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Towards the Participation of Social Sciences and Humanities in the Practical Realms of Technology

Susana Nascimento, ISCTE-IUL/Lisbon University Institute, Portugal
Alexandre Pólvora, University Paris 1/Panthéon-Sorbonne, France

Abstract: The acts of making something are usually unfamiliar to social and human researchers, who are more accustomed to an observant position regarding the technical moments of conception and construction. From the standpoint of the social sciences and humanities, this paper argues for a different approach to technological realms. Our goal is to move increasingly from detached studies to more interactive encounters, mainly through a commitment to working directly with researchers and practitioners from engineering, design, architecture and other technical fields. We argue that, although multiple analyses have been attentive to technological phenomenons and its empirical ramifications, there still lingers an overall passivity towards the possibilities of transforming them through synergistic research and development platforms. The external character of social and human sciences contacts with technology can be changed via interdisciplinary efforts, ranging from conceptual exchanges to methodological interferences in construction stages. By presenting joint experiences, we aim at a clearer picture of actual and potential benefits from dialogues between social, human and technical disciplines. At the end, our goal is for social sciences and humanities to produce not only interdisciplinary spaces of interaction, regarding the technological spheres of invention, production, distribution, or use and consumption planning, but also to transform these same spheres, from internal concepts and processes to the concrete artefacts by which they are accountable for.

Keywords: Interdisciplinarity, Science and Technology Studies, Social Sciences and Humanities, Engineering, Design and Architecture, Technological Processes, Active Engagements

Introduction

WE STAND BY the notion that, for the most part, social sciences and humanities have passively regarded the technical phenomenon, in the sense that scholars within these fields have embraced research from viewpoints that are often set apart from technological practice itself. There is nowadays a sizable body of knowledge that pays due attention to objects, systems or networks, their material and symbolic meanings, their complex processes of invention, construction and use, the economical and political consequences of their existence, etc. But most concepts and methodologies tend to remain distant from active and deeper engagements with technical artifacts and those who build them, even when sometimes transforming the knowledge that sustains public policies and supports societal developments. In this context, we find a need for direct efforts that strive for concrete interventions on technological processes by social and human researchers, while at the same time continuing to increase and diversify our theoretical and methodological bodies of knowledge on the intricate pathways through which technologies form and transform our macroscopic and microscopic realms.

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Among social and human studies which have already approached the technical domains, we start by addressing how there is space for surpassing observational paradigms restraining most philosophical, sociological or anthropological research from moving into more intertwined spaces. Our purpose is to form comprehensive outlooks that pave the way to interdisciplinary actions with technological agents. Afterwards, we move on to present conjoint collaborations, in which researchers from both sides engage in active exchanges of expertise that range from conceptual discussions or normative guidelines, to qualitative techniques or practical procedures to produce objects or systems. In the end, our analysis touches the distinctive rationale of interdisciplinary practices, in order to define our own understanding of its possibilities in contrast with other approaches. Social sciences and humanities should be able to intervene in the technical process from the start, while striving for genuine interdisciplinary experiences that prove able to form and reform technologies from symbolic to material spheres.

Not Enough Engagements or Notes on the Reasoning of Deeper Interactions

Entry points to the technical realm haven't been straightforward for social scientists, whether regarding observational or transformational dynamics, and one of the reasons was that whatever fell into this realm was often considered as exclusive to it. That is, for a long time, technology and its constructions were preferably analyzed internally, largely as an isolated and self-referential field that evolves according to an internal logic (Martins 2002, 104-105). In recent decades we have seen a fierce backlash against these early perspectives, mainly in the field of Science and Technology Studies (STS), and particularly from Social Construction of Technology (Bijker *et al.* 1987), Social Shaping of Technology (MacKenzie and Wajcman 1985), or Actor-Network Theory (Law 1986, Latour 1987) that introduced several notions of technology as socially constituted, and pursued empirical research on laboratory and technical sites (Vinck 2003). Moreover, a wide range of other perspectives have equally embraced different stances regarding the role of social sciences and humanities in the study and development of technological material and symbolic dimensions with social forces at play. Among a diverse set, we should point for instance the study of social models based on ICT's, analysis on risk and uncertainties, biological and gender assessments, time and territorial paradigm reviews, or consumption and appropriation studies, amid others.

Nevertheless, while all these different strands have introduced more complete insights on how technologies sustain human and social life, how they are shaped by non-technological factors, or also, how they are always product of complex interaction schemes, social sciences and humanities at large have yet to cross a frontier of practical engagements. They aren't still widely connected with technological realms in ways that could enable joint platforms of invention, production, distribution, or use planning. Although interested in the mutual connections between technology and society, most STS scholars, for example, end up focusing on social dimensions of technologies and overlook technologies themselves (Mackenzie and Wajcman 1999, 22-23) and the possibility of permeating their processes of invention and construction with social and human knowledge. Considering both the set of conditions technologies entail and the consequences of their existence, as viewed and reviewed by Langdon Winner (1986), Albert Borgmann (1987) or Don Ihde (1990), several opportunities to transform our approach to technology, by active insertions of diverse social topics on the

technical features of objects, systems and networks, have been unfortunately subdued in wider moves for the recognition of cultural, economic or political factors in technology.

We need to answer the call of thinkers such as Gilbert Simondon (2001) and his plea for a technical culture capable of truly comprehensive views, and embrace a wider field of possibilities considering the links between technological practice and social and human studies. It is within this context that we run into the need of assembling new and borrowed guidelines toward more active interventions in technology. We ask for human and social researchers to serve as active workers in the critical nexus of science, technology and society. If empirical research advanced our knowledge on practices and representations of technological actors such as engineers, designers, artisans, and other practitioners, there are insufficient efforts to work directly on the actual technical modes that compose the objects, machines and systems, created by these actors. It is urgent to build and extend practical collaborations between these domains, between sociological, philosophical or anthropological insights with technical thinkers and makers. This will generate, magnify and improve social and human expertise on technology, with those who work directly on it, sketching, building, spreading and putting to use specific things. But it will also help to improve technologies overall, enhancing the procedures and choices that guide them, through the addition of alternative research guidelines.

Some perspectives have already been working to better inform and reconfigure processes of invention, production, distribution or use, from a social and human angle. What some call the 'empirical turn' in STS and Philosophy of Technology (Achterhuis 2001, xv) has brought not only working groups who advocate more contact with technologies themselves, but also others that promote direct exchanges with the people who envision and produce them. Noteworthy cases are the engineering studies by authors such as Carl Mitcham (1994), Billy Koen (2003) and Louis Bucciarelli (1994), focused on changing engineers' knowledge and codes of conduct by introducing sociological issues in their education and work practices. Mitcham, in particular, has extensively appealed, on one hand, to philosophers to engage more directly with engineers, and on the other hand, to engineers to create technologies more related to values of public democracy or quality of life. Moreover, in the forefront of this approach we now find research collectives such as the Dutch 3TU Federation, which aggregates centers and research projects from Delft, Eindhoven and Twente, and is composed by scholars like Peter-Paul Verbeek (2000), Peter Kroes or Anthonie Meijers (2006). Mixing philosophers, sociologists, engineers and other applied scientists, groups like this became a good example on how to support deep engagements with engineering fields, alongside conceptual debates on the observation and construction of artefacts.

In general, we are currently seeing an increase in the number of interdisciplinary projects 'that cut across the boundaries between the natural sciences or engineering, on the one hand, and the social sciences, humanities, or even arts, on the other' (Barry *et al*. 2008, 22). Active participations of social sciences and humanities on technology, through joint work with engineers, designers, architects, applied scientists, artisans, etc., however, haven't been sufficiently accomplished (Frodeman and Mitcham 2007, 508). It is our belief that technical and social realms of expertise are complementary in answering the question: 'As we "make things work", what kind of *world* are we making? This suggests that we pay more attention not only to the possibilities of studying the making of technical instruments and processes, but also to those of intervening in this making, with special attention to the production of psychological, social, and political conditions as part of any significant technical change'

(Winner 1986, 17). It is in a similar sense that you encounter, for instance, a call in design studies for further exploration of cultural and philosophical issues, and also further crossing of disciplinary boundaries (Buchanan and Margolin 1995). It is crucial for social and human research to get involved in such developments in the early stages of technological processes, and this needs to be accomplished more often, and via wider and clearer interactions.

Some of those who Pave our way and how they do the Work they do

Although interdisciplinary endeavours haven't been as usual and far-reaching as one would want in a technically charged world, we should point out a significant number of sites and projects where social sciences, humanities and technological disciplines are seen working together in the most diverse and interesting ways. The concrete routes by which this combined work proceeds, passes through conceptual debates on cultural notions of technology, ethical and normative considerations, the embedding of specific values in objects and systems, the use of qualitative and quantitative inquiries for construction models, building guidelines for predefined social objectives, or even, concrete joint technological conception of objects, systems and other technologies, step by step, and with the ultimate goal of intermingling social knowledge and technical action in specific processes. Engineers, sociologists, scientists, anthropologists, designers, philosophers, architects, etc., may work together in a variety of ways, especially when overlapping and exchanging ideas, models and tools towards the same goal of producing a concrete technical artefact. And they may do it, while at the same time sharing concerns and erecting larger public debates, on the material and social conditions such artefact may produce, prior to and after their construction.

One good example of such interdisciplinary commitment by social sciences with technological actors is the pioneer work of anthropologist Lucy Suchman at Xerox's Palo Alto Research Center (PARC), from 1980 to 2000. Suchman worked extensively on the relations of ethnographies of everyday practice to new technology design, and on reconstructing technologies (such as information systems designed to transform administrative work), by direct engagements with design, mostly via interdisciplinary teams[1]. By 1989, the Knowledge and Practices Laboratory and the Work Practice & Technology (WPT) research area was well established at Xerox, and the group was composed of four anthropologists and two computer scientists. Suchman's view on the their role in 'practice-based design' is enlightening, or in her own words: 'having such a team allowed us to actually build things, and that made a tremendous difference. How directly we can bring the things that we learned to bear on technology development is not just kind of general recommendations, (…) It actually forces you to deal with things in ways that if you aren't actually trying to build something, you could just wave your hands about'[2]. Their project teams were able to be critically engaged with cognitive and computer scientists on notions of intelligence, knowledge, etc., collaborate with system designers in order to specify meanings of human-machine interface and usability, or yet, to enact participatory techniques in design processes (Suchman forthcoming, 6).

By the same token, at the Department of Sociology of Lancaster University we find other good examples in some of its research centers and groups. The PalCom project[3] (2004-2007)

[1] http://www.lancs.ac.uk/fass/sociology/profiles/31/
[2] Conversation with Lucy Suchman. 1999. Available at: http://www.presencing.com/dol/Suchman-1999.shtml#four
[3] http://www.ist-palcom.org/

brought together an interdisciplinary team of practitioners, designers and work analysts to build a series of prototype technologies able to support material practices of coordinating emergency teamwork. Ubiquitous computing prototypes that included devices as GPS systems, wireless bio-monitors, mobile phones, RFID tags, still and video-cameras, grid resources, etc., were developed through ethnographic studies of material practice and participatory design collaboration. In close interdisciplinary work, social researchers introduced an analytical framework on situation awareness and decision-making as outcomes of practical activities, and also envisioned a series of workshops and future laboratories to test and assess prototypes' benefits and initial problems (Büscher and Mogensen 2007). Monika Büscher, a sociologist involved in this project, has an extensive experience in assuming the active role of co-designer and facilitator of a range of new technologies, usually in interdisciplinary collaborations (Büscher *et al.* 2010). *Getting actively entangled in the design and construction stages, or having an influential voice in its procedures, is a challenging process for social researchers, but it may also become a cornerstone for the success of any technical project, given specific human and social requirements*.

A more direct involvement in technological making processes from social researchers, either more prescriptively oriented, either more action-oriented, can be further informed by an intention to change technologies depending on certain criteria and intended goals. This relates with an extended meaning of active engagement, in the sense that it implies an attention to social problems, ethical consequences, or the conditions for which you are conceiving technologies. David Hess speaks of a second generation of ethnographic studies in STS as 'post-constructivist' that, 'rather than focusing on how knowledge and technology are socially constructed (…) examines ways in which they might be better constructed, with the criteria of 'better' defined explicitly and their contestability openly acknowledged as both epistemological and political' (Hess 2001, 240). The appropriate expression may be 'intervention' (Downey and Dumit 1997) in the scenarios where social researchers find news ways to step in and transform technologies. In fact, in the last decade there has been a number of perspectives that pursue design as possible mode of intervention by exploring future-oriented scenarios. As such, our call to envision new ways of developing technologies approaches for instance 'speculative design', as in the tactics of 'projecting' possible future consequences and 'tracing' implicit conditions of certain issues (DiSalvo 2009), or even 'critical design' in its defiance of preconceptions and its reflection on social, cultural, and ethical implications of emerging and future technologies (Dunne 2006).

With several scholars working in the convergence of STS and speculative design for example (Beaver *et al*. 2009), the Department of Sociology at Goldsmiths College and its Centre for the Study of Invention and Social Process (CSISP), has also hosted several initiatives aimed at interdisciplinary cooperation, from a seminar series on 'Design and Social Science'[4] to conjoint design projects. As an exercise of interdisciplinarity, researchers from the Design and Sociology departments, and the Interaction Research Studio[5] are working together in the project 'Energy & Co-Designing Communities', with the objective of designing technological prototypes to support alternative energy consumption. In its first phase, the team engages directly with local and virtual communities already concerned with environmental issues, to study their practical, personal and community experiences of energy

[4] http://www.gold.ac.uk/csisp/
[5] www.gold.ac.uk/interaction/

demand reduction. In the second phase, based on these ethnographic and participatory interactions, researchers design and implement prototypes to be tested in homes and community spaces. As stated, this project benefits from the combined expertise of their interdisciplinary team, using not only ethnographic fieldwork, social network studies, web analysis, design-led research methods, but also prototyping equipment and batch manufacturing skills, among other methodologies, which at the end allows a technically driven project 'to pursue a highly unusual form of social research involving large scale technological interventions'[6].

Within the 3TU Federation mentioned before, the 3TU Centre for Ethics and Technology[7] is also engaged in transforming technological procedures, but mainly through sketching present and future scenarios. Their specific focus is on the ethical aspects of scientific and technological development, the moral acceptability and responsibility of their application, and their contribution to the issues of health and safety, environmental quality, civil liberties, social justice, and the quality of life. This Centre pursues an interdisciplinary and applied approach, which is due to their singular status as a unique collaboration between the Technical and Philosophical departments of all three participant Universities. Most of their projects consist of providing ethical evaluations and normative frameworks discussed with, or to be used by, scientists, engineers or designers, for present or future technological innovations being mostly developed by their own technical teams. For example, in the project 'Communication Support & Its Ethics to Improve Patient-Centred Health Care'[8], philosophers, sociologists and engineers from Delft's Technology, Policy and Management Faculty, Netherlands Institute of Research on ICT and the company Almende, are developing a communication support system capable of suggesting solutions according to stakeholders' preferences, values and interests. The interdisciplinary teamwork around it revolves on how to incorporate values and related moral issues as security, privacy and efficiency in a multi-agent software system from the initial stages of design onwards.

Interdisciplinarity is Human and Social Meeting Technical for more than a Coffee

Social sciences and humanities may build deeper engagements and practical interactions with engineers, designers, architects and other technical developers, through an extended diversity of forms, depending on the goals of each discipline, the projects in question, their researchers, chosen methods, analytical frameworks, stakeholders and institutional support, funding opportunities, etc. Nonetheless, aside all distinct possibilities, what we deem as key to implement these exchanges is a truly interdisciplinary take on technologies, both technical and socially informed, that starts at the very beginning of invention stages, and never underestimates the conditions and changes sustained by technologies as concrete artefacts in concrete social realms. Considering participations of social sciences and humanities in the practical realms of technology, we follow interdisciplinarity as a mode of collaboration that goes beyond a simple disciplinary juxtaposing or shared teamwork, which evokes Helga Nowotny's sense of transgression in transdisciplinary modes of knowledge (Nowotny 2006). As such, we distinguish it from 'cross-disciplinary' research that often refers to a variety of

[6] http://www.ecdc.ac.uk/pdfs/ecdc-case.pdf
[7] http://www.ethicsandtechnology.eu/
[8] http://www.ethicsandtechnology.eu/research/projects/patient_centrered_health_care/

interactions across disciplines, usually hierarchical and without actual intermingling or invention of new paradigms, but also from 'multi-disciplinary' or 'pluridisciplinary' trends, which usually end up by merely summing limited and transitory contributions with nearly zero extended integration between disciplines (Klein 1990, 55-56).

Interdisciplinary research has recently gained major status with epistemological discussions around new forms of knowledge production (Gibbons *et al*. 1994, Nowotny *et al*. 2001). Some would teach us that interdisciplinarity relates to the need of current technological, scientific, economical or cultural problems, to be addressed through joint platforms, in the sense they are beyond the scope of a single discipline (Klein 1990, 11). Others, as Frodeman and Mitcham (2007), have been discussing how interdisciplinary endeavours stand for efforts to go beyond the constraints of disciplinary and specialized knowledge. These particular authors warn us of epistemological, political and metaphysical limits to disciplinary research: the first on the interwoven character of present lives, an argument similar to the complexity of issues just mentioned; the second on the demand to connect publicly funded research and education to community needs; and the third on the need to address past and future cultural clashes, alongside analyses about technological effects on social realms. But regardless of the background and rationale of interdisciplinarity, or especially on the emergence of new ways of scientific production (Pestre 2003, Shinn 2006), we may always erect significant and interesting work on and around these topics without following major heuristic debates (Weingart and Stehr 2000, Simonsen *et al*. 2010, Wagner, Bratteteig and Stuedahl 2010).

Active participations by social sciences and humanities in technology should be seen more often as significant contributions. Aside from major epistemological debates, it is through this path that we may not only embrace deeper engagements in design, but also modify the notions of technology that sustain it, by preparing ourselves to share, discuss and employ a wide set of our own theoretical and methodological tools in concrete settings, as we have observed and discussed in some of the previous projects. In a study of engineer and non engineer researchers with collaborative experience, one of the findings reported that 'while engineers provide the problem and context and ensure the results are applicable, non engineers provide structure to the project in the form of methods and theories' (Borrego and Newswander 2008, 129). There has been, and there still are several resistances to a more active engagement to non-practitioners' views, but the 'requirement that one must be formally qualified in a field in order to speak authoritatively about it not only restricts access but also narrows the analyst's imagination and capacity to ask probing questions; an insider perspective develops that does not always accommodate the outsider's questioning gaze' (Jasanoff 2010, 203).

Researchers meeting at the interfaces and frontiers of their disciplines in order to stimulate real synergies, can be directed along critical routes, following lines of thought like those developed by Frodeman and Mitcham. Links between social and human thinkers and technological agents in the processes of design and construction must similarly involve the goal of transforming the content of technologies themselves, that is, their modes of existence and ends. This is equally relevant to our argument and it touches, for example, analyses as those by Andrew Barry and colleagues in the critical comparative study 'Interdisciplinary and Society' (Weszkalnys 2006). At the end, they present an 'agonistic-antagonistic mode' intended to give rise to radical shifts, in turn able to shatter intellectual, ethical or political limits in knowledge practices. Several recent undertakings, such as the interdisciplinary ethnographies in the IT industry by Suchman, have an ontological rationale in the sense that

we may believe ethnography to have 'potential to transform the technological object from being merely an object or product into something which, depending on the approach, is locally situated, socially contextualized, emotionally attached or encultured' (Barry *et al*. 2008, 35).

From our stand as social and human scholars, efforts towards interdisciplinary partnerships have to take into account the stimulating opportunities to intervene directly in technological research and development, and the dangers of falling into subordination to other disciplines and compliance to non-integrative strategies (Forsythe 2001, 128). But our point counters these situations, defending instead that interdisciplinary should match a world where both domains produce perennial or recurrent interfaces, develop new or renewed ways of thinking about artefacts and their consequences, explore convincing interdisciplinary work platforms to create technology and, in a certain sense, try to build all of it by considering the pertinence of social and technical contextual needs. A privileged focus could be linked, for example, to some of the work at the STS Department of Rensselaer Polytechnic Institute (RPI), which included researchers and students in engineering, design, social sciences and humanities, in projects as the 'Great Bagpack Redesign'[9]. Their particular perspective of 'design by society' is framed within a STS branch that 'emphasizes where design goes from here, and on what it will take to reconstruct technologies more wisely and fairly' (Woodhouse and Patton 2004, 6), or what we may call an 'active' and 'intervening' orientation. At the end, joining efforts between disciplines, for a shared framework and practical orientation of the values, assumptions and consequences of technologies, should appear as fundamental, always respecting the need of balanced and beneficial links between all engaged disciplines.

Conclusion

In undertaking an analysis from the viewpoint of humanities and social sciences, we seek to put forward the case that interdisciplinary projects engaging social sciences, humanities and technical disciplines, should also be pursued through comprehensive, active and intervention oriented approaches to technological realms. We believe that a comprehensive outlook on technology implies an attention to social, cultural, political and economical factors, as analyzed extensively by recent perspectives, while equally recognizing the technical features of objects and systems, their conditions and consequences. But we believe even more in an active approach that, from our side, implies a closer engagement with technical processes, as early as the beginning of invention and design, in the literal sense of being near these processes, side by side with engineers, designers, architects and other practitioners. And above all, we believe in an intervention oriented approach that should introduce social and human debates, participate in technical ones, apply its methods, learn from technical methodologies, and mix it under a common goal of delivering something to the worlds we all live in.

As we have seen in the projects discussed here, there are currently very good examples of interdisciplinary experiences which present a range of interactions and practices in this sense, from ideas and conceptual frameworks on the contents and values of specific technologies, to sharing and using methodological tools that enable social, human and technological combined teamwork. All these enterprises show how technical and social practices and

[9] http://www.ccd.rpi.edu/projects_backpack.html

knowledge fields can be intersected in specific contexts or given certain problems or solutions. Regardless of scientific troubled scenarios or institutional and funding obstacles, interdisciplinary partnerships are not only feasible enterprises, but are worth pursuing due to the synergies they can accomplish. Conjoint experiences in this domain must be, thus, encouraged, multiplied and showcased by both ends of the debate, as one of the most fruitful paths of analyzing and producing technologies. They both benefit largely from such developments and interdisciplinarity gains a more profound meaning. Moreover, from here on it is easier to embrace other tasks concerning technology and its constructions. Comprehensive, active and intervention oriented approaches may lead us to other spaces of participation, and we may work not only towards applied applied interdisciplinary platforms, but also towards the common objective of configuring technologies through alternative forms, in order to make them more sustainable, distributed, democratic, modular, ethical, etc.

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About the Authors

Susana Nascimento
Postdoctoral Researcher at CIES-IUL of ISCTE-IUL since January 2010 with research grant awarded by FCT-MEC, and also Associate Researcher at CETCOPRA of University Paris 1 since December 2009. Management Committee Member and Portuguese coordinator in CIES of COST Action IS1007 "Investigating Cultural Sustainability". Ph.D. in Philosophy at University Paris 1, and also Ph.D. in Sociology at ISCTE-IUL In (2009), supported by scholarship grants awarded by FCT-MEC and Fundação Calouste Gulbenkian. Visiting Scholar at the Department of Science and Technology Studies of RPI/Rensselaer Polytechnic Institute in 2006. DEA-Master in Philosophy: Forms of Rationality/Anthropology and Sociology from University Paris 1 (2004). B.A. (Hons) in Sociology in 2001 and Postgraduate Studies Diploma in Communication, Culture and Information Technologies in 2002, both from ISCTE-IUL. Current research interests are situated in the area of Science and Technology Studies, with a focus on sociological, philosophical and anthropological issues, particularly on Public Engagement with Science and Technology, Participatory and Community-based research, Environmental and Social Sustainability, Local Energy Planning, and Science and Technology policy-making.

Alexandre Pólvora
Researcher at CETCOPRA of University Paris 1/Panthéon-Sorbonne, and Committee Member of COST Action IS1007 "Investigating Cultural Sustainability" at CIES-IUL at ISCTE-IUL. Ph.D. candidate in Philosophy at the Philosophy UFR of University Paris 1, and in Sociology at the School of Sociology and Public Policies of ISCTE-IUL, supported by grants of Portuguese Foundation for Science and Technology, Foundation Calouste Gulbenkian and Philosophy UFR of University Paris 1. Visiting scholar at the Department of STS/Science and Technology Studies of RPI/Rensselaer Polytechnic Institute in 2006. DEA-Master in Philosophy (Anthropology and Sociology) from University Paris 1 (2005), and BA (Hons) in Sociology from ISCTE-IUL (2004). Work fields and research interests are primarily in Science, Technology and Society and Social Studies of Everyday Life, with specializations in Philosophy of Technology; Phenomenological Sociology; Modern Material Cultures; Waste and Recycling; Environmental and Social Sustainability; Practical Interdisciplinarity Between Social and Technological Sciences; Participatory and Community-Based Frameworks for Technological Development; Open Science and Technology Models; Grounded Theories, Ethnography and Epistemology of Qualitative Methods.

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