *Inventing Accuracy. A Historical Sociology of Nuclear Missile Guidance*. Cambridge Mass, MIT Press.

have to differentiate academics, engineers and citizens. Academics, as a rule fail to appreciate so many things, that it is hard to know where to start! There is this near impossibility with modernism and modernists in general to be sensitive to what is given in experience that baffles me. There are still people who fret in sociology, anthropology and maybe philosophy, because in my definition of techniques "I give a role to non-humans" ... and they pronounce this sentence as if they were saying "Latour is a pervert, a zoophile" or something of the sort. We have been connected, attached, folded with non-humans for millions of years, and especially for the last three centuries, and it would come as a surprise for academics?! How strange. In my experience, academics live in a world that still predates all the industrial and technical revolutions. They are sort of upper Paleolithic – and even that is unfair because in that time they had already lots of stones ... and when you see the way philosophers treat stones, it is not encouraging ... So what I can "reveal" to them is non-existing, since they see it as a revolting promiscuity or a "coquetterie" of my part. Luc Boltanski, the best sociologist in France, still believes that "all this talk about non-humans" in my sociology is a pose, a way I have found to render me interesting; he really believes that I can't be serious. For him, sociology is for humans only, any other thought is simply, as he put it, "poetism"; he told it to me again last week in a defense thesis where one of my students has been studying how some French anglers became militants for the quality of rivers: Their entire life revolves around fish, and their whole politics depend on this conversion of passions for angling into a new passion for defending the quality of the rivers. But the best French sociologist still wants my student to swear that she will abstain from this silly sociology (or philosophy) of mine! What can I say? "Poetism" means that if people speak in a way that seems to link humans and non-humans in strange ways, they don't mean it, it is simply metaphorical, poetical, false ... (Which is quite funny because Boltanski is also a poet in his spare time). So the bottom line is that years after the dispute with Collins and Yearley, everything is still the same: Academics seem to reply to my work, "Please don't take seriously what people say about techniques and material relations, they just don't know what they are saying, ignore what they say or do and keep separating the two as Descartes told us to do".

Now, engineers. Here I have failed so utterly that I did not really want to answer your questionnaire for that reason. I have been in

les Mines for twenty five years, and not once did I interest even one minute any of the engineering professors there. Did I try? Yes. How good was I at convincing them? I have been probably pretty bad. The best I could get as an effect after 25 years was that some professors condescended to consider that "in addition to the technical aspects" of, I don't know, mining, statistics, robotics, informatics etc., there might "also be some aspects" to be "taken into consideration": "yes, there are also social elements".... which, for them, usually means at best "acceptability" by the public. And I don't think Callon did any better in that school. The students have been interested in my class on "Mapping scientific and technical controversies", but not once was it seen as an important aspect or as a way to renew engineering culture in France – even though everyone is complaining about the "rise of irrationality" and the "decline of enrolment in scientific careers". I am actually fascinated by this failure because now that I am leaving to go to a social science school, Sciences-Po, a sort of French LSE, I am planning to do the opposite: that is, to interest politologists and historians in techniques. I will probably fail just as well but I want to try. So as far as engineers are concerned, the conclusion is that none of the work I did has revealed anything of significance to them about what they do, not even a new positive version of how interesting they are: I keep telling them "how interesting you are because you connect humans and non-humans in so fascinating imbroglios and so deep and opaque labyrinthic practice" and they answer "no, thanks, we are just plain boring, would you please stop being interested in us ... "!

Citizens are another matter. I think that with *Politics of Nature* and with *Making Things Public* I have entered into quite a lot of interesting conversations with those who realize that any new techniques are an assembly of some sort for which the representative parties are not "constitutionally" gathered. In that sense, I think I had a slightly better reception among journalists, politicians, ecologists; but again, this is marginal. The pretension of revealing anything to others is always empty anyway. People pick up whatever they want to pick. What I have done is to propose a rather rich and, in my view, tasty dish for which people can chose if they wish to come to the dinner table. But if they prefer modernism, what can I do? The problem with techniques is that people love to hate them and also hate to love them, no matter if they are academics or not, so it is extraordinary difficult to get the right distance with the mass of thing which they cohabit.

***3. What, if any, practical and/or social-political obligations follow from studying technology from a philosophical perspective?***

I am not sure again of what you mean by a "philosophical perspective". I only know how to study a subject matter by trying to be faithful to what is given in experience: That can be done only by description and, in the case of techniques, thick descriptions—given our utter ignorance and the rarity of their registration in culture and humanities. If by philosophy you would mean an attempt to add to those descriptions "foundation", "reflexiveness", "transcendental" principles, I really hope to have no philosophical perspective on anything, least of all on techniques. I am an empirical philosopher, and what I try to do with techniques is, as Simondon, urged us to do, to detect what is unique in their mode of existence. As long as this uniqueness is not detected, honored, celebrated and cherished, there is no way to call us humanists or to say that we teach "the humanities". So for me, most academic life, most literature, most humanities are deeply barbarians: They ignore, despise, love to hate, and hate to love what make us humans. This is why I think Richard Powers' enterprise in literature is so important: he has done in my view infinitely more for philosophy of techniques than any of us.

Does this have any practical or socio-political implications? I suppose. First, it has teaching implications: I have tried to do that for years, displaying the connections and the opacity of techniques and the importance of technology as a mode of existence, which could help students to reconnect with them instead of always cutting the connections and saying "they are just mere objects" – as the Carthaginians were doing when throwing their children in sacrifice to Baal and claiming they were animals ... Second, the politics of the future depend entirely on the careful and complex maintenance of involment with things whose ecosystems will be even more fragile and multiple. To dream of mastery and domination "over matter" is simply silly. But this is the politics of things, the Parliament of things, as I said, that I have tried to envision and then to scale model in *Making Things Public*. It has obligations, in Stengers' sense; it imposes obligations on me at least.

Can I say that it has practical implications? It is very hard to say. I have done lots of work, in the past, in the management of innovations, I am not sure it had any impact. Do philosophers have impact in the end? Yes and no. What we do is too marginal

to be evaluated by its impact, but may be I failed to understand the question. I really feel that for thirty years I have behaved as if I was talking to non-existing people, those who would have accepted that we have never been modern, but as long as they believe to be modernists or post-modernists, I think it is fair to say that my work is fairly useless. And in addition what does it mean to have "socio-political obligations"? If those obligations are defined by Isabelle Stengers or Ulrich Beck they are pretty different from those defined by Steve Fuller ...

***4. If the history of ideas were to be narrated in such a way as to emphasize technological issues, how would that narrative differ from traditional accounts?***

I think it is in science studies that notions like practice, know how, space, equipment, innovation, laboratory networks, actants and so on, are used. In a sense, it is fair to say that techniques have become the way to understand *episteme*, and in that sense, one could say that science studies have largely counteracted the original prejudice of philosophy which rendered techniques subservient to science. Most of the new social history of science – I am not talking of history of ideas since it has disappeared from view and rightly so – is inspired and in the shadow of an attention to techniques in all of the meanings of the word: one of them being art, another being know-how, a third being "intellectual techniques" or "paper techniques" and of course the most important being the new role given to instruments. It is also the trend of the sciences themselves because of their heavier, costlier and more visible materiality. So they tend to offer themselves more to the grasp of technology than of epistemology. Now it is obvious when people talk about materiality, that it bears no relation whatsoever to what was meant by it in late modernity. I don't think a major book like Reviel Netz on mathematical practice in Greece would be possible without a disclosure of what we mean by techniques.[4]

What has always interested me, of course, is how the grand narrative of the human race would be modified if we were to include the non-humans in it in a productive way and not just as "matter". Or rather what would happen to materialism and "the domination of Man over matter" if we had at last a realistic definition of "mat-

[4] Netz, R. (2003). *The Shaping of Deduction in Greek Mathematics : A Study in Cognitive History.* Cambridge, Cambridge University Press.

ter" like the one inspired by technology. It is because techniques are never about mastery, domination, prediction, but always about surprise, ruse, detour, opacity, obscurity, arrangement, attention, care, complexity, unintended consequences, translations, folding, and labyrinth that they have interested me so much. You find this complete originality of techniques any time you pick up a book on one technique, on steam engines, on pencil, on paper clips, on accounting, on diagrams and so on. The last one I read was on the invention of the "container" and how this box "changed the world". It is impossible to talk about globalization without taking the contained into account.[5]

Now you have hundreds of books on how a given technique "changed the world", but we have no master narrative of what it does to our representation of ourselves to be technical through and through. I think it would be really interesting to try. I made a feeble attempt in *Pandora's Hope* and in my work with Shirley Strum, but we have not yet escaped the simplistic "materiality" or the Marxian narratives with the *Homo faber* myth. In that vein, anthropologists like Philippe Descola, Marshall Sahlins, Tim Ingold, probably could teach us much more on how to liberate matters from the silly materialism of the past – which was nothing in fact but a simplistic projection of geometry by epistemologists onto technical questions. Or even more simply, an artifact of projective geometry, a confusion between drawing a machine on paper, as if the mode of existence of a technique had any direct relation with the ways they are drawn! I have been fascinated by this question and I hope to make it the topic of my next exhibition and catalogue: How come modernists have ended up imagining that matter – the matter of their 'materialistic', 'mundane', 'down to earth' mythology of efficiency and reductionism – could be a piece of paper? How could they have confused *res extensa* and materiality when every object, every artisan, every skilled gesture would have told them the very opposite? In present philosophy the thinker who is doing most to reinvent a master-narrative that factors techniques in, is certainly Peter Sloterdijk in his three volume *Spheres* story. It is not always done with the care I would like to see, but it is a master narrative of humanity born out of techniques and I am all for it.

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[5] Levinson, M. (2006). *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger*. Princeton, Princeton University Press.

***5. With respect to present and future inquiry, how can the most important philosophical problems concerning technology be identified and explored?***

Philosophy does not proceed with research programs and grant applications, but one can still identify some topics for which we are in great need of meetings and descriptions. One of course is the very notion of non-humans. How can we talk about "tools" in a not "toolish" and thus "foolish" way? Graham Harman, a young philosopher of technology, has given a lot of thought to that question in redescribing Heidegger's concepts. I don't believe in a subfield of philosophy called philosophy "of" technology, there is only philosophy, but in proper metaphysics the ontology of tools remains a complete mystery.[6]

Another topic is to reassess the origin story proposed by Simondon: to link it to magic and to make it a *vis à vis* of religion is odd, but it is probably a very strong inducement to try to anthropologise even further the connections humans entertain with non-humans. Another very promising growth area is in reaching out to anthropologists: now that the master book of Descola offers a map to chart the human non-human connections in many different collectives, we might reconsider the whole notion of material culture and in a way rewrite the entire Marxism without having to fall back into the Efficiency, Objectivity, and Profitability mythology.[7] I am thinking here of the fabulous book on *Barbed Wire* by Reviel Netz (yes the same author as the other masterpiece!) probably one of the best "materialist" studies I have read since Cronon's book about Chicago.[8] A materialism that will import in its definition of materiality the insights we all had about technology would make a big difference.

But none of that will do if we are not able to invent *visualizing* procedures to render vivid to the eyes of those we try to address the new shape of techniques. The problem as I see it is that we are still dramatizing techniques with the vocabulary invented in the Renaissance to invent and collect and draw them together. In other words, the optical space in which techniques

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[6] Harman, G. (2002). *Tool-Being: Heidegger and the Metaphysics of Objects*, Open Court.

[7] Descola, P. (2005). *Par delà nature et culture*. Paris, Gallimard.

[8] Netz, R. (2004). *Barbed Wire: An Ecology of Modernity*. Wesleyan University Press; Cronon, W. (1991). *Nature's Metropolis. Chicago and the Great West*. New York, Norton.

enter the world of humanities – from childrens books to CAD design computer screen to technical museums – is still that of the Quattrocento: immutable mobiles and exploded views plus more than a few hypes and in the end some moralization. If you want to portray them "realistically" as I tried to do with *Aramis*, that is, to show them not as an object but as a project, as a "thing", as a "collective", as an *assembly of assemblages*, there is no good way and we are left with only the fragile web of words. I don't think we will convince any one, and be able to teach, as long as we don't benefit from an enterprise that should have the magnitude of the Quattrocento invention of perspective. Except, of course, it is not perspective: more like what Peter Sloterdijk calls "spherology", the study of technospace, of bubbles and envelops. Can philosophers do it? Alone not. But with artists, historians, computer scientists, designers, citizen groups, maybe. Again can we "draw things together", can we make "things public"? These are the questions that are still attracting me to technology and to which I hope to be able to contribute a bit, even though I have so thoroughly failed to interest my colleagues in the engineering school where I have developed all of those ideas. Maybe philosophers always write for absent people.

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