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The Pilgrimage Goes On...

A Conversation with Liam Bannon about Humans, Machines, and their Interactions

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Abstract: By recollecting memories and experiences of his 40 years career through Human-Computer Interaction (HCI), Computer Supported Cooperative Work (CSCW), Interaction Design, Participatory Design (PD) and more in general the design of information systems, Liam Bannon outlines a history of the relation between design-related disciplines and social sciences. Based on such history, Bannon explains his long-term engagement with the cultivation of human capabilities through design and reflects, more in general, upon the meaning of human centeredness in design, taking also into consideration contributions and questions proposed by Science and Technology Studies on these issues.

Keywords: Human-Computer Interaction (HCI); Computer Supported Cooperative Work (CSCW); Participatory Design (PD); Activity Theory; Interaction Design.

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Introduction

Liam Bannon welcomes me on the first floor of the new building housing the Department of Information Engineering and Computer Science (DISI) at the University of Trento¹. Not even the time to greet, and

¹ The original conversation was recorded on the 10th of June 2015 in Povo (TN), at the DISI building of the University of Trento, where Liam Bannon is Visiting Professor, also teaching a Doctoral Course on the design of learning spaces for the ICT International Doctoral School. The text has kept the informal style of the original interview, with some small revisions for clarity. Liam apologizes for any inadvertent misunderstanding of people's positions or factual inac-

he right away points to the corridors: “Look! Look! How can they still design buildings in this way? Corridors and closed doors – all the same. This place really does not afford anything but walking through the corridors into your own room. No encounters, no meetings, or other activities besides walking straight to your room”.

His sensibility toward spatial designs that foster human competencies and skills become the topic of our talk, even before our conversation officially starts.

He already knows that the conversation will also tackle the issue of Participatory Design, about which he recently wrote an historical outline together with Pelle Ehn (Bannon and Ehn 2013). We already had the chance to talk about this paper one year ago, thanks to a seminar organized by RUCOLA², entitled: “The Participation of What?”.

Because of this previous mutual knowledge, Bannon starts the conversation by trying to underplay his role in the Participatory Design movement.

Liam Bannon: My role has often been the one of an interpreter for different communities of other communities’ work. I always try to talk to a certain community about what I find interesting within another community. The problem with such position is that often people start to see you as being “the expert” in whatever approach I am trying to bring in to the community. I do not feel that this is quite appropriate, and I do not wish that all of their thinking about the topic is mediated by my (limited) knowledge of this other approach. I am quite happy to say, “This is what I personally find interesting”. But, I’m not trying to claim expertise in all of these different areas. So, for instance, Participatory Design... although I have been connected with that community for sometime and I know many of the people who really helped to put it on the map – within informatics in the eighties and nineties – I am not the spokesperson for Participatory Design. There are many others much more qualified than me, with more practical experience. I do try to work in a participatory fashion in some sense with the projects I do, but it can vary quite a lot in terms of what happens.

curacies that may have crept into this text – it is just a set of personal, anecdotal reflections, captured at a moment in time. For more extended published articles on many of the topics raised here, please contact Liam Bannon at liam.bannon@ul.ie. Comments also welcome.

² Research Unit on Communication, Organizational Learning and Aesthetics, Department of Sociology and Social Research, University of Trento (www.unitn.it/rucola).

Alvise Mattozzi: Yours seems to be a sort of research journey through different communities and frameworks, a journey through which you do not only carry out your enquiry, but also connect different sites you happen to explore. You already framed your research in this way early on, in 1989, in a paper vividly titled: “A Pilgrim’s Progress. From cognitive science to cooperative design” (Bannon 1989).

LB: Yes, with that paper I have tried to describe a bit what was driving me at that time.

AM: However, it can also be considered a sort of far-sighted program for the years to come.

LB: In a way yes, but I could not know that at the time...

I studied psychology and computer science separately, in the early seventies, and I became interested in the relation between the two. There were two levels, as I saw it: one was conceptual, like thinking of the computer, and computation, as a model for the mind, and that was the information processing approach, which was very dominant in cognitive psychology at that time. So I became interested in that, and in fact I worked within artificial intelligence, which was thinking of intelligence as a general mechanism which could be simulated in the computer. So that if we were able to build something in the computer, then we could assume that it simulated how we humans think, assuming that we are also information processors. That was one level of the interest of the relation between mind and computers. The other level was a more practical one, which is related to people having difficulty using computers. This was in the early days, there were people using punched cards for their computer programs, not really interactive systems, but I was just trying to understand some of the difficulties these people had in debugging programs... and I worked in a computer help centre, dealing with people and their difficulties in getting their programs to run, trying to understand how they saw the world. And so then I went to do my PhD in Canada, and that was with somebody – Zenon Pylyshyn – who was interesting to me as he had a joint appointment in Psychology and in Computer Science, and worked in artificial intelligence. He also had strong links with people in philosophy. So, I went to work with him. And, during the time I was in Canada, I started to shift, in terms of my approach, questioning this idea of thinking of the human as a computer, about the computational approach. Because like any model, I mean, it has strengths and weaknesses. But, I just felt that the weaknesses – to my mind – were fairly fundamental in terms of understanding of how people act in the world. You had, at that time this idea in artificial intelligence that the mind was a kind of brain with some inputs and outputs, like a brain in a barrel: there was no sense of what it meant to be a body, there was no sense of the social, and it didn’t relate also to where meaning comes from, how do these symbols get meaning,

or value; so I began to have a lot of questions about this approach.

So I became interested in alternative frameworks, like thinking about machines in terms of being artefacts or media and from there to computer mediated activity. Activity theory was one framework that seemed to give me some handle on things that were different from the computational approach.

AM: And, then, you went in San Diego to work with Don Norman.

LB: Yes, I was there as a post-doc with Don Norman's group. We developed a loose framework for talking about what we called "user centered system design", and that was trying to put attention on the human capabilities of people, and on their psychological capacities, and also trying to get designers to pay more attention to who they are designing for. But, we still tended to think of the people using the system like users of the computer, not competent workers in their own right, and we also viewed them as our objects of study, like subjects in psychology experiments that we instructed to perform tasks that we devised for them, and then measured their performance. We would ask them to do something that we would observe, often in lab conditions, and notice how they manage the task. But, we didn't really engage with them in terms of their everyday working life. So, it was a kind of user centered design, rather than a system technical centered design, yes, but, we were still psychologists talking about 'people using systems'. Thus, we tended to focus on some of their general psychological capabilities, not understanding really much about the task or the detail, even though we did look at tasks of course, in terms of task analysis. But, we didn't really understand their world. We were bringing them in, creating a task and getting them to do it – to our design. What we started to realize is that, although there are certain things that you can learn from this type of study – in terms of basic capabilities, human performance characteristics, they really didn't address a lot of the issues about what people found helpful or not in the systems in their workplace. Also, we were not addressing people who were using systems in terms of discretionary use, those who weren't operators of machines, those who were doing tasks or using only certain applications through the system.

So, there was something that inspired me: I felt we needed to go out into the field, in other words to understand people in their actual context of work, and to pay more attention to the conditions under which people work.

I wrote an extended report, when I was in San Diego, still in the early days, it was called: "Extending the Design Boundaries of Human-Computer Interaction" (Bannon 1985) and I pointed to few different things there. One was this general notion that the design boundaries of HCI coincided, at the time, with what I called: "The Human-Computer Dyad", namely the individual person operating on a computer. That was

the focus when we looked at interaction, very much just the interface. But, actually, in the workplace what you discovered very often is that people are accomplishing work not only with and through a computer, but also with other people and other machines. So, the computer mediates... So rather than thinking of human-computer interaction, we might better talk about computer-mediated activity. And then the question was what's a good framework for studying this? The early HCI paradigm was very much focused on the human as an information processor. So, the mind was like a computer, and so you have the idea of input-processing-output, etc. So, the idea was that mind and machine were very similar, and we can talk about them in the same way. Whereas when you switch to talk about computer-mediated activity, people are accomplishing things but maybe a tool or a medium perspective becomes more appropriate. So, people are accomplishing things with artefacts in the world, and it's through various media, and they affect the way we communicate. So that suddenly changed significantly the theoretical frames one might be interested in.

So, for instance, Vygotsky in psychology, in Soviet psychology, talked about language as also mediating human thought, as a tool for thought, but also he talked about tools, artefacts in the world coming from a Marxist kind of thinking-dialectics. An understanding of the world where humans are active subjects. Vygotsky's and then Leontiev's work, you have this development of Soviet school of thinking called "cultural historical activity theory"...

AM: Which was quite practiced in San Diego...

LB: Well it was! And indeed I was also was exposed to it, not in the Cognitive Science group, the group I was in with Don Norman – that was still within the information processing framework – The Cognitive Science Lab – but through another professor in Psychology at UCSD, Mike Cole and his group. Cole's group was The Laboratory for Comparative Human Cognition (LCHC), across in another building. I came across Vygotsky many years before in my psychology studies, but he [Mike Cole] was looking at the technology in this very different ways – as something mediating activity. I spent a lot of time over there, so that was influential. There was this whole idea of thinking of human activities in the world. How can you not start looking at the context in which activities are occurring? How can you not start looking at the fact that there is not somebody working with a single computer, but rather that people are using systems – for sending messages to others, or sending documents, or sharing and editing and working on them? So you would wonder: "How come we not talk about that in terms of the design of our systems?". In the early days, one issue was how difficult it was to work collaboratively on a document, for instance. You had versions and editing options, but from the very outset it was still very much an individual working, so try-

ing to collaborate through the system, was quite difficult.

On encountering field studies, it is also what got me interested in more sociological and ethnographic studies. We start saying: "Ok, we need to prove more ecological validity for the kind of studies we do, we need to pay attention to what is the world of work in which these systems are used". And so ethnographic approaches became influential in terms of understanding the workplace, and that led me into taking a course on ethnographic studies in the mid-eighties, and reading the work of people like Eleanor Wynn's on office conversation, and Lucy Suchman's work on human interactions around an 'intelligent' photocopier.

AM: In San Diego, working on the extension of the boundaries of cognition there was also Ed Hutchins, wasn't he there?

LB: Yes, there is an element of his work where he was combining ethnography and human activity, in terms of moving cognition out of the individual mind, but he was still using a computational perspective. It is interesting... it's expanding the information processing beyond the individual, but still maintaining the information processing view, putting it out into the world, whereas the activity theory approach is different. The latter doesn't necessarily stress the computational aspect. Ed hadn't joined UCSD as a faculty member at that time although he had connections with Norman's group and with Cole's group. He was in the Naval Research Labs nearby. So when I was there we did meet on occasion... But there were also many other interesting people there: Aaron Cicourel was there and Roy D'Andrade, a cognitive anthropologist, and a linguist, Jeff Elman. So, there was an emerging kind of cognitive science orientation that would look more at the environment rather than in the mind, but it had not set up a new faculty yet when I was there in the early 80's. But there were some very interesting discussions.

So, personally, the time in San Diego was very influential, because I spent a lot of time amongst these groups talking with many different people. So, for instance, I took a course in ethnomethodology from, Bud Mehan [Hugh Mehan], who had been a student of Garfinkel, I believe... and, if my memory serves me right it was on his course he had as an invited speaker Lucy Suchman. So the first time I met Lucy was at that course, when she talked about some of her work at Xerox PARC. This was her early work on people having difficulties using the smart help on copiers. This was the basis of her thesis on plans and situated action, which came out in '87 (Suchman 1987).

AM: Well, San Diego was actually really the right place, then, in order to question the boundaries of HCI!

LB: Yes, sure! But that was just one element within my 'pilgrimage'. The idea of understanding what people are doing with technology and

looking at the ways in which people organize their activities with and through these technologies... and so moving from the idea of a human interacting with a computer to the idea of interacting with a technology as an artefact, a more complex artifact, of course: a machine is more complex than a tool, a hammer or something, but it can still be seen as an artifact, as a product of human activity and crystallized knowledge. Then this idea was the first element that spurred my move away from a cognitive-psychology-based HCI.

A second element that bothered me emerged more through listening to some people in the HCI community of the time, at the way they would talk about users – often considering them as naïve, and as stupid users. Even many of those who were supposed to talk from a ‘user-centered’ view would talk in this way. And this bothered me on two levels. On a first level, ethically: it is not a good way to think about your fellow human beings. I mean in general, not just in relation to technology and design, I don’t think most people are stupid. And, on a second and more practical level, I think it is a very bad concept to start with. If you think you are designing for stupidity, you will design stupid interfaces, – you will produce that behavior you are designing for. And so, what does that mean in terms of trying to build something... if you think about somebody who is going to be using the system every day or whatever, the idea of being able to learn more while on the job, because you have made this very simplistic sort of interface that doesn’t allow people flexibility, to take control of it, to shape it to their own ends. This bothered me.

By chance around the time when I was still in San Diego I met a couple of people who came from Scandinavia. Susanne Bodker was one. She was at Aarhus University in Denmark, and was visiting [the Smalltalk group] at Xerox PARC. I also met Pelle Ehn and Morten Kyng, who were working on the UTOPIA project in Scandinavia, on graphic workers and the design of better computer-based tools for newspapers. I thought that what they were doing was interesting, in terms of their work on participatory design – which was inspired by the Norwegian computer scientist, Kristen Nygaard. What I found interesting in terms of my own initial sense of understanding of this, is that they were really working with a kind of user involvement in design, and wasn’t it just user involvement in the design of technology, but there was an explicitly political angle to it, in the sense that you had management and labour, and management was controlling the technology and labour didn’t really know that much about what the technology could do. So they were very explicit in their position: “Ok, we want to be consultants, computer scientists... but to work with labour, to work with the trade unions”. This was something rather startling! You must remember that the Trade Union movement was very strong in Scandinavia at that time. They had started with educating people about the capabilities of technology, but then they became interested not just in terms of understanding the context, but rather in asking: why couldn’t we have an influence on designing the future technology?

And that's when they became interested in some of the HCI and user-centered design work at UCSD, because they saw it as possibly fitting in with their concerns. I thought that it was an interesting idea having people involved in design, not just studying people. I became interested in that approach, and so I started interacting more with those people and discussing with them, and then they invited me to come and visit, so – after a rather long hiatus, a 2 year walkabout in Asia and Australia – I went to join them and learn about their work in Scandinavia. At around the same time, the mid-eighties, there was the emergence of the area called CSCW – computer supported cooperative work. This started out in '84 with a couple of people: Irene Greif and Paul Cashman in the US bringing together a group of people from mixed backgrounds from all over the world, interested in aspects of collaboration with and through technologies. So it included some people working in computer mediated communication, people like Murray Turoff, who worked on the notion of the network nation, but it was more than that, people like Doug Engelbart and his augmenting the human intellect project at SRI, people in hypermedia, people working on shared databases. So there was a mixture of people, and they called this particular gathering in '84 "CSCW", Computer Supported Cooperative Work, without having really a conceptual frame for this term. But, out of that emerged a first public conference in '86. I wasn't there because I was travelling in Asia at the time (between '85 when I left San Diego and '87, I was travelling). The Second ACM CSCW Conference was held in 1988, and Lucy Suchman was one of the program chairs, if I remember right. She had at this stage become interested in the work of people in Scandinavia working on participatory design. So here we had a linking of some people in terms of ethnographic studies and work practices on one hand, and on the participatory design work on the other: so at the '88 conference there was a strong representation of Scandinavians, and I was now in Aarhus, so I also went to that conference. And so that became quite an important meeting place, both for developing the European approach to CSCW, and for the development of the Participatory Design (PD) Conferences, which started in 1990 in Seattle. I wasn't there, but I had a paper with some other people from Aarhus in the 1993 book from the 1990 PD Conference (Schuler and Namioka 1993) The PD conference then became a more regular event, so it kind of merged some of the PD and CSCW interests: these do not overlap, there are separations, but there were linkages between people in these communities. Because the notion, in general, is that if you have a large database you access something in it, but traditionally it was just you who individually access, and the system keeps a record that you access something. But who accessed before you, or after you, the idea that you might like to know or be aware of this, the ways in which the artifact might mediate interactions – there is no notion of that in the software.

But the other whole area in terms of CSCW was bringing together people from the social sciences, where the idea was: if we are trying to

build technology to fit into people's work practices, then we need to know their work practices, and so we need to investigate them, and so the interest in what was termed "workplace studies". And it just so happened that a lot of the sociologists who got involved in the CSCW area happened to have a strong ethnomethodological connection or foundation. And so, after a few years, the vast majority of work that you saw in some of the CSCW conferences from sociologists was almost exclusively ethnomethodologically-inspired, written up in terms of members accounts, mutual intelligibility, etc. So you had this kind of emergence of CSCW, PD. What was interesting then is to see the way things evolved.

At Xerox PARC, they brought a lot of very skilled computer scientists and developed the personal workstation, the "Alto", which was the forerunner to the "Star" and other machines. The Star was the first commercial release of kind of a graphic type interface (a GUI), that later inspired Apple's Lisa and then Macintosh. So there was a strong AI orientation initially, trying to make machine's intelligent. but that's also where Lucy Suchman was working during her PhD studies, and so she had quite a big influence on some of the people, like [Austin] Henderson, who was a very well known software developer there. He started to realize that maybe this approach to try to make the machine more and more intelligent might not be the way to go. Taking on board some of the ideas from Lucy Suchman's work, he realized that you are never quite sure what's going to happen, so that you can't predict in advance every possibility, and maybe we've to re-think how we build systems, to allow for people to negotiate through troubles, and provide resources for them to do so, and not have the intelligent system try to "guess" what the user is trying to do. So I find it very interesting to follow the trajectory of someone like Henderson, as his writings become more open and exploratory, as to how to build technologies that support people in customizing and tailoring computer systems. And if you look at some of his much later work he has a company called Pliant Systems, i.e. pliant, flexible systems. He worked with Morten Kyng on a paper on tailoring and customization (Henderson and Kyng 1992). So you had this interesting mix of a people from a US research organization like Xerox PARC and Scandinavian people interested in PD work and in CSCW.

So, in my view, Lucy Suchman was a very influential bridge between these groups. And I had known some of these people, but it's not that I was at the same level, I was a little bit more junior. From San Diego, where I did have some informal links with Xerox PARC people, then to Aarhus. Interestingly, after I got to Aarhus I discovered people from Xerox PARC, who were setting up a new research lab in Cambridge, UK – called Rank Xerox EuroPARC initially – also visiting in Aarhus, which is a kind of interesting mix of corporations and Marxist-inspired activity! A while later, I ended up working as a consultant in Cambridge for a while and that was interesting too. When that started, a lot of people working there were psychologists, studying HCI approaches, but within a

few years there was a complete shift, so that the people who came in were mainly sociologists, The British sociologist Bob Anderson became head of the group, followed on later by another sociologist, Graham Button – both of them ethnomethodologists. Other people who were connected with Xerox at that time, included Christian Heath, and also Richard Harper went to work there, and other people well known for ethnomethodology ended up having connections there – so there was really quite interesting swing from psychology to sociology, from HCI to CSCW, at Xerox EuroPARC.

AM: The interest of your personal history relies in the fact that it sounds as a sort of allegory – as was the original John Bunyan's *Pilgrim Progress* – of the recent history of design. The 70's and 80's were indeed a period when cognitive psychology emerged as the new partner discipline of design. Just think of the relevance and success of Norman's book: *The Psychology of Everyday Things* (Norman 2013). Whereas with the new millennium design started to dialogue more and more with social sciences, especially STS, of which today's configuration has its roots also in the workplace studies you mentioned. It really seems that you were always in the right place at the right time!

LB: Yes, I know. I sometimes make a joke about being a sort of Forrest Gump figure. I happen to appear in various pictures and people wonder: "What are you doing there?". Because I wasn't the driving force, far from it, I was a rather minor player, in these strange inter-minglings, but I was often in between these groups, acting as a kind of a mediator, as I had links with the HCI, CSCW and PD communities.

AM: Can you tell me about projects in which you feel you were able to put all this knowledge somehow together?

LB: It is not so easy. When I was in Denmark, also because I was not speaking their language (although everybody in the University also speaks English) it has not been always easy to fully collaborate on empirical aspects of projects. Also during the time I was there, it was a time of transition – some projects were finishing, others were starting. I was not in the lead on those projects. Very often these projects started because somebody knew somebody and they were able to get access to a particular workplace. So in PD what you're trying to do is discuss with people about their current work situation, and also talking and showing how technology might create new possibilities, and then thinking about building prototypes. I think that some ideas from participatory design had a strong influence in the long run on HCI and one of them has certainly been paying attention to the necessity of creating prototypes. The idea behind it is that we are not going to get it right on the first time, so that you need to make a preliminary system, or part of the system, and have it

tried out by people in their work situation... rather than showing people abstract formulations – diagrams, charts, of what the system is going to be, which does not mean anything to them, you actually create some sort of a physical instantiation, even if it is fairly simple... just paper and pencil or even cardboard... but the idea is that through this material instantiation you can actually imagine working with this new system – you have a screen like this, you do this, you then print there, and people are then able to concretize what it might be like, then they can comment on it in a meaningful way... which is completely different from the idea of showing them a diagram with all these lines and arrows, which mean nothing to them. And that in the long term has had a big influence on many fields. But, the problem is that what happens when some approaches become popular, it just becomes a buzzword... “Oh, we do ‘PD’”, and it becomes banal, so somebody says: “We do participatory design”, and you ask, “How do you do participatory design?”, “Oh, we do user surveys, we ask people what do they think, and they are participating in our surveys”, but well this not quite what we mean by PD!

Another issue is that we must be aware of some of the limitations of the work we do. We can get into difficulties by showing people g possibilities, which can be interesting but also can be dangerous, because what you do is to show people a desired future, but they don't have it! In some cases, the question is what power do they have to make it happen? and in some cases they do not have that power, so in a sense after the project is over, what are they left with? It is potentially a problem, because now they know their work system could be better, it is like an expectation that is not fulfilled...

AM: The case of design eliciting desires and questions is a very interesting case, contrasting with the idea of design as problem solving. And this idea of design is somehow similar to that of radical or speculative design as proposed by John Dunne and Fiona Raby (2001; 2013), except from the fact that Dunne and Raby usually work in an exhibition-gallery context, whereas you were working within actual workplaces.

LB: Yes, and this is something that people are concerned about in terms of long-term engagement with people in work environments. And this is difficult with the research funding models we have. So this is the kind of institutional problematic, you know, you've got funding for two years on your project, or even less, and you've engaged with some people in a work domain, and you start to work with them, you are taking their time and they are engaged with the idea. And sometimes you make a prototype and then and they say: “Oh, we like it, we want it”. But the point is: it is not necessarily robust enough to give to people, or it doesn't fit into the current way they are working or whatever. And then it can be a bit of a let down... like in terms of what do we provide for the people involved... it can be an issue in some cases. Again, it has to do with building

with people, developing mutual trust and support having to answer questions such as: “Who are you? What are you doing? What are you looking to get from us?” And what will you do for us?”. Even if people have the best intentions, it is not straightforward, there are a lot of practical issues. So, on one hand it’s sort of ironic that PD has moved from being a very small number of people mainly in informatics, outside of the mainstream, who were not interested in publications, but more in working with the trade union world, to becoming gradually more mainstream and accepted on the academic front, and very popular, and so in a way some of the PD activity has become more mainstream within general HCI and user-centred design practices. This may be a good thing, but also things change over time, both internally, and also the external political, neo-liberal environment. Social democracy, and trade unionism are no longer as strong as they once were. In some case, PD is everything and nothing, and again, it’s a sort of ‘gentrification’ process, as in the urban context, an appropriation, that makes it different from what you expected.

After Scandinavia, I went back in Ireland for a brief period trying to set up a HCI and CSCW consulting practice, but I found there was not very much opportunity for this kind of work in Ireland at the time (1990). Then I went back to Denmark, then I worked in Copenhagen again for a while again doing CSCW, and then I moved to Limerick and I tried to set up a CSCW center there, but it was very difficult at that time, there wasn’t much funding in Ireland, and it was difficult to get funding to do field research, and I found it hard to get money from agencies or companies,. So after a couple of years that CSCW side of things reduced, and I moved into interaction design. Interaction design... what’s the link with the other topics? Well it’s a bit tricky. Some people like Terry Winograd, who was one important person in the emergence of interaction design also was influential in HCI and CSCW and PD for instance, and people like Susanne Bodker also crosses these fields. What is new with Interaction Design (IxD) is the engagement of the profession of Design with various technology communities. They had really been separate, both in terms of professional training, traditional design, industrial design, graphic design, often in separate professional schools, not in universities. It didn’t really had much to do with computing or interaction. But what you started to see was a lot of designers shifting from a focus on product to process and services, and they realized that the computer was becoming not just a tool to make things, but a processing element. So there was an interest on the design side – becoming more interested in the capabilities of these technologies. But on the other hand you had people on the engineering side who realised that the computing environments that were becoming possible moved them away from factory workplaces into homes and public arenas – areas where they had little experience or understanding. You have technologies such as ubiquitous computing and then suddenly computation leaves the computer box, the PC, and starts to become something that you can embed in the world and in the envi-

ronment. Then the issue is how do you mix the physical and the digital, how do you even think about 'augmented' desks: and so suddenly you are dealing with the presence of these things in your lives, it's not like simply *using* the technology or an application, it's actually living with the technology. So that the whole frame changes and we need to ask how do we design actual spaces that are now augmented with technologies? And actually back in my early Aarhus days, Pelle Ehn and I we came up with the idea of a kind of an exploratory student seminar on ideas from architecture and industrial design for people in software, in informatics. Pelle had an interest in the Bauhaus, in art and technology and the socialist orientation of that, and he thought: "What might a digital Bauhaus be?"... and I had an interest in architecture and planning, design ideas of creating spaces, thinking about inhabiting spaces, information spaces... and maybe we could get some ideas about the linkage between the physical and the digital. So we read various pieces by different people... we also used a collection edited by John Thackara *Design after Modernism* that had just come out, and had a bunch of interesting papers by people like Christopher Alexander, J. Chris Jones, and other design theorists that we found stimulating. The idea of interaction design became a place where we could explore ideas of human activity, human ways of interacting, embedded in new technologies. Thus, it shifts from the more engineering-focused work on the workplace. But again, there are some quite strong overlaps... some people like Terry Winograd who promoted interaction design also had a strong political interest in the work of PD, and he was one of the few supporters of the Scandinavian work in the US in the very early days. He also had an interest with Flores in the phenomenological approach, so that opened up again another idea of how we think about what computing is. "Do categories have politics?" (Suchman 1993). This brings us back to that debate between Suchman and Winograd that I helped bring together in the CSCW Journal, which several of us started in the early 90's.

To go back to your earlier question, in terms of particular projects in interaction design I was involved in, when I was back in Limerick... one was an EU project called "SHAPE – Situating Hybrid Assemblies in Public Environment". The focus of that was exploring ubiquitous technology, but it was part of a program called: "The disappearing computer" (DC). We wanted to move towards getting people away from thinking of 'using the computer', the PC or whatever, and instead, have them explore the world through augmenting the world with computation.. And this particular project, in which our Interaction Design Centre at the University of Limerick was involved, brought a lot of interesting people together, along with other DC projects. Just like, in the early 90's, an EU CSCW project called COMIC, and lead by the UK computer scientist Tom Rodden was very influential in developing a European CSCW community, the DC programme helped create an IxD European community. It was a very influential and significant project, and involved a lot of interactions, espe-

cially between some of the sociologists of Lancaster and software people. It was quite an influential project in the European CSCW, in which I was involved – I was still in Scandinavia at that time. And then, in the early 2000, this later DC project was SHAPE, in which we were designing museum installation: so there was a form of participation, it wasn't in the sense of 'full' participative design... in the sense that we talked with the curators in the museum, we did visitor interviews in the museum, we shadowed people, and so on. But we didn't exactly have a design team composed of a certain number of visitors or curators; we did interact with them, but the ideas came more from the design group. We thought about participation in different aspects of the study, and one of the elements was that we wanted to encourage engagement with the exhibits, we wanted to encourage people to question things in the museum, not just to think of the museum as a one-way device, you know, the place telling you how you should think about the past, or the people. We conducted the study at the Hunt Museum in Limerick: it's a museum exhibiting a large private collection, of Mr. and Mrs. Hunt. They had a huge variety of things, like Picasso's, Chinese ceramics, Neolithic bronzes, all sorts of stuff, some quite interesting. But what we tried to do, we still wanted to get away from this curatorial perspective of telling people things, so we discovered some objects in the collection that were of questionable provenance: what they were, what was their function, nobody knew! So we encouraged people, the visitors to the museum, to engage with these artefacts and think about what they were, and then we asked them to record their opinions, we tried to do that in a way that wasn't intimidating, by using a telephone-type device that was easy to engage with. And then we collected all the responses, and we played it back on a radio-type device and people could hear the opinions of others in real-time: so there was a sense of inclusion, a kind of engagement, in the sense of people participating in the outcome of the work... which was interesting, but not at the level of true participatory design. Here we have participatory engagement with the designed exhibits, so there is a n element of continuing the design of the exhibit through the involvement of the visitors – their contributions do become a part of the resulting exhibition, which is interesting. So, we come back to the very issue of participation: what do we mean by it, what are we participating in, and under what conditions?

AM: From what you are telling, it seems to me that the issue of questioning, of raising questions is something related to participatory design, at least in your practice. Before you said: "through prototypes you question things: what if things were different?"... and now you say that you wanted people to participate through asking questions and raising doubts rather than provide answers...

LB: Sure, sure. These are fundamental questions concerning how do we think about the standard story or the rhetoric around participative de-

sign practice. One of the other things we should mention is that sometimes there was a tendency for people to think: “Oh, in PD you do certain things”... specific techniques... Robert Jungk’s notion of Future Workshops, for instance, which is a useful enough technique in some cases to get people engaged, to have people start to talk in front of others, because it’s a very simple way of identifying what is somebody’s problem, what has happened in the current situation, and what is a possible future. So there is nothing mysterious about it, but suddenly you think that what some people want is just “give me the box of trciks (techniques) and we will implement that”. And that’s not really what it’s about, it is back to the issue of how you’re engaging with people; are you open to listening, as well as supporting some kind of enabling process? When you make something, what is it? It’s about going on a journey, a journey of exploration, rather than thinking of something finished. I know you’ve read the design chapter that Pelle and I wrote: Pelle has become very interested in this idea, especially with Latour’s work on things as assemblies and projects as matters of concern (Ehn 2008). And so he’s been thinking in terms of social innovation, as well; this changes what we have today in terms of the meaning of participative practice, and trying to engage with different publics. It is quite a different space.

As for myself, my own recent work is focussed more on the issue of the replacement of human intelligence by machines. For instance, there are many projects that try to predict and control human action. I feel that such an approach tends to actually limit our design conceptual spaces. The relevant issue is spending enough energy thinking how it could be otherwise, how we could augment human capabilities in different ways. It seems that we do not even explore that space. Rather than augmenting, it is all the time: substitute, substitute... Even within most of the ubiquitous computing models, approaches tend to focus on ambient intelligence. So, we try to model people, we try to guess what your desire is, what your affect is, what your emotions are, and then we try to do things via the technology. It’s a strange scenario when the technology is actually the actor. The person becomes passive. And this brings us to the old issue tackled by STS, and especially by Actor-Network Theory. The reason why I so strongly push on the actor perspective, i.e. the human actor, comes from what I was saying before. Which is saying: “look, people act!”. Whereas much energy is spent on making the machine more active and all we want from people is their input: we just want to track them, to follow their movements in a room. Actually, they do not do anything. It is the system that tries to do everything: it opens the window, it turns the controls... Why? Why not say: “Look, we have this, we have ubiquitous technology, we can have sensors, we can hav systems pick up lots of data”, but at the same time starting to think more creatively in terms of what people may want to do with that, and how people can shape and frame these things – turning data into meaningful information. What tools do we need to help people to engage with the material being collected – to organize, assem-

ble, see patterns etc.?). So to go beyond simply seeing people as mere assemblages within a system, I believe there are both philosophical and pragmatic problems with the AI and ambient intelligence story.

Instead, we could start to move within this other conceptual space, where we can start thinking of how do we represent data for people to interpret. In this way they could choose how they want to do things. Maybe in part they want to hand off to a machine, or in part they may say: “No, I want to control these things. I do not want the blinds to open automatically. I want to control it”. It is in that sense that the human-actor-narrative has meaning for me. It is in this context of that debate.

These issues are very relevant in for instance complex systems. Sometimes, there is the danger of trying to blame the human actor for everything. It is not that people do not make mistakes, but the issue is why they make mistakes, what is the context, the institutional arrangement around the system’s presentation of information. It is much more complex. For some people, the way we get over the underperformance of humans is to eliminate them through machines. But this is also problematic in many real world situations. We need to realise the over-automation can also be a problem in complex systems (see the book by Gene Rochlin *Trapped in the Net*). So, how do we think about these human-machine systems in interesting ways? I agree that the human actor is not the only “actant” in complex systems, and so this does make me interested in some fo the ANT formulations, although I feel my understanding of much fo this work is still very basic – but I am working on it ☺.

AM: I think that Latour and Actor-Network theory in general would not be so distant from your perspective: the main issue – very well pointed to by a recent paper published in *Social Studies of Science* (Sayes 2014) is distribution. It is a sort of misconception the one about opposing humans to machines, humans to non-humans. It has been a rhetorical gimmick to raise an important issue about human agency, with the aim not so much to praise machine or non-human agency but to take into account the distribution of agency. Thus, what you were saying it is not something that Latour could not agree on. So, instead of talking in term of human or non-human agency we could reframe the issues, following your concerns, in terms of designing systems that provide you with answers, even before you ask a question, and systems that allows you to explore the question, etc.

LB: Sure, sure. I’ve been working on this paper about human-centred design trying to question this concept (Bannon 2011). Within a particular context, it has meaning, especially historically. However, it has now become a sort of mishmash. It is even included in the ACM index of terms and it actually refers to just a mishmash of HCI concepts like hci, accessibility and a bit of visualization. In this reading, is not a conceptual construct. It has become more a convenience term in everyday conversation,

for talking about things. I myself, nowadays, also don't think it's a clear conceptual construct.

When I say “human-centred systems”, what I actually mean is systems that don't just model the user – try to put the user into the machine in a way, but rather allow for some space of flexibility for that person acting in the setting. My concern regarding this concept is also why I started trying to work with people in STS, through people around me that are more familiar with this tradition. For instance, I have been very influenced by people like Susan Leigh Star, the way she frames issues, I find it very perceptive, very meaningful. More recently an Italian colleague now at Limerick, Cristiano Storni, has been gently trying to educate me about STS approaches, and I am becoming more comfortable with some of the concepts, but I still have a long way to go! I have no problem with some of the STS work that I've read at times. Certainly talking about the role of car bumps and traffic policemen and things like that... you know... yes, certainly I can see its relevance... I understand Latour in terms of getting beyond the standard, human-machine conception, the social-technical divide. I think it's certainly intriguing and I have no problems with certain accounts in term of talking about networks, but I find the strong symmetry argument, for instance, extreme. It's a step too far somehow... I can't quite integrate that in my thinking at the moment.

I am not certainly here to pronounce about, you know, what I think is right or wrong: it's really about the utility of the theoretical formulations in addressing some of the questions we have. I am interested in how do we understand the human-machine relation, the social and the technical relation. So, I ask myself: “How do we talk about technology?”. The problem, as I see it, given that I am normally residing in computer departments is that when I talk with engineering and computing people, they talk about the technical, and the human is not seen within the technical. It is really about trying to understand how do we talk about these things, both at the macro level, like in the history of technology, and at the micro level. We can wonder about how to talk about technology following all these different people, Heidegger, Marcuse, whatever... but there is also a notion like computation, through which computers are considered as machines as well as humans. And, this concept allows to explore certain questions, but then it leaves other issues out. So, the question with STS seems to be not so much whether I can follow it, or I can understand it, but in some cases, I am not sure what to do with it, in terms of my design concerns...

AM: This issue of the utility of certain categories reminds me of my personal experience with student designers. I discovered that I have to rethink most of the things I tell them... I try to teach them, in term of their utility for design purposes, in terms of their translatability in design terms. But this is an interesting constraint that forces me to actually rethink many concepts and theories and question them on many more

grounds.

LB: Design... actually this is another reason why I got close to STS. To me one of the things is to get away from this notion of design as something that is done only through a creative act. I am not trying to trivialize the notion by saying that we are all designers. Clearly, there *is* a sense in which we are indeed all designers, in that we all shape our environment, we move desks around, we arrange artefacts in space, etc.... For certain purposes that is important, to think about our creative acts, the way in which we all shape, and move in, our environment. At the same time, there are certain skills people have who are very good at synthesizing, and taking ideas and exploring design space, and I appreciate those skills very much in certain people. But I don't like, as it happens for instance in architecture, this hubris that you find in some cases, where people state: "I am the (only) designer", "Design is my sole prerogative, it is my creative act".

That is why notions coming from STS such as "shaping", "infrastructure", etc. I think are helpful to show the imbrication of these things. Other notions such as the work involved in the construction of concepts such as categorization and classification (Bowker and Star 2000) are very important for people in computer science. The danger is that people in computing often take their model for reality. The people who build models are normally aware of the model limitations. The problem is that those models are picked up and used by other people. These people think the model is how the world is... No, it's not!

To think more about work in STS, that I find intriguing, look at Anemarie Mol. I found her work very inspiring. Her book, *The logic of care*, for instance (Mol 2008). I found it very insightful for my purposes. I think that is something very relevant for people who work in design and technology in terms of how we think about health. I am moving in this space, trying to discover, trying to understand, and if I look at my trajectory, I can still talk about it in terms of a 'pilgrim progress': pilgrimage here in its literary sense of a journey – not its religious significance. Some prefer to call this nomadism, but I do not agree, as nomads do not just journey, they move, but they do not move into the unknown, they move between known places. So, that idea of travelling like the pilgrim, in the sense of exploring, of trying to understand, that's what I could say of myself. This is what I have been trying to do: articulating, over thirty or more years, how to talk about this relation between the social and the technical, the human and the machine; how to understand it. And I will be the first to admit that I still have a long way to go!

Speaking from within computing, I always wonder how we can get it so wrong, how do we seem to build systems of all forms, pieces of software, technology in general, buildings, whatever, that seem so unfit for people and their activities. And how is it that, notwithstanding the smart people working in technology development, with all their knowledge,

with all of their skills, we continue to do this. This is what I wonder about: what's behind it, what are the underlying models or, better, the underlying assumptions that lead to this mess?

And then, what is it to be human, when we think of it. We need to reflect about the implications of holding assumptions about the need to design for stupid people, for people that are thought to be non-creative. So here, many concepts from anthropological and sociological frames of understanding – members practices, members language, accounts, stories become useful in order to counter this idea of stupid users. Think of notions taken from activity theory or practice theory: looking at mediating activities by moving away from the technology *per se*, trying instead to support our practices.

These are all framework, approaches, concepts that I find useful. Of course you could say that many of these concepts are coming from somewhat conflicting perspectives. But I don't have a single position. And even though I am associated with this term 'human-centered' computing, or design, today I feel that the term, while of historical importance, is not as useful as we look forward, as a way of thinking about new forms of human-machine interweavings. And that is where my engagement with the STS community will I hope bear fruit in the next years – in terms of new ways of thinking about the design of socio-technical complexes. We need to work on listening to, and understanding, each other better!

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