Changing Worlds

Ideologies, Utopias and Ambitions in Science & Technology

edited by Marlene Altenhofer, Leo Matteo Bachinger, Boka En, Jasmin Engelhart, Victoria Neumann, Nikolaus Pöchhacker, Mercedes Pöll, and Angela Prendl

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Matilde Igual Capdevila is an architect and artist from Valencia, Spain. Her works combine spatial installations, story-telling, collected obvservations and drawings. Lately she has been exploring future scenarios, everyday life and public spaces. The fields of her research/practice are diverse and vary depending on the opportunities at hand, however the same question motivates them: how can we live better together? After completing her studies of Architecture at the Polytechnic University of Valencia and graduating with a MA in Art&Science at the University for Applied Arts in Vienna, she is currently unemployed.

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Mercedes Pöll, for this special issue, has ventured into writing about self-tracking, risk, and governmentality from a background that combines Gender, Sexuality, and Queer Studies, music performance, and a propensity for worrying. Their PhD thesis was concerned with the experiences of people in relationships without sex. Mercedes' writing, teaching, and current projects involve, among other things, various ways of relating; queer approaches, methodologies, and ethics in intimacies research; and tensions between identities and practices.

Angela Prendl holds a BA in Cultural and Social Anthropology and is currently completing her Master's degree at the Department of Science and Technology Studies (both University of Vienna). Her formal training and work as a graphic

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Editorial: Changing Worlds?

Marlene Altenhofer, Leo Matteo Bachinger, Boka En, Jasmin Engelhart, Victoria Neumann, Nikolaus Pöchhacker, Mercedes Pöll, Angela Prendl

Contemporary societies are permeated by technoscience: knowledges[1] and artefacts alike influence policy decisions and economic endeavours as much as choices in our everyday lives. Many who have worked on these technoscientific influences have shown that they are never neutral, but have the potential to carry power relations into all parts of society.

Winner's (1980) arguments on how artefacts can play political roles through their very material properties – though criticised by some (cf. Joerges 1999) – serve as an excellent example for how technoscientific artefacts can partake in producing political landscapes. He argues that poor and particularly Black residents of New York were effectively prohibited from reaching certain areas of the city by overpasses that were too low for buses – the main means of transport for New York's poor – to actually pass through underneath. At the same time, artefacts can be used in ways that do not adhere to or even contradict their initial design, thereby circumventing or subverting discriminatory effects (cf. Akrich 1992; Eglash forthcoming). Of course, this applies equally to artefacts that are intended as liberatory, but lead more precarious existences in their everyday lives (cf. Hasson 2012; Moser 2010).

Focusing on the role of knowledges, (Black) feminist and postcolonial critiques from within as well as outside academy have long suggested that scientific knowledge bears the marks of those most powerful in its making (cf. Barad 2011; Boston Women's Health Collective 1970; Collins 2000; Harding 2011). Foucault's (1998; see also Hacking 2007; Rose 1999) work on discourses – particularly scholarly and scientific ones – highlights their shaping of the subjects of social orders. Using the example of scientific classifications of 'the homosexual', he traces the emergence of an intelligible identity that people can take on (or not). The knowledge practices

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that have produced 'the homosexual' have had a great many effects (positive and negative), ranging from producing an identity concept rife with pathologisation, discrimination, and oppression to co-constructing the groundwork for early homosexual liberation and modern-day gay rights movements (Tobin 2000). Similarly to artefacts, knowledges lead complex lives that cannot simply be reduced to being either oppressive or liberatory (cf. Collins 2002; Delgado 2010; Epstein 1996; Russo and Beresford 2014).

It seems fair to say, then, that science – as well as knowledges more generally – and technology have enormous impacts on the ways our societies are structured and function on an everyday level. It also seems fair to say that this impact is both shaped by and, in turn, shapes the ideological foundations of these societies. Finally, it seems equally fair to say that the outcomes of particular technoscientific practices are not predetermined: knowledges and artefacts alike can both oppress and liberate.

This was our point of departure for organising the first *Changing Worlds* conference with the support of the Department of Science and Technology Studies at the University of Vienna in 2014 from which this special issue emerged. The name alludes to multiple meanings as not only are we changing the world – or *worlds*[2] –, but they are simultaneously changing us, and are never stagnant in the first place. Our aim was to examine this interconnectedness – particularly in its relations to science and technology.

Proceeding from this overarching interest in the enmeshed changes and changings that we are part of and take part in, we put a particular emphasis on the *ideologies*, *utopias*, and *ambitions* that permeate science and technology. Following Sheila Jasanoff's (2004) suggestion that 'the ways in which we know and represent the world … are inseparable from the ways in which we choose to live in it' (2), we were interested in how these various ways of choosing – or wanting – to live in the world might be interlinked with technoscientific arte-/facts[3].

The conference combined various ways of engaging with the world, from scholarly research into how worlds change us and how we change worlds, to artistic envisionings and explorations of other possible worlds[4], to the production of technoscientific artefacts with the intention of changing the world, to collective exercises for finding 'our' places in these worlds that we inhabit. We are very happy that this special issue provides a similar breadth of ways of seeing and changing worlds:

Examining the politics of artefacts, **Olesya Benedikt**'s contribution explores the inbuilt power relations of the Smart City Songdo in South Korea: a city built from scratch, incorporating the newest and shiniest forms of technology – but for whom? As Benedikt shows, the city is built around a very one-dimensional vision of its population. In selecting highly educated individuals and putting them in a technological eco-system that replaces nearly every inconvenient aspect of daily life, Songdo's residents are given a very specific freedom – the freedom to be productive. Benedikt's argument thereby is not so much that the city generates a form of segregation. The city pre-selects white-collar workers or breeds them in a climate of technology-driven governance. Surveillance is here less emphasised as a means of social control, but more as a service of the city to its dwellers. Benedikt's article exemplifies what Scott (1998) meant when he described the meaning of seeing like a state. In Songdo, the absolutist gaze from above with its well-meaning attitude reminds us of the all too common Big Brother. Benedikts contribution sheds light on the worlds built into concrete, steel, and fibre cables, and leaves us with the question: what would an inclusive Smart City look like?

Continuing these explorations of how artefacts, knowledges, and politics are connected, **Boka En and Mercedes Pöll** investigate the ever-increasing dissemination of computers and digital devices – such as smartphones in pockets and bags, or wearables directly on the body –, specifically in their role in self-tracking as popularised through health care systems and the Quantified Self movement alike. In reference to Foucault, En and Pöll examine how self-trackers engage in practices of governmentality and subjectification of the self. In doing so, the authors show how these practices often buy into neoliberal logics of individual responsibility and constitute an image of humans as always imperfect, and therefore to be improved. There are norms of optimisation and scientification at play, using specific notions of risk that are rooted in encountering the imagined human inadequacy and deficiency. Understanding self-tracking as multiple practices, En and Pöll argue for changing the world of self-tracking practices through queering them by enabling experiences beyond dichotomy-laden, benefit-maximising, and efficiency-increasing neoliberal ideals.

Chiara Carrozza and Andrea Gaspar address aspects of change in the context of digital knowledge production from a different angle. In their contribution, they narrate their attempts to study and make use of digital ways of knowledge pro-

duction in the social sciences, which after some familiarisation leads them to rethink and change their methodological approaches. Gaspar's realisation lies in the difficulty of studying ethnographically how digital tools change academics' ideas about research practices without reflecting one's own methods. Carrozza – after being initially frustrated with the lack of outcomes of her computer-aided analysis – comes to see her own method as an epistemic object worth investigating. On the basis of their experiences, Carrozza and Gaspar argue that it is useful to think of research as a craft that continuously creates knowledge in form of prototypes – and take this seriously in their own practice. They do not only theorise about knowledge production as prototyping, but actively perform it in their article in that they open up their research process in a way that includes what is often left out in descriptions: the failures and the changes.

Doris Arztmann, Teresa Wintersteller, and Veronika Wöhrer also address the role of knowledge-making practices by examining modes of participatory knowledge production in Participatory Action Research (PAR) with children. Their contribution asks how the roles of and connections between 'laypeople' and 'experts' may change in and through PAR. For example, Arztmann, Wintersteller, and Wöhrer connect 'traditional' academia with school education by working closely with children and young people – not only letting them participate in research, but encouraging them to work as researchers themselves. The authors critically address the role of power relations in participatory research, both in their own role as researchers and power hierarchies amongst their (other) research participants. They relate their experiences and insights to arguments from Disability Studies.

Linking participation and artefacts, **Tom Bieling, Tiago Martins, and Gesche Joost** also approach participatory work from the angle of attempting to work towards greater inclusivity. They argue that the concept and demands of diversity offer both challenges and opportunities particularly for designers, paying close attention to how different perspectives can be reflected in artefacts and design practices. Describing their experiments with designing for empowered interaction (including the participation of deaf-blind people in the design process), Bieling, Martins, and Joost argue that design should emphasise diversity and its strengths. Their *Lorm Hand* is a case in point for how attentive design of assistive technologies for deaf-blind individuals can emphasise talents and strengths rather than *correcting* 'disabled' or 'handicapped' bodies. Instead of taking for granted stand-

ardised, able-bodied users, the authors bring bodies with their different abilities into the focus of design. Equally an assistive device and outreach instrument for deaf-blind activists, the *Lorm Hand* becomes an interesting experiment for how design *in* society can become generative for societal change – particularly in regards to what can be accomplished through invitation and encouragement instead of adjustment and top-down intervention.

Andrea* Ida Malkah Klaura seeks to pursue inclusivity by leaving behind a science characterised by exclusiveness and elitism. Instead, their utopia embraces partiality in scientific endeavours, thrives on (self-)reflexivity, and calls for the inclusion of all those who may not be at the forefront of doing science, but still feel its effects – as well as people who bring their own knowledges and inspirations into scientific practice, but may not be heard. Drawing from feminist technoscience, Klaura moves towards this utopia by emphasising potential in the concept of trans*disciplinarity and inclusive efforts like Participatory Design, arguing to 'actively intervene in each other's work as well as in our own work to come to new insights'. Klaura's Reflective Collective Positional Mapping exercise conducted at the conference gives insights into how the conference participants positioned themselves and reflected on obstacles in their own trans*disciplinary practices.

Finally, **Benedict Endler and Matilde Igual Capdevila**'s contribution constitutes a fictional piece of academic writing imagined in an alternate future in which the field of Science and Technology Studies (STS) has risen to prominence in social-scientific practice and public consciousness – a future whose direction was determined by majority vote of the Changing Worlds conference participants. Capdevila and Endler set their article in the 2030s, 20 years after the actions of a radical eco-activist group (the 'Green Storm') influenced engagements with science and technology as well as social issues on a global scale. From this vantage point, they imagine the aftermath of the Green Storm and examine/imagine, among other things, the development of new STS-related fields and theories, the growing relationship between STS and popular culture, the introduction of STS concepts into religious debates, the crucial role of STS thought in policy-making, as well as internal divisions. Capdevila and Endler's imagined future lives on as the result of past events, reactions and decisions, and interpretations thereof, coloured by intent as well as circumstance. What remains present is their awareness of change as a historical and present reality: 'History was written, by rewriting it'.

Each of the contributions frames its own microcosm of changing worlds through its emphasis on different ambitions, utopias, and ideologies. They represent a collection of text-based arte-/facts that appear in their particular forms in a miasma of circumstances, coincidences, and intentional decision-making on many people's parts – and within the greater frameworks that enable, restrict, and influence our abilities, opportunities, and willingness to take part in this publication process, worlds that change (around) us, and ways of changing worlds ourselves.

The texts in this special issue share many similarities and differences, and the order in which we present them here is but one of many possible ones. There are many threads that you can trace that hold the individual contributions together, from the links in the above segments, to concerns with artefacts and knowledges, to a shared interest how we are enabled to or barred from participating in changing worlds. We invite you to formulate your own connections between the different parts that make up the whole that is this special issue – and, particularly, to try to connect what you experience therein with your own life, your work, your visions for science, technology and society, and opportunities for change.

Endnotes

[1] We use the plural term 'knowledges' to emphasise that there is not simply *one* knowledge that people refer to, but manifold knowledges and knowledge practices that are situated in and shaped by specific socio-historical contexts (Haraway 1991).

[2] http://foucaultnews.com/2013/12/08/poststructuralist-humour-2013/ (accessed 10 Jan 2016)

[3] While we have been talking about 'knowledges' and 'artefacts' as distinct notions so far, we want to emphasise that these two facets are often inextricably entangled.

[4] This phrase is borrowed from the title of Matilde Igual Capdevila's contribution to the 2015 instalment of the Changing Worlds conference.

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The Valuable Citizens of Smart Cities: The Case of Songdo City

Olesya Benedikt

ABSTRACT: The article on hand uses the city of Songdo, South Korea, to examine how self-proclaimed smart cities select their citizens, and to what effect. It shows how the smart city uses technological systems to refigure citizens into subject declared *valuable*, fit for competing in the global knowledge economy, and thus highlights the exclusionist aspects of the notion of a smart city. The form of governmentality to be found in this city, the article argues, is highly socially selective and holds the potential to profoundly upend societal constellations, pushing those who are already marginalised by the knowledge economy even further to the rims of society. The smart city, at least as it is envisioned in the case of Songdo, is in this sense an expression of highly efficient clientele politics. Carried by a public-private cooperation, it seeks to establish a new estimation of the relative moral values of various professions in urban environments.

KEYWORDS: smart cities, valuable citizens, governmentality, social selection and exclusion, technological systems, knowledge economy

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In recent years, there has been much talk about the emergence and development of the new urban trend known as the *smart city*. In most contexts, this new conceptual trend carries positive connotations by standing for an intelligent, environmentally friendly or efficient urban space, which seeks to improve the quality of life of its citizens. However, there is also an exclusionist side to the notion of a smart city. This article examines how and with which societal repercussions self-proclaimed

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smart cities select their citizens and use technological systems to refigure them into subjects declared *valuable* – all to compete in the global (knowledge) economy.

Originally, the term *smarter city* was coined by IT consulting company IBM and defined as an urban entity offering a better understanding and control of urban life while optimizing the usage of limited resources (cf. Cosgrove et al., 2011, p. 1). At first, this term referred to current urban development projects which have been built from scratch, such as Masdar City in Saudi Arabia, PlanITValley (also known as Living PlanIT) in Portugal or Songdo City in South Korea (Ryser, 2014; Greenfield, 2013). These urban environments have been constructed by cooperatives comprising different stakeholders, particularly local governments and renowned IT companies (such as IBM, Cisco, Siemens, Intel, Samsung etc.) as suppliers of technology (hardware). According to the urbanist Adam Greenfield, we currently observe an unusual movement in the history of urbanism, since never before large-scale commercial actors (IT companies) have been so deeply involved with the building-up of a city's ideology (Greenfield, 2013; see also Townsend, 2013). These companies promise to transform both the newly built and existent cities into smart environments, '*where information technology is wielded to address problems old and new*' (Townsend, 2013, p. xii). Where the cities of the twentieth century have learnt to coordinate '*the flow of people and goods in a rigid, predetermined way*' (ibid.), the so-called smart cities of our century are going to predict, optimise and smoothly coordinate every single movement within the city in real-time – with the integration of information-processing technologies (sensor networks, cameras, RFIDs etc.) into the very urban fabric (objects, surfaces, spaces, bodies etc.) and interconnecting them through one pivotal operation center in each city. In such cities – thanks to technological systems – citizens would never get stuck in traffic jams, produce less CO2, constantly know where their personal effects are, have immediate access to medical staff or education programmes, etc. The technology-driven, automatically coordinated environment will free them from any obstacles to everyday life and thusly improve the quality of life – according to the promises and visions of this kind of technological utopia. The canonical smart cities such as Masdar, Songdo and PlanITValley all tell a similar narrative about the current way of life in technologically-managed urban environments and suggest themselves as prototypes of future cities.

In the meantime, the definition and notion of smart cities attracted great attention from city administrators, finding itself applied to hundreds of other cities

worldwide. This led to a diversity of smart city initiatives and different social, technical or economical emphases within smart city policies. When I started my research on smart cities in 2011, there were few analytically and critically written academic works on the subject. Over the last four years, the situation has changed considerably: many books and articles have been published, covering different aspects of this urban phenomenon critically and reflectively. However, still little is to be found when it comes to qualitative research on the connection between *smart cities* and the production of their desirable citizens against the backdrop of the promotion of global knowledge economy. The geographers Olds and Thrift have already said that almost all Western states follow a rhetoric and a measure of modernisation that is based on fashioning citizens who can become '*actively seeking factor[s] of production*' (2005, p. 275). This attitude, which was adopted from the world of business, is meant to produce subjects within the context of the state that find their place in '*contemporary, and especially future, systems of accumulation*' of capital (ibid., p. 274). The new urban trend *smart city* seems to be shaping up to produce ideal sites for the implementation of such subjectivisation processes. Accordingly, the present paper asks: How and with which societal consequences are smart cities – the latest (but not first) technological utopias – connected to the refiguring of citizens into valuable subjects for the purposes of the knowledge economy?

To answer this question, I focused on the smart city of Songdo, South Korea – harnessing qualitative methods of the social sciences and cultural studies, such as small-scale participant observations, expert interviewing, mappings of the city, and document and media analysis. Since I set out to examine the connection between *smart cities* and its desired citizens, I took particular interest in the ideas, imaginations, objectives and notions of those who conceive and realise the city. To break down the emerging subjectivisation processes of the *valuable citizens*, I applied the historical point of view and the theories of governmentality studies, which, thanks to their wide perspective and thoroughly developed methodological and theoretical toolkits, lend themselves well to analyses of current 'societal upheavals' (Lemke et al., 2012, p. 9). Further, I am confident that special attention should be given to developments of smart cities such as Songdo, because they do not represent one-off, singular projects (Lindsay, 2010). Instead, with the rationale of the increasing urbanisation worldwide, other cities just like Songdo are to be built in 'copy and paste' fashion, e.g. the 'Meixi Lake' development in China (Woyke, 2009). However, before I start to elaborate on this novel urban develop-

ment and its societal consequences in more detail, I would like to further introduce the urban project of Songdo and the theory of governmentality.

Technological Utopia: Songdo

Fig. 1: The city of Songdo

Songdo City is planned and built as a leading international business district in Northeast Asia, located in the Incheon Free Economic Zone (IFEZ), South Korea. It is supposed to become a business and research hub, which targets to build an environmentally sustainable community by using advanced information and communication technologies on a large scale (IFEZ, 2010). Construction began in 2003 and is slated to be completed by 2020. This new city consists of forty percent parks and green spaces, rendering its urban space highly walkable (see fig. 1). Its current residents can use water taxis, public transportation or bicycles to move without cars. To make the city more sustainable, innovative waste management was developed: every flat in the city has a pneumatic trash pipe. Once residents of Songdo throw their domestic trash in this pipe, it will be supplied to a central waste processing centre by the underground system and recycled there. But more than just waste, grey and rain water are also collected for irrigation and recycling. For these and other reasons, Songdo City was chosen in 2012 as the host city for the Green Climate Fund (cf. GCF homepage). In combination with various green management systems, Songdo already provides its residents with so-called 'smart services' such as effective traffic management, smart health care or smart home management – which means that citizens can easily connect to the city government, schools, universities, hospitals and more from the comfort of their home via tele-presence, at the press of a button.

This self-appointed smart city has been constructed by a joint venture made up of the US real estate development Gale International and the Korean construction giant POSCO E&C, with the support of the local government (Songdo IBD,

2015). The joint venture purchased 5.77 square kilometres of territory reclaimed from the ocean and, in turn, was awarded by the Korean government the contract to develop the city of Songdo (Shin, forthcoming 2015, p. 7). Accordingly, this city has been called '*the largest private real estate development*' (Lobo, 2013; Viser 2014). Once construction was complete, 252,000 people were to be housed in the city (IFEZ, 2010), benefitting from the city's advantageous location (its proximity to the Korean capital Seoul and the international airport) and enjoying the '*unparalleled quality of life*' promised by the city (Songdo IBD, 2015). The latter is traced to the implementation of various smart services described above, which are backed by networked technological systems, including pervasive RFID, sensor networks, CCTV, telepresence systems, wireless Internet etc., and provided to the city by private companies such as Cisco Inc., 3M Worldwide or United Technologies (ibid.).

A theoretical excursus on the concept of governmentality

The analysis of the connection between smart cities using the example of Songdo and refiguring process of its citizens into valuable subjects proposed in this article is based on theoretical considerations adopted from the concept of governmentality. Originally proposed by the French social theorist Michel Foucault, governmentality studies concerns itself with the meaning of governing. Beyond mere force or oppression, Foucault drew attention to the meaning of 'technologies of the self' as an important form and instrument of governing and power. By technologies of the self, he understood different means and processes (education, exercising, self-management etc.) which can be used by individuals to transform or modify themselves (i.e. their bodies and minds) for reaching different goals such as the state of integrity, happiness, liberty and purity (Foucault, 1984, p. 35f). The task of the government therein is the invention and promotion of this kind of technologies of the self. However the latter are mostly coupled to particular governmental targets (Lemke et al., 2012, p. 29), such as the production of healthy, wealthy and/or knowledgeable citizens fit for competing in the world economy. The term governmentality thus semantically combines the act of governing and the mentality behind conducting governance. Foucault himself explains a key meaning of governmentality as follows:

> First, by 'governmentality' I understand the ensemble formed by institutions, procedures, analyses and reflections, calculations, and tactics that allow the exercise of this very specific, albeit very complex, power that has the population as its target, political economy as its major form of knowledge, and apparatuses of security as its essential technical instrument. (Foucault, 2007, 144)

After applying this abstract term to urban spaces, as sociologists Thomas Osborne and Nikolas Rose (1999) did already more than ten years ago, we find that there are many ways to territorialise governmentality in urban form by producing certain 'truths' about cities – such as healthy, risky, or enterprising cities. For example, since the nineteenth century, diseases in European cities were not only 'governed away' through improved water quality, sewages etc. but also through the promotion of health. In Osborne and Rose's words: '*If the habits of those who live in the city are in large part bad habits, then it is necessary not so much to act directly upon those habits themselves but to modify the city so as to induce the right kind of habits'* (ibid., p. 743). Multiple strategies and tactics can be applied in order to achieve a desired urban population consisting of subjects with the 'right' habits: development and establishment of certain kinds of city architecture (private/public spaces etc.) and infrastructure (flow regulation, accessibility etc.), rules (written and unwritten), norms, promotion of 'desirable' life styles and more.

To sum up, the term of governmentality – as it used in the context of this article – enables us to reconcile different strategies, tactics and actions of diverse stakeholders (city administration, private sector and citizens), which synergistically produce a profile of desirable citizens in smart cities built from scratch. In the case of Songdo, the governmental assemblage of tactics consists of selecting and – through technologies of the self – re-figuring valuable citizens, as well as of replacing non-valuable citizens with technological systems. All to become a smart city known as a humane and moral environment appropriate for modernity, and to compete in the global knowledge economy.

Selecting *valuable* citizens

The historical origin of Songdo illustrates how the city found its citizens: namely by selecting them according to particular national, social, and economical objectives.

In most relevant academic literature and journalistic articles about Songdo, readers learn that this city was built from scratch; more rarely, that its territory had been partly reclaimed from the ocean; and, even more infrequently, that it had accommodated small fishing villages before. However, this kind of information avoids raising any hackles by painting Songdo as a history-less city (see for example Roy, 2014; Arbes/Bethea, 2014). I disagree with this common assumption by considering the meaning and consequences of this urban development from a historical perspective. According to Do (n.y.), both the coastal wetlands with their rich flora and fauna and the homes and working areas of numerous fishermen had to be eliminated in order to make way for the new city. In view of the displaced fishermen and the amount of sea life destroyed, there can hardly be talk of a construction on a *blank slate*. Rather, the construction process can be read as a conscious decision on the part of the South Korean government to adapt its territory, and the ways in which it is used, to the globally expanding economic objectives and sources of the 21st century. While between 1950 and 1970, this area of land was a fishing industry zone that had been specifically selected and promoted by the government (ibid.), it was now declared a site for the emergence of global business and research hubs, designed to keep South Korea competitive in the international knowledge economy. The tour guide I met in the 'Compact Smart City Hall' museum located in Songdo recounts how the idea for building the new city was born:

> The story behind [Songdo] is…it started in 2003. At this time was the president Moo-Hyun Roh and he was thinking…since we have China next to our country, and they had already free economic zones like Shanghai. They got a lot of attention. And the president thought, we don't have this kind of cities in Korea. So, he was thinking, if we can build the city like Songdo, he thought it will be a good chance for Korea to step forward.

The information given in Korean media is, as a whole, not transparent enough to know what exactly happened to fishermen and their families after falling victim to the presidential ambitions for South Korea to leapfrog. One of the local artists provides us with insight into the city building process by using satirical cartoons to illustrate the fishermen's plight (see fig. 2 and 3).

Hardly ten years later, the president's idea about a new city had turned into a

physical urban space. Having taken a walk through the city in 2011 and considering the current layout of Songdo, it becomes quite clear that the city of Songdo is subject to a strict segregation into a small number of sectors – office spaces, commercial districts, residential areas and green and other public spaces (see fig. 4). In those areas marked off as office space, city inhabitants can work in select industry sectors, which include: biomedicine, the high-tech industries, logistics, finance or international trade. A fragmentation of the urban space this strict facilitates the rise of a dynamic of movement between the segments on the part of the residents, who split their daytime between the physically separate spaces on one level and the various groups thusly segregated (workers from specific industries, service providers within the commercial district, housewives/housemen and so on) on another. Such a segmentation of urban space brings up associations with Fordism, whose overriding objective was to increase productivity.

Fig. 2: A satirical cartoon depicting representatives of companies and organisations involved in construction. They are pushing a fisherman off a ship labelled 'Tidal Power Plant Development', saying: 'All that needs to happen is you taking the plunge!'

Fig. 3: A satirical cartoon depicting a teacher and her students in a museum. The teacher explains to her students which creatures used to live on the territory that now houses Songdo. A fisherman figures among the extinct marine creatures.

Looking for a more detailed description of the professional opportunities offered by Songdo, I constantly found myself pointed towards the connection between an 'unparalleled' quality of life, technology, resources, innovation and a 'world-class' international community. This 'international community' is intended to be made up of 'forward-thinking' individuals. From Songdo's official website:

> The people of Korea and their international partners are creating the new gateway to Northeast Asia, a city designed around the people who live and work there. The forward-thinking individuals and companies who make Songdo IBD [International Business District] their home will experience an unparalleled quality of life as technology, resources, and innovation come together to create a world class international community. (Songdo IBD, 2015)

Taking these claims at face value, it follows that the city of Songdo was built around a target demographic of potential inhabitants that is very clearly demarcated: forward-thinking professionals and their families. As the sociologist Robert Hollands (2008) hypothesised already, the self-appointed 'smart cities' will increasingly polarise knowledge workers and the uneducated, poor local population, on the economic, social, cultural, and spatial axes. He is of the opinion that the term 'smart cities' in itself already comprises a notion of social polarisation (p. 311f.). The geographer Alberto Vanolo (2014) agrees with Hollands and assumes that 'smart cities' will find little space for those who are 'uneducated' in technology, poor, or otherwise marginalised by the smart city discourse (p. 893). Looking at Songdo's overall rents as well as its strict spatial and occupational segregation, this city does not seem to accommodate 'non-forward-thinking' or, in other words, non-*valuable* individuals at all.

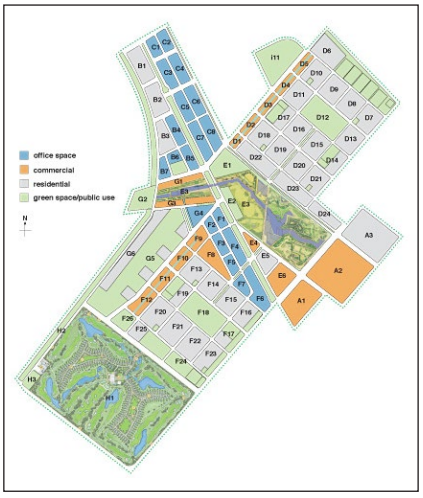

Fig. 4: Map of topological segmentation of Songdo

Now that fishermen and their families had been expelled and replaced by wealthy citizens, one might be inclined to think of Songdo and its citizens as a newly built and organised *gated community*, where at least working-class service sector employees still commute to the city for work and go home upon completion of their day's tasks. However, Songdo goes a step further and tries to entirely replace its human service sector workforce with technological systems: it seeks to create a society where everyone has equal job opportunities by strictly defining what kinds of occupation are desirable and valuable and which ones are not. Based on this definition, *non-valuable jobs* and subsequently the *non-valuable workers* are going to be gradually replaced by machines, at the very least accord-

ing to the visions of life in the city that were expressed to me. In the next section I will specify these visions.

Replacing *non-valuable* citizens with technological systems

According to a member of the Ubiquitous Consortium (UC) in Seoul, the primary mission of *smart cities* is to free city inhabitants from 'monotonous' work, so that they may turn their attention to more 'valuable' pursuits. The so-called '3D jobs' in South Korea are slated to be increasingly taken over by technological systems. The term '3D' is an acronym for '**d**ifficult', '**d**angerous' and '**d**irty' professions, especially in the manufacturing and service industries such as construction, gastronomy, cleaning or healthcare (Lee, 2007, p. 7). In the UC member's words:

> What we want is, let the human being do the most valuable things. (…) We want to release human being from this kind of 3D-works. Some people repeat some not valuable work. That means they can repeating checking in some place something and spending their time and they work for that, and they get some salary. But they just check, is this device ok or not. Or this part of the bridge ok or not. But that kind of thinking can be replaced by sensors, by smart city system. So, we want to say, replace the jobs by the system. So, people can do more valuable things, not this kind of things.

So he argues with the high level of morality to be found in a smart city, which is intended to be built primarily for the humans in it and not for the sake of the technological systems per se. The presence of so-called 3D workers testifies to an inequitable treatment of humans and an uneven playing field when it comes to employment opportunities, both of which are thought to be inappropriate for a 'modern society'. Asked what types of employment the inhabitants of smart cities *can* pursue, the UC member replies:

> Oh, this is up to them. You decide. Pay more time for develop your mind or spirit, soul or enjoy life more. (…) So, if you are employed by the city office and your role let's say is to clean the street. It was very common, but nowadays the clean-

> ing car can do it. Or if there are some cleaning system, without the use of human being. This is a kind of slavery work, motion work. Even if you have to earn money for your life, so we say it is not suitable for them, for modern society. They can do valuable things, use your brain and on other things. (…) if you think about middle period, say you need some slaves for this dirty work. Or you want some worker import…worker from foreign countries and to this kind of work. So, this is not equal opportunity. So, we can realise high level of morality if we have smart city. This what I am saying: Smart cities for human being.

According to this quote, the 'monotonous', 'slavish' work is effectively equated with any work involving physical labour and made out to be 'ignoble' and 'dirty', while employment that is 'valuable' is vaguely defined to refer to various activities 'using the brain' and 'other things', and is welcomed. The precise nature of said activities remained unclear.

Research by human geographers Olds and Thrift on the new Singaporean definition of citizens can, to some extent, clarify this way of thinking in South Korea. They have observed that the increasing cooperation between governments and private business companies gives rise to new practices of governmentality, finding that the conduct of the Singaporean state government becomes increasingly intertwined with the discursive and practical dogmas of various institutions '*produc[ing] and disseminat[ing] business knowledge*' (Olds/Thrift, 2005, p. 272). These dogmas constantly redefine who is to be considered a 'worthy' citizen and incessantly set out to produce adequate kinds of subjects ('souls') that conform to '*contemporary, and especially future, systems of accumulation*' of capital (ibid., p. 274). Both scholars point out that the refiguring of citizens into subjects is nothing new in itself, bringing to mind associations with Taylorism, for example. What is new, however, is that increasing amounts of attention are directed towards producing 'knowledgeable' citizens (ibid., p. 275). Going by the UC member's claims, smart cities are thus envisioned as socially equitable, 'fair' environments, housing knowledgeable citizens only: The image of a city divided along the lines of class (the wealthy and educated versus low-income service workers) is to be avoided. Accordingly, activities such as garbage collection and street cleaning are devalued relative to knowledge-based work. The key aspects of a knowledge economy, which according to Powell and Snellman (2004) include an emphasis on intellectual capabilities

as opposed to bodily work and natural resources (cf. p. 201) are realisable with technological systems and legitimised through the new morals of equal urbanity for everyone. The UC member thereby highlighted the unequal chances in the labor market between local and foreigner workers. However, Songdo is promoted as an international community, which means foreign workers in select occupations only such as biomedicine, the high-tech industries, logistics, finance and international trade, etc. are welcomed, whereas foreign non-knowledge workers need to give way to the construction of a human and moral environment.

One relevant example of attempts to materialise the ideas about replacing so-called 3D workers with technological systems is the novel waste disposal system in Songdo. The former leader of IFEZA [Incheon Free Economic Zone Authority] describes it as follows:

> First, Songdo was an empty ground, ten years ago. First, we made such a big tunnel – underground – actually even the track can also go through. So, the size of tunnel is very big. Inside, there are cabinets like this. One cabinet for water supply pipes and gas also. And also communication cable. And rubbish also. You know in the house, if they [citizens] throw out the rubbish, then the factory just sicking this rubbish and it goes through this pipeline and it will be changed to the energy, electricity, something like that.

Fig. 5: The door in the staircase opening onto a pipe, which transports the domestic garbage on to the waste disposal plant.

Thus there are waste container in stairways or on the street that transport the garbage directly, underground, to the waste disposal plant (see fig. 5 and 6).

Such systems of waste disposal are beneficial to city management for a number of reasons: they supposedly lead to a reduction in city traffic, which means reduced consumption of CO2 and absent 3D workers – at least the original idea and justification for in-

Fig. 6: Automated waste disposal bins in front of a block of houses.

stalling such an expensive system. To what extent this idea has yet been realised is out of the scope of this article, but merits closer scrutiny.

So far, I have outlined how Songdo's proprietors exert their power on Songdos' citizens by selecting and replacing them, pursuing particular goals: 'improving' the image of current or future cities and increasing overall profits in the city (and thus the nation as whole) through particular professions and an emphasis on business. The next section of the article goes into the re-figuring process of citizens already declared 'knowledgable' or 'valuable' respectively, which proceeds with the support of technological systems in everyday life. The desired citizens of Songdo can free themselves from any obstacles in daily life thanks to the delegation of several tasks to technological systems – so that they can gain more free time and brain capacity to be put to use for 'valuable' tasks and reflections, as in the following examples. Here, the city environment provides the infrastructural conditions for encouraging certain desirable behaviours – but at least, the decision to harness them or ignore them is left up to Songdos' residents.

Re-figuring *valuable* citizens

It frequently emerged from the expert interviews that Songdo's inhabitants benefit from a net- worked urban infrastructure primarily by becoming more 'carefree' and saving on time that can be spent at their leisure. Any and all actions undertaken within the city can, according to these statements, be supported by technological systems. An employee of IT company Cisco, Inc. describes the benefits of a smart city as follows:

> I think smart city means everything is connected. Everything actually. People today at the bus stop, if I have to transfer the bus I have to cross the street, but you know after getting off the bus I can check, ohh the app said, the bus will come three minutes later, I can run. And if I lost [I missed the bus] then I can check next bus and if it says it comes ten minutes later I can go to the convenient store and I can have [eat] something. So I mean, right now buses are connected. It has GPS, it has network. It is connected to the center, connected with my smart phone. Because it is connected, I can check and I can have more time. I don't like dependence, I like to have more time.

The quote shows how the time saved by the usage of apps can increasingly be used in productive fashion. In general, the state of 'waiting' appears as an obstacle in the city, which, if not minimised, should at least be put to sensible use. For instance, city residents no longer have to wait for the elevator standing in the corridor, but can summon it while still in their apartments. They receive a timely notification once it is ready and awaiting passengers. Reducing or at least purposefully using waiting time is, as in the quote above, more often than not traced back to independence and additional gained time.

Songdo's citizens also would not need to worry about where they have put their personal belongings. The use of smartphone apps or the 'smart kiosks' scattered around the city (see fig. 7) enables residents to always track the position of their belongings and find out how to get to them, no matter where they are within the city. A representative of IT company Cisco explains the usage of the 'smart kiosks':

> This is smart kiosk. It can be located everywhere, in subways, in buildings, trans areas (…). You know any places. So, just press 'car parking' if you are not sure where you parked your car. Then you just put your number in here and press search, then it indicates where your car is parked and then will let you know how to get there.

The software not only points out *where* the objects are, but also *how* to get to them the fastest. Time that would normally be spent searching for things is saved. Both side benefits of this service – the saved time and attention, the latter referring to the fact that you do not have to worry about losing your belongings and can enjoy an 'unburdened mind' – free up resources that workers can repurpose productively for other tasks.

There are other ways in which technology evolves to support people's everyday lives. The smart city will also allow parents to leave their children at home 'without issue'. Parents can remain in contact with their children on a permanent basis.

Fig. 7: smart kiosk in Seoul

This scenario is painted in the following excerpt from the interview with the UC member:

> And then you got married and you have two children. Five, six years old. And then to leave them alone is ok. But however you are interested: is there any problem? Or you want to talk to your children, say, very easy to talk to your children, if they are in your home and they are in a smart city. You also can specify, if they get rid of your house, say within fifty meters. More as fifty meters they get rid of the house, then it will automatically inform you. They are far from your house. And the camera will start to send the images to mother and father. So, they can talk 'Where are you going?' 'Go back to home'. Say, if you can afford baby sitters, then it is ok. But otherwise you will be very much stressed. You have to work during the day time, but you always will think about your children. (…) But if you live in a smart city, even if he goes out from his house, they can trace him, so safe. Comfortable to breed your children, if you live in a smart city.

The quote illustrates the technology by showing how the residents of Songdo can still continue their work in their offices due to technological surveillance systems, giving them peace of mind about their children's whereabouts. Alternative courses of action, such as sending your child to kindergarten, hiring a babysitter or, especially, working directly from home (especially considering the existent telepresence technologies in Songdo), do not figure prominently in the UC member's remarks. It is not far-fetched to conclude that this is a city where 'order' around and within the community is ideally ensured through the use of technological systems. As Saskia Sassen (quoted in: Meister, 2012) has already pointed out, Songdo's inhabitants practically no longer need to take heed of the world surrounding them. Because the city supplies them with all kinds of services, they have nary an excuse to not be productive and ready for work – which means that they can fully focus on their professional activities.

Consequently, the citizens of Songdo, already selected, educated, and knowledgeable, are encouraged to behave so as to maximise 'productive' time, through the application of technological features. From the above examples, we can gather that the additional time gained essentially serves either for satisfaction of elementary physiological needs (such as having a quick snack between changing buses)

or continued work. And the citizens are responsible for *actively* recuperating time through the use of technological appliances, so as to optimise themselves and their way of living under the ideals of independence and autonomy. According to Lemke et al., 'autonomous' subjectivity is currently being promoted as a societal ideal, '*whereby the self-responsibility* [here: independence, autonomy] *demanded is satisfied by directing one's own life towards economic criteria of efficiency and entrepreneurial calculations'* (Lemke et al, 2011, p. 30). This is quite visible in Songdo, not least because there is little information to be found on what Songdo's inhabitants might do in the city, besides work and satisfying their primal needs – apart from shopping, sports (such as playing golf and biking), and learning languages via tele-presence technologies. For more, there are few provisions in the city, both infrastructurally and (it appears) conceptually.

Conclusion

The article has examined – using the example of South Korean Songdo – how self-proclaimed smart cities (built from scratch) select their citizens and use technological systems to refigure them into subjects deemed *valuable* to compete in the global knowledge economy. It thereby called attention to an exclusionist side to the notion of a smart city: the form of governmentality to be found in this city is highly selective from a social standpoint and holds the potential to profoundly upend societal constellations, while pushing those who are already marginalised by the knowledge economy even further to the rims of society. The smart city, at least as it is envisioned in the case of Songdo, is in this sense not one that is socially inclusive, but rather an expression of highly efficient clientele politics, driven by a public-private cooperation.

There are a number of emergent problems. First of all, the value judgment on who is to be included and who is to be excluded is cast in fairly simplistic, trite terms – but pitting blue collar against white collar workers hardly seems prudent. The fact that the concept of automation is taken to a whole new level only stokes this conflict. No longer is it just specific parts of the production chain that are automated, but any and all 'low-level' services are targeted for replacement with technological systems. As a result of this process, a new pattern of urban morality is articulated: cities consisting of *valuable* (as in *knowledgeable*) citizens are hu-

mane and appropriate for modernity, while all others – those who uphold social and professional diversity – are declassified as 'inferior'. This new hierarchy of cities will also pit 'new' cities against the old.

Another argument to be considered is the classical issue of the government encroaching on personal liberties. Beyond the mere technologist aspect of surveillance and privacy, which has been expounded at length elsewhere, the governance approach leverages redefining mechanisms that lead citizens to change their behaviour, ostensibly of their own accord, over the middle-to-long term – towards both using more total time for work and increasing productivity during work hours. To what extent this is justified, especially when invoking either abstract goals such as a more 'moral' society or economic benefits, is a question that should be subject to an informed, open public debate. Can a city (or its owners) really tell its citizens how to use their time, time it allegedly gifts them in the first place? Or is this behaviour justified, since it is a certain segment of citizens that chooses to move there to begin with, willing to knowingly accept the consequences?

The problem, after all, lies in the definition of the word 'smart'. That word can be stretched so thinly that it loses any real significance. Using a word this broad renders its interpretation inherently political. Surely we all want a 'smarter city', but smart in a sense that fits our own ideas. Is it really smart to widen social disparity and broaden the rift between 'knowledge workers' and those less fortunate? Is it not much more intuitive to attach the label 'smart' to a city that manages to create a propitious living environment for all socioeconomic groups in society, bridging their various needs and affording a chance at a happy life for everyone?

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Illustrations

Figure 1: The city of Songdo, Olesya Benedikt

Figure 2: Cartoon, source: Ko/Schubert/Hester, Yekang/Derek/Randolph (2011): *A Conflict of Greens: Green Development Versus Habitat Preservation – The Case of*

Incheon, South Korea. http://www.environmentmagazine.org/archives/back%20issues/2011/may-june%202011/conflict-of-greens-full.html (accessed March 3, 2015).

Figure 3: Cartoon, ibid.

Figure 4: Map of the city of Songdo, source: Songdo IBD. http://www.songdo.com/songdo-international-business-district/the-city/master-plan.aspx (accessed March 10, 2015).

Figure 5: Waste disposal system in Songdo, Jung Hur.

Figure 6: Waste disposal system in Songdo, Jung Hur.

Figure 7: 'Smart kiosk' in Seoul, Olesya Benedikt .

Are you (self-)tracking? Risks, norms and optimisation in self-quantifying practices

Boka En and Mercedes Pöll

ABSTRACT: In this paper, we reflect on self-tracking practices in the context of neoliberal ideologies – predominantly the quest for self-improvement as mediated by and affecting the individual. On the backdrop of Foucault's concept of governmentality and current academic research on the Quantified Self, we consider online accounts and reflections of people's self-tracking endeavours as they emerge from and exist in neoliberal frameworks. We will outline how they relate to and produce ideas of humanity as inherently risky, the construction of 'normality' based on individual parameters, as well as optimisation as a never ending imperative where new opportunities for improvement are paramount. Finally, we present and suggest ways of *queering* self-tracking in order to subvert and reconceptualise its practice in order to imagine and enable the emergence of different utopias.

KEYWORDS: governmentality, risk, neoliberalism, queer, self-tracking, quantified self

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'I've gone to some great extremes in search of sexual satisfaction', says Miles Klee in an article for *The Kernel* (2015), prefacing an account of his light-hearted experiments using self-tracking apps to gather data about his sexual activities. After all, he states, '[h]ow could I improve my sex life without first assessing how I normally bang?' Klee downloaded three different apps onto his smartphone – *Intima*, *Love Tracker*, and *Track My Sex Life* – and proceeded to log each instance of sexual activity with his wife over the next two weeks. Among the variables he tracked were the duration of each sexual encounter, the kinds of activities performed, their loca-

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tion, and their levels of satisfaction. Reporting on his experiences, Klee illustrates the kind of self-tracking that we are interested in in this paper: recording (mostly quantitative) data about aspects of one's self (or selves) with the aid of digital technologies.

Within self-tracking practices, numbers play a pivotal role as primary means of producing and articulating facts, lending them authority through quantification in a way that makes them appear 'objective', 'true', and 'trustworthy'. This is illustrated by the motto of the Quantified Self movement: 'self-knowledge through numbers' (Quantified Self, 2015). Klee happily reports that over the course of his tracked sexual encounters, his wife (who was tasked with this job) never rated their sex lower than five out of five possible stars (or other icons). But quantifying one's sex life, it seems, is not without its hurdles. *Love Tracker*, for example, has a built-in timer that must be switched on at the beginning of each sexual encounter. Klee recounts his troubles with this function:

> […] was I meant to flick it on as soon as I lunged toward my wifes side of the couch and, by extension, reached second base? Or should I start it when, after 20 seconds of making out, she realized that I wasn't going to leave her alone until she shut me down or acquiesced to my clumsy advances?

Besides having to grapple with the ontological question of what constitutes sex and its starting point in order to adequately track it, Klee recounts a pressure to perform building up as a consequence of his tracking: he developed a desire 'to impress the apps' by reaching better results – for example, by hoping to log as many sexually active minutes as possible. Paradoxically, Klee also notes that two of the three apps he used would not have allowed him to input a duration of longer than 23 minutes, setting a rather arbitrary upper limit that nevertheless provides a point of orientation when (re-)viewing data.

At the basis of many self-tracking efforts lies the idea that the data can be harnessed to discover ways of improving one's life in some respect. Accounts surrounding self-tracking tend to focus on narratives of change and transformation towards a better now, and an even better future. Klee's experiment with sex-tracking itself is linked to its potential for improving the quality of his sex life – even though it quickly becomes clear that he is actually quite satisfied with the status quo.

Accounts like Klee's are what sparked our interest in thinking about self-tracking in terms of risk-taking and risk awareness, social and individualised norms, and the impetus of optimisation. Proceeding from this initial interest, this article constitutes not a rigid study of a fixed data set, but a collection of ideas and provocations of thought that developed out of our own immersion in and reflections on self-tracking discourses. In the process of this immersion and reflection, we considered first- and second-hand accounts, reviews, presentations, and other narratives online (e.g. on blogs, in forums) as well as academic publications, all linked to what has become known as the Quantified Self movement.

On the basis of these observations as well as our own personal experiences with self-tracking, we trace some of the ways in which different kinds of risks are construed and constructed in the course of self-tracking enterprises and examine how these ways tie into normative social structures and existing systems of power that guide the scopes of action and being that people see as un-/acceptable and im-/possible for themselves and others. In doing so, we seek to point out self-tracking practices as a site where the distributed functioning of power (referred to by Foucault (1991) as governmentality) can become particularly visible. In order to do so, we will engage with three kinds of risks produced in quantifying the self: firstly, the assumed fundamental fallibility of humanity; secondly, the production of individualised norms; and thirdly, the drive towards being as excellent as possible by finding new risks (i.e. opportunities) to improve upon. We will trace how governmentality plays out in self-tracking, and think about *queer* ways of understanding and doing self-tracking as a means of engaging with the quest for ever-increasing excellence.

Tracking Self-Tracking

But what is self-tracking, anyways? At the most general level, we could call any activity with the aim of monitoring various aspects of one's life *self-tracking*. This might include notebooks as well as simply keeping track of certain parameters in one's mind. Such practices have a long history going back to at least ancient Rome and Greece (cf. Foucault 1990, 2002a, 2002b). More recently, in a study conducted by the Dew Research Center in 2012, Fox and Duggan (2013) found that a significant portion of the US population engaged in some kind of self-tracking, a fifth of

whom used some form of digital technology in their practices. Considering the enormous number of tracking apps in smartphone app stores as well as the flourishing of dedicated tracking devices, it seems likely that this proportion has risen further since 2012. Indeed, for the purpose of this paper, we are going to focus on self-tracking that involves the use of digital devices for keeping track of one's bodily parameters.

This form of self-tracking, particularly practices that focus on bodily and health issues, can be seen as part of what Nettleton (2004) called 'e-scaped medicine' as medicine is increasingly moved to the realm of the Internet and the authority of traditional medical experts is challenged. As such, self-tracking constitutes a part of the increasing digitalisation of human bodies (O'Riordan 2011) as well as backs the trend of 'prosumption' that has come with the advent of the web 2.0 (Davis 2012). Prosumption, here, refers to a blurring of lines between production and consumption as web 2.0 users don't simply consume web content, but actively contribute to its production. A similar point holds true for self-tracking as self-trackers don't just consume apps, information, etc., but contribute their own data.

Even though self-tracking sounds, by name, like an isolated enterprise, there is a culture of self-trackers, the *Quantified Self*, founded by *Wired* editors Gary Wolf and Kevin Kelly in 2008. While this group represents neither all self-tracking activities nor all the people who engage in them, it functions as a galvanising agent for more 'serious' self-trackers by offering a centralised forum. Face-to-face events like the annual Quantified Self conference as well as more regular meetings by local groups exist, and to a large extent consist of 'show and tell' presentations in which self-trackers narrate their experiences with self-tracking (Watson 2013). While the term self-tracking is strongly associated with that of the *quantified self and while numbers as well as their assumed objectivity play a central role in many self-tracking practices*, self-tracking is also linked to interpreting data and embedding it in narratives, producing a *qualified self* (Jones 2013; Boam and Webb 2014; Davis 2013; Lupton in press).

But what do self-trackers actually track? In their 2012 study, Fox and Duggan found that the most popular tracked aspects were exercise, diet, and weight. This fact already points to the entanglement between self-tracking and societal norms and ambitions such as health and beauty ideals. However, there is a far wider variety of properties that can be tracked, among them, for example, sleep patterns,

blood sugar levels, geolocation, or mood. Beyond the body, self-tracking may also involve tracing more abstract stats like one's purchases or finances. The Quantified Self website lists over 500 different self-tracking 'tools', from wearable pedometers to smartphone apps (Quantified Self 2015). There is also a wide variety in tracking practices: while some trackers may only track one or two aspects of their lives for limited periods, others track manifold data points over long timespans (Lupton 2014a).

Although self-tracking in the ways outlined above is a relatively recent phenomenon, it has received a degree of attention in not only popular, but also academic circles. For example, self-tracking has been enthusiastically argued to be a valuable tool for health promotion and improvement, e.g. through tele-care (see for example Swan, 2012a, 2012b) and is estimated to reach 50 billion in 2020. A wide-ranging Internet of Things (IOT). Others have been more critical of such perspectives, suggesting that it ties into current neoliberal orderings of society[1] that emphasise the individual's responsibility for their own health and 'patient consumerism' (Lupton 2013b) while understating the importance of sociocultural context and furthering a culture of pervasive surveillance (Lupton 2013b; Lupton 2014b; Lupton 2012). Additionally, such enthusiasm may leave issues such as potential conflicts of interest within the healthcare industry unexamined (Krieger 2013). Finally, some analyses explicitly emphasise the capacity of self-tracking to influence societal and individual norms, for example about sexuality (Lupton 2014c) or in accordance with the neoliberal ideal of the self-responsible 'entrepreneurial subject' (Lupton 2013a). On the other hand, Nafus and Sherman (2014) have argued that self-tracking practices can involve a form of 'soft resistance' insofar as commercial and governmental interests in compiling large datasets are foiled as users move between different roles and switch between collecting different kinds of data, thereby resisting traditionally authoritative 'clean' data collection practices.

Our immersive, exploratory research was conducted in co-operation with Ágnes Fülöp and is based on several dozen individual accounts that self-trackers offer on the internet. We found these accounts primarily through a) the Quantified Self website, b) links between different accounts, and c) web searches for keywords such as 'Quantified Self'. In this paper, we want to selectively zoom in on how the notion of 'risks' can operate in self-tracking endeavours.[2] In our current worlds, risks are among the cogs that keep the machinery of self-optimisation and

self-government running. They form part of what Foucault (1991) called governmentality: the distributed functioning of power through society. Governmentality, in this sense, is a 'soft' and subtle form of power:

> it is a question not of imposing law on men, but of disposing things: that is to say, of employing tactics rather than laws, and even of using laws themselves as tactics – to arrange things in such a way that, through a certain number of means, such and such ends may be achieved. (Foucault 1991, 95)

Risks feature in this scheme insofar as they are one of the strings that tie expected behaviours and individuals' self-governing activities together (Lupton 1999b). Risks, then, are not merely elusive monsters that lurk out there in the dark and that we should seek to drag into the light. Much rather, they are constituted in and through social norms (Fox 1999). Based on a feminist materialist perspective that takes into account how discourses and the 'material' world are entangled, we want to suggest that risks are born from intra-actions[3] between a range of material-discursive factors (and we are going to examine who bears these risks in this paper). This means that risks cannot be relegated to the realm of a supposed objective material reality that is 'out there' and only needs to be dis-covered, but neither are they simply figments of social construction(ism). In any case, they are firmly entangled with societal ideologies and take part in shaping both these and users' ambitions as well as the utopias they/we strive for.

In what we are going to present below, we have little doubt that we are wrong, and that our 'description' can never be complete – not only because we are situated in the world and therefore cannot claim to see from nowhere, everywhere or even just anywhere (Haraway 1991), but also because any description of the world influences that very world: looking is touching. However, we are not alone in believing that a complete account of the world is not only unachievable, but also undesirable seeing as exclusions (and resulting new arrangements of reality) may also open up space from which alternative ideas can grow.

What we therefore seek to offer is not a description of 'the world' as 'it is', but much rather a partial and conversational account: an account that is brought forward through manifold conversations with the objects/subjects that we look at and that look back at us, with authors and books, with our own lives, practices and

experiences, and, finally, with you, our readers. After all, it is not without reason that Granny Weatherwax, a character in one of Terry Prachett's Discworld novels, says that reading books is like necromancy because we re-awaken the spirits of people and times long passed. Still, the notion of a spirit should not lead us to wrongly assume that these spirits are faithful to someone or anyone. Much rather, these spirits also only exist in their 'intra-action' with the contexts in which they re-emerge, and we – their readers – are parts of these contexts. We therefore want to invite you to bring in your own experiences with tracking, knowing, improving, and producing your selves as you read this paper in order to re-awaken our respective spirits in an intra-active conversation about the *values* that matter.

Risky Humanity

Risks tie into self-tracking practices through the pervasive implications (or, at times, explicit assumptions) that humans are fundamentally deficient. Moschel (2013) asks poignantly: '[w]hy are we fat? What makes us feel sluggish? What causes our disease? How can I improve?' The implication is clear: human life is risky; it is prone to dysfunction and seldom fully conforms to the myriad standards we hold it to – be those standards of physical health and fitness, mental constitution, emotional wellbeing, outward appearance, or others. It appears that *something* needs to be kept in check in order to control or pre-empt the fallout of being human, and the Quantified Self strategy to wrestling for this control is surveillance via self-tracking.

There is a range of human deficiencies that can be fairly easily pinpointed in their need to be mended or improved upon, for example in narratives on weight-loss. However, the very first issue (both chronologically and metaphysically) that humans have to contend with to even be able to tackle other risks is their fundamental irrationality. Humans are seen as beings that *mis*interpret the world around (and inside) them according to received assumptions and emotions: since they cannot even see their own faults, they cannot effectively pursue betterment. As Moschel (2013), in a 'Beginner's Guide to Quantified Self', writes,

> [e]very day we blindly make decisions we hope lead to improvement. To make matters worse, we judge success based on imperfect and biased feelings. If our world is dark, it seems we are also covering our eyes.

There seems to be something 'wrong' with the person who engages in self-tracking: they seem to be at risk from their own untrustworthiness when it comes to perceiving and producing 'hard facts' and understanding themselves – there is a *meta risk* to being human. Beato (2012), casting this issue in the light of the human trait of forgetfulness, states that

> [f]orgetting is the highest form of forgiving, and our inability to pinpoint exactly how we deploy our energies and resources allows us to live comfortably in the face of our own mediocrity.

Here is where the powerful role of technology becomes most apparent: digital devices and applications (from specialised, dedicated self-tracking apps to 'generic' social media) don't let us forget anymore, as long as we make the effort to log the relevant data. This is in line with what Zandbergen (2013) calls the Quantified Self community's propensity for 'radical acts of self-disclosure'; our digitally enhanced memory capacity reminds us both of our successes and failures, and does not let us forget anymore; it partially outsources a risky aspect of humanity (memory) and thereby confronts us directly with the inescapable realities of our lives (one of which may be that we're just … mediocre). In this light, self-tracking is not merely a numbers game, but creating a culture of self-confession based on overcoming the hurdles our own brains place on our track. As Beato (2012) articulates, 'intellectual perceptions, which can be readily influenced by external forces' are what self-tracking practices promise to go beyond in order to produce *truer* truths – truths that help us see ourselves clearly, unencumbered by the incomplete and biased ideas and memories we hold about ourselves.

The way to produce the *truest* truth is through a form of *scientisation* of the self with the help of digital devices in self-tracking, based on valuing measures that provide reliable means of attaining self-control – like the supposed neutrality and credibility of numbers. In this sense, self-tracking can be seen as an example of what Foucault (2002b) describes as the production of links between the subject and truth, where truth regimes (i.e. ways of distinguishing between truth and non-truth) play an important role in the subjectification of the self. Indeed, ideas in the Quantified Self movement can be linked to the argument brought forward by Nick Fox that '[m]odernism […] is a project of mastery which begins with a process of

definition and then – through reason and via the application of technology – controls and changes a phenomenon' (Fox 1999, 23). The very ambition to control (for) human deficiency and inefficiency lies at the heart of certain self-tracking enterprises.

According to Foucault, governmentality functions through three modes of objectification: science, dividing practices, and turning oneself into a subject (Foucault 2002c). In the Quantified Self movement, these three modes of objectification are brought into alignment with each other: self-trackers divide themselves into multiple aspects that can be transformed into data, and these data are seen as the rational and neutral expression of a kind of scientific truth. In these readings, the self is disclosed as manageable, thereby steering human self-trackers onto a road where self-control and improvement (i.e. overcoming one's flawed humanity) becomes a tangible and achievable goal. Self-tracking constitutes a strategy to deal with the looming risk of human inadequacy.

Transcending normality

This risk – perceived failings that need to be eradicated, or faults that need to be improved upon – is predicated upon the process that an individual person turns themselves into a marked, recognisable subject of their own gaze. Foucault (2002c) upholds that

> [t]here are two meanings of the word "subject": subject to someone else by control and dependence, and tied to his [sic] own identity by a conscience or self-knowledge. Both meanings suggest a form of power that subjugates and makes subject to.

This form of power can be traced in the roles that norms play in self-tracking practices. People actively seek out norms and make them their own, self-police and self-regulate in order to adhere to them (Lupton 1999a, 61). What makes engaging with norms in self-tracking practices particular is that wider scientific and societal standards are sometimes construed as hindering efforts at self-improvement. Coming back to the idea of human fallibility and untrustworthiness, one could even argue that norms play a part in humanity's inherent riskiness due to their

pervasiveness in shaping people's preconceptions. In that sense, norms can be seen as *skewing* perspectives on the realities of an *individual's* life.

Many self-trackers seem to take set standards – such as, for example, conveyed by governments or experts (e.g. medical professionals) – not as ultimate, but as guidelines that inform, but do not govern the decisions that result from their interpretation of their individual data. They follow Wolf's (2010) argument that '[s]ome of us aren't standard […]; perhaps many of us aren't.'

Shining through this argument is the entrepreneurial individualism that lies at the heart of Quantified Self practices: the desire to take charge of one's own life on the basis of the most accurate information possible – information not simply obtained through statistical aggregates of large populations, but by monitoring the Self that really matters, i.e. by *becoming an expert on and of oneself*. Ian Clements (2013), for example, consistently self-monitors around 250 biomarkers to predict his health and to find the best measures to enhance his long-term survival with cancer. To Clements, his own body and lifestyle as well as the data he has compiled about them hold the answers to improving his health situation – to the extent that he calls it '[t]he missing dimension of Cancer Survivorship'. By blurring the lines between lay and expert knowledges, Clements' self-tracking empowers him as a patient as well as a person with cancer. While he has no intention of foregoing professional medical care, he nevertheless exercises agency by actively producing data and trying to interpret it, i.e. by doing work that is usually left in the hands of 'experts'.

A common understanding of the functioning of risks in governmentality is that '[c]ontemporary knowledges and discourses on risk emerge from both expert and lay sites, but it is the experts who hold most sway because of the assumed "scientific" and "neutral" character of their knowledges' (Lupton 1999a, 63). However, what seems to be happening in the Quantified Self is that self-trackers refuse received expert knowledges and become experts on and of themselves by producing what they see as 'scientific' and 'neutral' knowledges through numbers (see also Nafus and Sherman 2014). Again, *scientisation* plays a major role in legitimising self-trackers' attempts at producing alternative knowledges on and of themselves and the risks they face. It seems that rather than simply tackling risks by comparing oneself to what should be 'normal', being subjected to norms can itself constitute a risk to avoid or circumvent.

However, it should be noted that while particular standards are challenged and often subverted in the Quantified Self, this does not mean that self-trackers can rid themselves of norms completely. Frequently, more pervasive norms about what the world in general looks like (and therefore *should* look like) are not questioned and built into self-tracking devices from the outset. Fitness apps, for example, often boast software that factors in a user's age, gender, or weight in order to produce 'more accurate' data. These apps presume a universal alignment of gender identity with a particular body type, metabolism, etc. However, not only can this perceived alignment be problematic for many (such as intersex as well as trans*- or gender-variant-identifying people), it also obfuscates the heterogeneity of physical and functional characteristics among persons who share bodies of the 'same sex'.

Similarly, the overarching ideals – or utopias – of the Quantified Self movement – self-optimisation and efficiency enacted by entrepreneurial subjects – appear to be rarely questioned in their validity as goals to be strived for, and the ultimate aims of self-tracking efforts are left largely unchallenged. For example, self-trackers might be critical of specific strategies of becoming smarter – e.g. pedagogical practices that don't pay attention to 'experimentally proven' knowledge about memory retention –, but unquestioningly accept that better memory is a goal that is worth pursuing.

Likewise, any issues that come up in the practice of self-tracking are usually located back in the individual, while leaving little room for taking larger social structures or contexts as possible influences. Therefore, while self-trackers, in their quest for optimisation and risk aversion, may not listen to experts when it comes to the specific pieces of data that they track, they nonetheless often buy into broader cultural frameworks, from ideas about gender differences in fitness activities to the overarching theme of efficiency and self-optimisation. The ideology of questioning norms does not extend to all norms.

Be the best you can be

We have seen that frequently, the goal of self-tracking is individual fulfilment or reaching 'an ideal version of myself', as Nell Watson (Daalder and Watson 2013) phrases this in regards to her weight-loss aims. Optimisation is key in a neoliberal

risk enterprise that is not content with mediocrity. Within self-tracking, statistics and their numbers are not used in relation to large populations, but in order to establish *individual norms* – norms to which specific neoliberal actors can and should adhere in order to maximise their potential and therefore minimise their risk of 'not being excellent enough'.

This particular drive towards constant improvement leads us to the final facet of the Quantified Self movement that we want to address here: the search for new risks that are 'hidden in the numbers'. While self-trackers may collect data in order to tackle problems and risks that are already known, they frequently also look for opportunities for optimisation that were previously unknown and are yet to be uncovered. As Wolf (2010) states,

> [a]lthough [self-trackers] may take up tracking with a specific question in mind, they continue because they believe their numbers hold secrets that they can't afford to ignore, including answers to questions they have not yet thought to ask.

Risks, therefore, are not only about dangers that we face already, they are also about those that could come to haunt us in the future – and they provide opportunities. This can be illustrated, for example, by the self-tracker who 'had started by looking for a cure for insomnia and discovered a way to fine-tune her brain' (ibid.).

Coupled with the overarching trope of human deficiency, understanding risks as opportunities holds its own challenges. After all, there is always the danger that '[y]ou may simply have failed to notice a debilitating habit, a negative correlation, a bad influence' (Wolf 2010), leading to a missed opportunity – to not living up to your full potential. Numbers, it seems, can help us not only to function within certain working parameters to avoid risks, but also to seek out and address risks (and, through this, happen upon potential benefits) that we might not even be aware of. As we have indicated above, discovery and production are closely entangled: if risks are constructed in light of societal ideals and ideologies, then the search for new risks can never be merely a matter of discovery. Indeed, what we do or do not consider 'risky' is not a matter of what is 'out there'.

This brings us back to the starting point where humanity is intrinsically risky if not supplemented by neutral numbers and rational digital devices, and also to

the neoliberal impetus to produce not only norms to which one must adhere, but also ideals for which one can strive. The discovery of new risks is interlinked with the quest for self-optimisation: by finding heretofore unknown risks that could be avoided, the self-tracker enables themselves to further optimise oneself. Not being excellent enough constitutes a risk in itself.

In the Quantified Self movement, the boundaries between risk and self-improvement are blurred. No clear distinction is made between attempting to avert negative potentialities and attempting to avert ones that are simply not positive. Levina (2012, 153), writing about 'Health 2.0' initiatives in which self-measurement and sharing of data with others are combined, argues that '[b]y optimising risk subjectivities, Health 2.0 narratives ask us to imagine a future where we are most happy and healthy'. A similar point seems to apply to the Quantified Self movement: the notion of an optimised future self also feeds into maximising 'productivity' (including in the sense of producing insights about oneself) in the present.

Bearing risks

Risk, as it operates in the Quantified Self movement, is not simply a technology of government that is deployed by a state or specific actors within its domain. Even though risks are definitely convenient for a neoliberal state and economy, they are not a product of such a state. Instead, neoliberal ideologies – including not only striving for optimisation, but also a specific form of 'freedom' from external regulation – are embedded in the very social fabric that constitutes the Quantified Self movement, making it impossible to trace back ideological strands to particular individual sources. Self-trackers are not merely 'expected to engage in practices identified as ways of avoiding or minimizing the impact of risks to themselves' (Lupton 1999b, 101). Instead, they take an active part not only in adhering to these expectations, but in producing them in the first place – as an expression of freedom.

Self-trackers, then, are indeed 'active rather than passive subjects of governance' (Lupton 1999b, 90). However, we need to take more seriously their multiple positioning: on the one hand, they are positioned as subjects in the sense that they are subject to the rule of an external, clearly delineated entity; on the other hand, they are subjects in the sense that they are agents who actively question

certain norms (like the authority of medical experts), but might uphold others (like gender norms or the prioritising of productivity and individual responsibility). If Foucault (2002c, 341) writes that '[t]o govern … is to structure the possible field of action of others', then the Quantified Self movement shows clearly how it is also very much about structuring one's own possible field of actions – not because of more or less clearly defined medical or psychological norms or any one actor's agendas, but because of a more general ideology of self-improvement and self-optimisation that is flexible enough to enable the questioning of some norms while (and through) upholding this more general overarching theme.

Queering self-tracking

We do not wish to propose an exclusively bleak and static perspective on these matters. The Quantified Self undoubtedly contains drivers towards becoming better and better, and towards un-covering more and more risk opportunities for self-improvement as symptoms and perpetuators of neoliberal ideologies. However, self-tracking is a varied, multi-dimensional practice. While improvement or monitoring may be the central theme of many self-tracking endeavours, some practices are not exclusively geared at achieving the neoliberal utopia of being the most self-possessed, efficient and, successful individual one can be.

In this vein, we believe that attempting to *queer* self-tracking can be a worthwhile endeavour. We understand *queering* as carrying forward the legacy of anti-normative criticism by activists and academics, performed through the questioning and destabilising of social norms, including those pertaining to gender and sexuality (Browne and Nash 2010, Jagose 1997). Such criticism seeks to make it possible for new worlds – new utopias – to emerge. Specifically, we hope that there may be utopias out there in which competition and one-upmanship do not govern social systems – why be afraid of 'mediocrity' when there are no hierarchies to contend with, thereby ridding the term of its threatening quality?

In order to think about how queer/-ing self-tracking might work, it is necessary to consider that devices and practices function in intra-action with each other – there is not one without the other. As a self-tracker, one needs to engage with one's technology of choice, which in turn influences one's field of action within the particular tracking exercise. On the development side, it is therefore crucial

to interrogate the ways in which possible realities are imagined. If, for example, an app necessitates the user to tick a 'female' or 'male' box, the technology contributes to a reality in which there is only one or the other, in which this distinction has a significant bearing on the self that is being tracked, and in which there are differences that are, to some degree, uniform among the members of each group. Queering self-tracking here could act through decisions made on the part of the developers – decisions to open up rather than close down who imagined (or as-yet unimagined) users might be (van der Velden and Mörtberg 2012). This opening up would enable new worlds to emerge.

It is furthermore interesting to note that 'failing' (Halberstam 2011) at fulfilling a technology's requirements and assumptions can in itself draw attention to pervasive norms and as such constitute a queer practice – or at least a point of departure for further queer(y)ing forays. For example, the sex-tracking apps Klee used in our introductory story asked for the duration of 'sex'; this could potentially open up a space for questioning assumptions about what seems so obvious: what is 'sex', anyways? Similarly, the sex rating system could be taken as a point of departure for reflecting on why it needs to be rated in the first place. Realising that one does not fit into expected norms can act as a stimulus to start questioning and challenging norms on a wider, societal scale, and thereby queer self-tracking through one's own experience and self-reflection.

Moreover, self-tracking efforts can contribute to awareness-raising and increasing empathy for experiences that are not our own. Pedometers, for example, play a pivotal role in Jesse Shanahan's (2015) #AccessibilityMatters challenge: Shanahan encourages able-bodied people to walk in her shoes by adopting an approximation of her everyday restrictions – they have 3.000 daily steps at their disposal to go about their life and accomplish chores. In addition, there are conditions for special (but very everyday) circumstances like not getting enough sleep or standing for longer than 20 minutes, which cost additional steps.

Similarly, in order to counter the emphasis on productivity and efficiency, self-tracking could be queered by tracking data that ostensibly has 'no use', but is done as an exercise of silliness and fun, and to direct one's attention to aspects of life that lie outside neoliberal paradigms. One such example was given to us by our friend J. who takes a photo every time they encounter a yellow car. In doing so, J. ostensibly contributes nothing to their self-development; it does not, generally

speaking, 'make sense' for them to track yellow cars since there is no apparent benefit beyond an accumulation of data. The effort might be classified by many as a waste of time and energy. Still, J. enjoys tracking yellow cars 'purely for the fun of it'.

Finally, queering self-tracking can also mean embracing data outside the realm of coherency, leaving space for ambiguity and contradiction.[4] Thus, queer self-tracking could be understood as an embracing of multiple selves and their instabilities – rather than insisting on accessing hidden, unshakeable truths located within oneself through data, and fitting them like puzzle pieces into a coherent picture of oneself, such truths are never un-covered, but co-constructed in the process of looking for them. Resisting the demand for coherency and singularity can mean opening up opportunities for the emergence of unexpected, unusual, *queer* realities.

However, while there are spaces for queering self-tracking in both the technologies themselves as well as in users' practices, not everything always goes in the intra-actions between devices, users, and practices. For example, the placement of information and data on-screen implies correlations and drags our attention to something the developers deem particularly important. If a period tracking app prompts the user to indicate their mood in addition to their menstrual status using button placements, it creates a reality in which a person's menstrual cycle and mood are interlinked, and probably assumed to function in stereotypical ways.

At the same time, apps and devices are not inherently 'anti-neoliberal' as they only become meaningful in intra-actions that involve much more than just, e.g., the coded fabric of an app. The health-tracking app Google Fit allows users to select not only 'male' and 'female' as their genders, but also 'Other' and 'Decline to state', which might, as we argued above, allow new utopias to emerge by enabling realities in which gender is more than binary. However, it is unlikely that it will do so on its own, in the context of societies that are very much characterised by a male/female distinction.

Self-tracking itself is a multiple practice with facets that can be problematic, beneficial to people's well-being, and even *queer* in the ways it offers engagement with risks, norms, and the paradigm of optimisation in neoliberal social contexts. Devices, apps, users, practices, ideologies, ambitions, and utopias are but puzzle pieces that only make sense – whether in a 'useful' way or not – if put together.

This means that the worlds in which self-tracking is performed change its practice while, at the same time, self-tracking changes worlds. Self-tracking need not automatically succumb to neoliberal imperatives; indeed, instead of focusing on ways of anchoring it in discourses of improvement and optimisation, we suggest a creative recasting of focus in which self-tracking can function queerly and open up space for the unexpected.

Endnotes

1 The basis of our understanding of neoliberalism is a focus on the autonomous individual that is fully responsible for their circumstances and actions – at the expense of affording any influence to sociocultural factors and forces: '*Homo economicus* is a free and autonomous "atom" of self-interest who is fully responsible for navigating the social realm using rational choice and cost-benefit calculation *to the express exclusion* of all other values and interests. Those who fail to thrive under such social conditions have no one and nothing to blame but themselves.' (Hamann 2009, 38, their emphasis)

2 While we have chosen our evidence on the basis on what would be most illustrative for our individual points, we want to note here that our observations could have been backed up easily by different cases.

3 Our usage of this term is based in Karen Barad's (2007; 1996; 2003) *agential realism*. It points to the fundamental interdependency and mutual (performative) constitution of 'objects' in the world. Rather than assuming that the world is populated by individual and independent objects, an agential realist perspective is based on the assumption that it is not individual particles (i.e., the 'atom' that cannot be divided any further), but 'phenomena' that are the basic ontological unit. A phenomenon, in this context, is the combination of various factors that lead to the emergence of 'stuff' in the first place: the relation gives rise to the relata, not the other way round. Specific objects only exist in and through such phenomena, not outside of them – this is what Barad calls intra-acting.

4 See Law (2004) for a more extended treatment of how coherency is a core characteristic of current Western ways of seeing the world – including the ones popular in social science.

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Performing digital ways of knowing: epistemic walks with methods-as-prototypes

Chiara Carrozza and Andrea Gaspar

ABSTRACT: Based on our experience in the project 'The Importance of Being Digital: Exploring Digital Academic Practices and Methods', we narrate our different trajectories of engagement with digital methods and digital practices. Inspired by emerging scholarship that looks at prototypes as a cultural and epistemic form, we delve into an exploration of methods (both traditional and digital) as prototypes – open-ended, non-instrumental explorative devices – for our knowledge processes. By opening up the craft of our research we illustrate and discuss what 'digital ways of knowing' – ways of knowing inspired by digital practices – might look like, and which reconfigurations of knowledge practices and trajectories they could enable.

KEYWORDS: digital practices; digital methods; prototypes; epistemic cultures; collaboration

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This article reflects on our research experience during the project 'The importance of being digital: exploring digital academic practices and methods'[1], initially aimed at investigating the role and the potential of digital technologies, social media and digital methods for academic work. During the project we organized two training activities with the aim of creating the practical conditions to engage a group of social scientists within our research and to gather – through focus groups and interviews – empirical materials to analyse expectations and utopias, anxieties and disbeliefs, regarding the contribution of digital technologies and tools to academic work and to knowledge creation.

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We could have based this article on the analysis of the data we collected during the project but along the trajectory of this project, this didn't make sense to us. We don't want to suggest that the materials we collected were useless, quite the contrary, but that they worked in unexpected ways. Rather than as 'empirical evidence', they worked as 'prototypes' – open-ended, non-instrumental explorative devices for our knowledge process. Prototypes are traditionally part of the craft of design, engineering and architecture, but until recently, foreign to the 'epistemic culture' (Knorr-Cetina 1999) of social sciences. An emerging scholarship looks at prototypes as a cultural and epistemic form (Corsín Jiménez 2013; Corsín Jiménez et al. forthcoming) and as a new paradigm of knowledge production (Corsín Jiménez and Estalella 2010).

Examples include 'critical making', 'a mode of materially productive engagement that is intended to bridge the gap between creative physical and conceptual exploration' (Ratto 2011, 252); experiments with ethnographic research, such as forthcoming proposals for the re-functioning of traditional ethnography as participant observation into an exercise of experimental collaboration (Criado and Estalella forthcoming a; Estalella and Criado forthcoming b) and proposals that conceive ethnography in terms of a studio or design practice – the 'labinars' (Rabinow and Marcus 2008), with 'the intent of experimenting with the production of knowledge on the analogy of prototyping' (Marcus 2013, 406).

More than by specific digital tools or technologies, these experiments towards renewing social sciences methods and knowledge draw inspiration from digital practices – open-sourcing, hacking, prototyping – and from the modes of producing knowledge associated to these practices. In this article we would like to illustrate and discuss what these 'digital ways of knowing' look like and which reconfigurations of knowledge practices and trajectories they could enable through our different experiences as researchers in this project.

Part 1: Andrea's exploration. Engaging with digital ways of knowing: taking our research methods for a walk

One of my fieldwork activities in the project 'Being Digital' was to attend the workshop 'FAQs about Open Access: the political economy of publishing in anthropology and beyond', organized by a group of doctoral and postdoctoral students from

the Research Group of Anthropology with a Public Orientation based at Universidad Autónoma de Madrid. My attendance to this workshop put me in a strange position: on the one hand, I was attending with the aim to collect data through the recordings of the sessions and through observation (the debate was an opportunity to collect material on the epistemic utopias of academics and their views about the transformation of scholarship), but at the same time, the event also occasioned an important academic discussion with my own academic community – thus it was impossible for me to be 'outside' of it, to relate to it only as an 'observer' in the traditonal sense.

To complicate things further, the workshop took place at Medialab-Prado, 'a citizen laboratory for the production, research and dissemination of cultural projects that explore collaborative forms of experimentation and learning that have emerged from digital networks'[2] which is precisely the 'house of the prototype', according to Corsín Jiménez and Estalella (2010).

While other medialabs we knew, in particular the Medialab-SciencesPo (see Part 2), were more focused on developing digital tools for social research, MediaLab Prado's projects explore issues of openness, collaboration, participation, bottom-up pedagogy, informal learning, experimenting with multimedia and digital tools, free culture and open source software. The possibility of approaching what seemed to us like two contrasting 'epistemic cultures' was exciting and thus we wanted to collect data on the different ways of engaging with the digital technologies that those two environments suggested. Thus, we saw the workshop about Open Access in MediaLab Prado as an opportunity to use my skills as an ethnographer to approach the Medialabs' cultures as empirical material, but this plan turned into something different, as I experienced the impossibility of establishing distance from 'data' and from the people I wanted to extract that data from. This dilemma resonates with the debate about the 'crisis of methods in social sciences' (Savage and Burrows 2007; 2009), where the narrow conception of 'social science methods as mere instruments for data production' is being challenged (Ruppert et al. 2013) and, more specifically, with the debate questioning an extractive model of ethnographic engagement, historically consolidated as participant observation (Criado and Estalella forthcoming a). The questioning of an extractive model of knowledge is actually emerging from the challenges that new media and new digital infrastructures pose to the model of scholarship as we know it. The debate around Open Access stages some of the tensions that emerge

from the confrontation between different paradigms of knowledge production and different ways of relating to data and methods that new digital possibilities enable.

The discussion was more nuanced than simply the pros and cons of Open Access: there were different points of view on what such a change in the communication system could mean for anthropology, which exposed a whole reconfiguration of the research practices and models of scholarship. Some scholars in the debate claimed OA as a means of *refunctioning* our methodology in social sciences and as an opportunity for redesigning the political structures of academic knowledge, exploring how to convert the whole research process into a more collaborative and open kind of process. These scholars, in particular, are involved in epistemic experiments that are based on the contact with the practices of other epistemic cultures: free software, open software, open design, and open-source architecture. In the debate, they *displaced* the question of openness from a reconfiguration of the communication system to the possibilities of reconfiguring the *making of* academic knowledge. Sánchez Criado, for example, highlighted the methodological/epistemological possibilities of Open Access, suggesting the importance of doing ethnography *through* Open Access rather than ethnography *of*, while Corsín Jiménez suggested 'refunctioning our methodology rather than (discussing OA as) just a means' (transcriptions from the recordings of the workshop). Reacting to the reduction of Open Access to publication issues, which he sees as deriving from the dominance of the model of print culture, Corsín Jiménez stressed that Open Access should not be reduced to a shift in the communication system, but we should rather think of 'how the academy opens access to itself?' (ibid.), a question which in turn he relates to a difference between open-source software and open-source hardware.

> (…) whereas for some digital projects opening access is tantamount to opening the sources, in the case of hardware projects, opening access and opening sources are in fact different operations. In this light, when guerrilla architectural collectives speak of open-sourcing their practice, they don't just mean granting access to their designs. What they mean, rather, is that every stage in the process of designing and building an architectural project should be open (Corsín Jiménez, transcription from recordings of the workshop).

The 'challenges of open-source architecture' are the same challenges that he sees open-source bringing to the academy: 'an invitation to rethink methodologically and epistemically what scientific research is all about' and also 'a challenge that invites – some would even say, presses – the social sciences to re-imagine and refunction their methodological, collaborative and epistemic equipment' (ibid.; Corsín Jiménez 2014c).

An example of open source anthropology is Corsín Jiménez and Estalella's *Ciudad Escuela*, a project on open-source urban pedagogy where *new forms of expertise* are being developed, based on activities that require modes of sociality strongly mediated by forms of *open* knowledge production (Estalella and Criado forthcoming a) – Corsín Jiménez reports that they 'got to a point where to keep carrying out our work with guerrilla architects' they had to 'devise ways in which to collaboratively *infrastructure* [their] presence' – that is, their 'ethnographic toolbox and sensorium – in the city' (Corsín Jiménez, transcription from recordings of the workshop).[3]

What became clear to us – and this changed the direction of our research – was that the *open-source anthropology* projects are not just a new vocabulary about scholarship nor a matter of visions nor utopias about technological transformation, but it opens an epistemic reconfiguration towards more experimental, collaborative and tentative modes of producing knowledge. More than just using digital media or developing new research tools, what these explorations suggest is the need to open the methodological aspects of research and reconfigure it, for example through the creation of spaces/infrastructures/devices for shared knowledge production. The reconfiguration of the research epistemology implies redesigning and repurposing already existing methods: an example is the proposal of *devicing fieldwork* (Criado and Estalella forthcoming a), something that I ended up adopting for my future research.

Ethnography as Experimental collaborations

So I went to the workshop to collect discourses, attitudes, practices and perfomances about the transformations of scholarship, and I left with my conceptions of scholarship and research transformed. This example also captures well what went on with our relationship to the traditional methods that we used to collect

data for the project. Personally, I realized that I am less interested in describing this phenomenon than in experimenting with it. My plan for future research explores a different way of producing ethnographic knowledge. I am still interested in approaching medialabs as sites for the production of knowledge, and therefore I propose to do collaborative fieldwork in two contexts: Future Places, in Porto, a festival of digital culture and MediaLab for citizenship, and in MediaLab Prado, Madrid. The aim of this fieldwork, however, is not to understand those contexts and different cultures *per se*, it is to use them to experiment with transforming knowledge and creative practices both in design and in anthropology through a collaborative mode of fieldwork that goes beyond the traditional methodology of participant observation. The focus is no longer the medialab cultures, but rather an experimental exploration to discover what kind of knowledge may result from the collaborations between anthropology and design.

A key methodological concept is the idea of *devicing fieldwork*. Estalella and Criado, drawing on the proposal of Ruppert, Law and Savage (2013), think of methods as devices, that is, as patterned arrangements that 'assemble and arrange the world in specific social and material patterns' (2013, 230). Instead of the traditional ethnographic detachment instituted by a naturalist paradigm of knowledge production, devicing fieldwork is more akin to an experimental science 'arrangement' that 'assembles the experimental conditions for the joint production of knowledge' (Criado and Estalella forthcoming a, 9), where key informants are not reduced to providers of information but transformed into epistemic counterparts (Criado and Estalella forthcoming a, 5). At the same time, devicing fieldwork differs from the merely activist forms of ethnography or public oriented anthropologies: it explores the possibility of redesigning our presence in the field by creating exploratory arrangements to produce knowledge.

Inspired by this methodological reconfiguration, I plan to engage in joint exploration with designers and media professionals by co-designing activities on topics of interest to me and to my collaborators. Although it's impossible to plan in advance what these activities would be, one possibility is organizing a project together with designers/media artists/architects and anthropologists with the aim to jointly explore – and prototype – new models of collaborative scholarship. By experimenting with the proposal of collaborative ethnography – and devicing fieldwork, in particular – I would contribute to the literature that calls for a revi-

talization of the anthropological methods through a refunctioning of ethnography (Marcus and Holmes 2008) into collaborative modes of fieldwork (Criado and Estalella forthcoming a) and through learning from the knowledge environments and epistemic cultures of other fields of expertise (Corsín Jiménez 2014b).

Part 2: Chiara's exploration. Engaging with digital methods

In less than one decade, starting from the pioneering Digital Methods Initiatives[4] of the 'Web epistemologist'[5] Richard Rogers (2013), several initiatives and research centres have committed to 'move Internet research beyond the study of online culture and beyond the study of the users of ICTs only' (ibid, 4) by developing and exploring the possibilities offered by digital technologies for social research. Among them, Médialab-SciencesPo[6] (hereafter, just Medialab) that was founded in 2009, an initiative of Bruno Latour, who in recent years has been particularly interested in exploring the *materialization* of Actor-Network Theory (ANT) allowed by digital techniques, and in particular, reflecting on how digital traces left by actors inside newly available datasets might help the reformulation of classical questions of 'social order' (Latour et al 2012).

The *Oficinas* Digital Methods (ODM)[7] was organized in the context of our project to provide the opportunity to engage with Médialab's researchers and methodological proposal. The ODM took place in Coimbra in Autumn 2014; its format was two, two-day workshops, held at an interval of two weeks, where fifteen researchers were invited and proposed to experiment with a set of tools on their research questions or data. What follows is an account of the digital method project I carried out during the ODM. To some respect, my engagement with digital methods is a story of a failure; nonetheless it has enabled the reconfiguration of a research trajectory.

My exercise joined curiosity for digital methods with scientific mobility, a research interest I have cultivated since my experience of political activism with the movement of Italian students and researchers that, starting from Autumn 2008, unsuccessfully tried to oppose the last reform of the national system of education and research. I became part of the *diaspora* of Italian researchers in 2011, and since then, the experience of being a mobile researcher has offered plenty of input to reflect on the dissonance between the representation of scientific mobility pro-

moted by EU research policies and that portrayed in the scholarly literature and its practice. I decided to turn my investigation to the analysis of how scientific mobility is discursively and materially constituted in EU research policies and to this aim I collected a set of documents from EU institutions[8], and provisionally organized them into three groups according to their contents[9].

I started to nurture the idea of using this collection for exploring digital methods and in particular the tool called ANTA[10] (Actor-Network Text Analyzer) developed by Medialab with the goal of transforming 'a set of texts in a network' (see Venturini and Guido 2012). While digital text analysis is not a novelty in social sciences, Medialab's idea in developing such a tool was to 'privilege interpretability over everything else. We wanted researchers to be able to read straightforwardly the graphs we handed them and know exactly what is in them' (ibid, 6). For this reason, the tool focuses on two elements: documents (disregarded by most of the text analysis tools) and expressions (words or groups of words regularly occurring together as *n-grams*); the tool considers the simplest type of connection between documents and expressions: the plain occurrence of the expression in the document, in order to keep documents relevant in the analysis. In general terms, the tool is designed to automatize as little as possible the work of text analysis, leaving ample space for a researcher's choices. On the other hand, it works with an unknown algorithm provided by a free online service called AlchemyAPI (see ibid. for details, 7): in brief, the researcher does not know exactly how expressions are identified and choices can be made only after the extraction.

To set my digital method project I gave the instructors the corpus on scientific mobility for the uploading on the ANTA platform, provisionally organized into three sub-folders corresponding to the three categories of documents (see above). The second step consisted in *tagging* the documents: while at that moment I was not totally aware of the implications of this action, I let the instructors tagging documents with the three categories I used to organize my folders, which seemed to them the obvious thing to do (fig. 1). The third step consisted in the extraction of the expressions, that in the language of ANTA are called 'entities'; this is where the black box of the algorithm plays its part. The resulting list was huge, with more than 20.000 entities; the tool displays a distribution graph of the frequency of entities per document (fig. 2) that offer some quantitative criteria to perform the following step: selecting the entities for the analysis.

In this case, the distribution graph selected 5,000 entities, leaving out the extreme cases (a small number of entities were present in almost every document; a great number in just one document). However, I was advised that the number of 5,000 was still hard to manage and suggestions were made to reduce the number

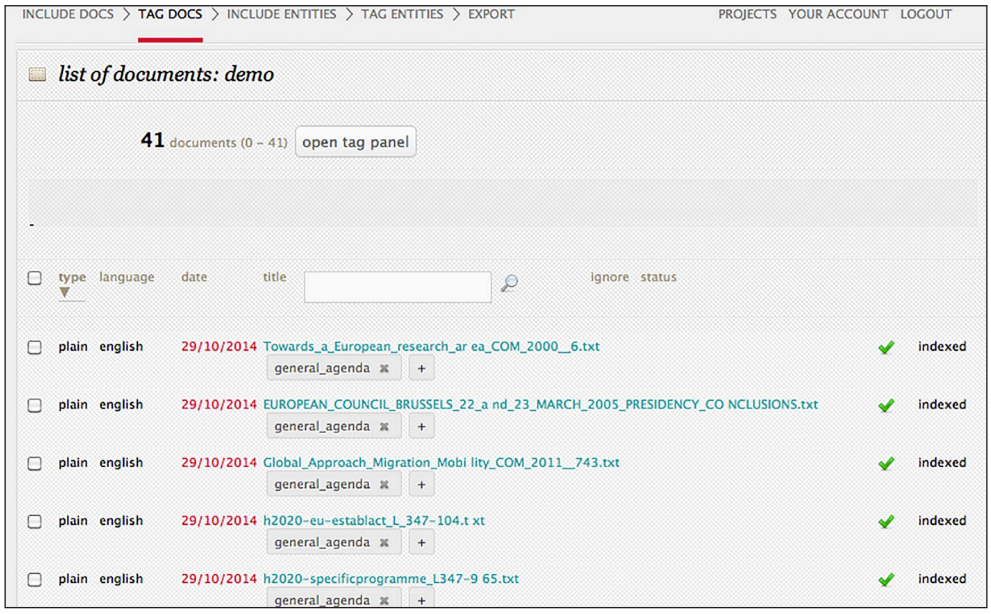

Fig. 1. Tagging documents in ANTA

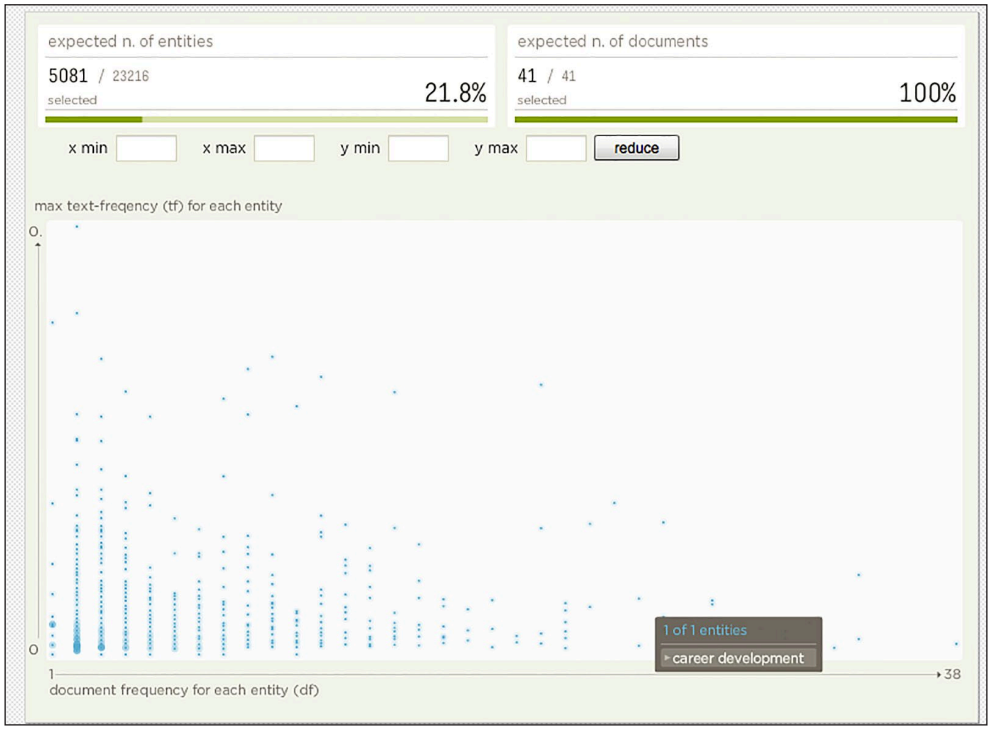

Fig. 2 Statistics about the extracted entities in ANTA

using the automatic tagging of the entities made by the tool. By admission of our instructors, this automatic tagging is of limited value for analytical purposes and should be replaced by researchers with a coding designed specifically for the research questions under investigation. Instructors suggested all the entities tagged as 'Quantity' (fig. 3) be deleted, these supposedly being non-pertinent to the analysis. However, numbers and quantity are actually relevant in the EU definition of mobility as well as in the schemes operationalizing it.

In general terms, I felt reluctant to delete entities before having gone through them, so I decided to proceed in a different way: exporting the results to visualize the network of entities and documents with the tool Gephi[11], designed to perform the interactive visualization and exploration of all kinds of networks and complex systems (Bastian et al. 2009), before proceeding to the necessary operation of tagging the entities according to the research questions. If in ANTA a social scientist is confronted with a selection of expressions whose rationale of extraction is mysterious, in Gephi the difficulty is quite the opposite. Despite the goal of Gephi's developers 'to provide some network analysis methods to social scientists, that would not require learning graph theory' (Jacomy et al. 2014, 1), using Gephi is challenging because it offers plenty of features to manipulate and adapt the network in order to produce a meaningful visualization. After importing a table of nodes and edges, the default visualization is a compact square (fig. 4) that needs

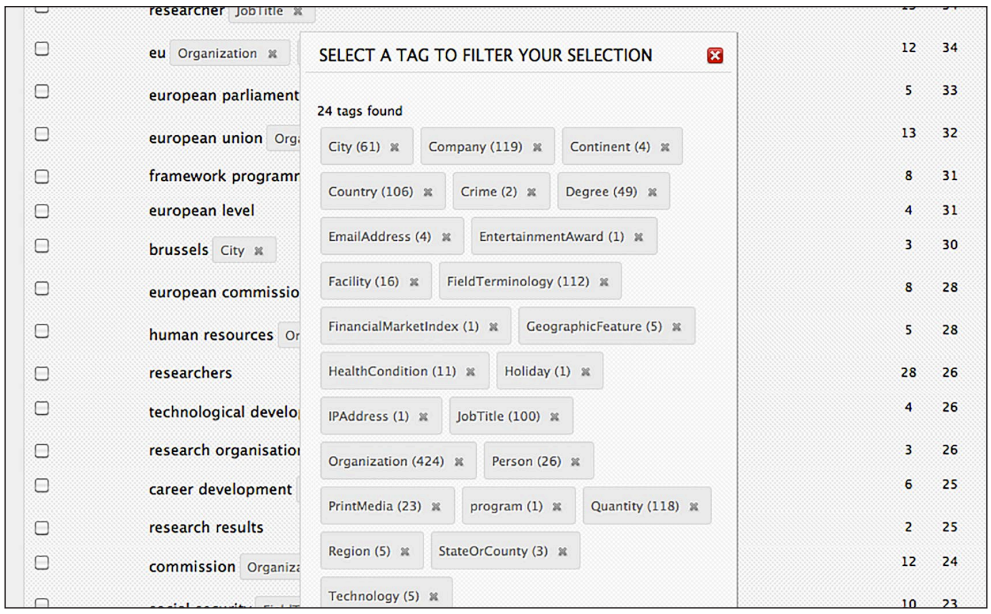

Fig. 3 Filtering entities through tags in ANTA

to be manipulated to be informative; the first operation was choosing one of the available algorithms to spatialize the graph. Instructors advised me to use *Force Atlas 2* whose operating principle is that linked nodes attract each other and non-linked are pushed apart (see Jacomy et al. 2014). This algorithm is continuous, meaning that the researcher has to decide when to stop it, depending on his/her judgement of 'satisfying' visualization.

The second operation was running the modularity algorithm, whose function is detecting clusters, groups or communities into the network. Surprisingly, the big cloud of entities somehow appears internally divided into 4 main clusters (fig. 5): three of them mostly separated, and a forth (the green one in fig. 5) 'in between'

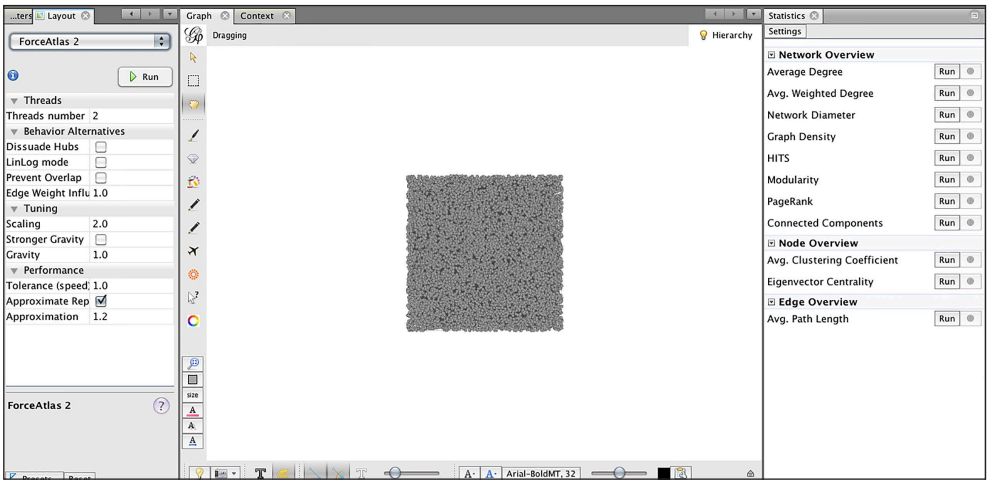

Fig. 4 Default visualization in Gephi

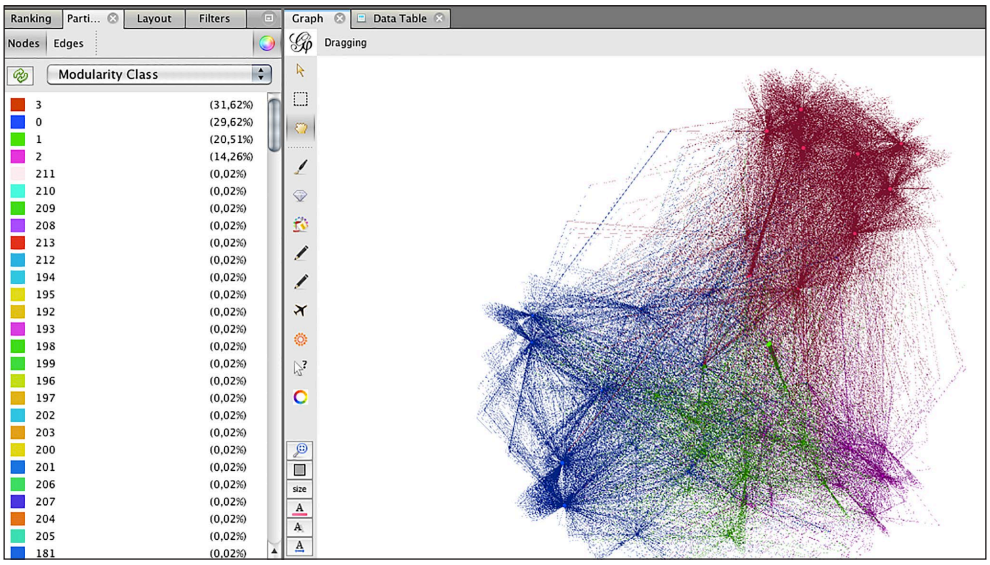

Fig. 5 The network of ANTA entities (modularity classes)

them. Reminding me that this was a bipartite network of expressions and documents (see above), the instructors interpreted this outcome as a confirmation of the homogeneity of language used by the EU across different kinds of texts (documents within the same category tend to use similar language).

As was done for each of the digital methods projects set during the first workshop, I received suggestions by the instructors about the work to be done by the second workshop (two weeks later): reading the list of all the nodes in order to 'try to get some sense of the clusters' and particularly of the expressions in between the clusters. This operation also involved a huge amount of *cleaning* (deciding to keep or to drop nodes and merging duplicates) and a reflexion about how to categorize the nodes to replace the tagging of the entities made by ANTA. In short, I found myself in front of a long list of expressions, many of which were meaningless or duplicated: after days of cleaning, I reduced the list to 3,000 expressions. However, the hard part was yet to come, as 'tagging' means being confronted with the research questions. I did not start from defined questions. My initial idea was to use digital methods in an exploratory mode, with the vague aim of identifying meanings and values conveyed by EU discourse with respect to scientific mobility. While several expressions were inspiring, I struggled to discriminate the clusters on the basis of hundreds of decontextualized expressions. During the second work-

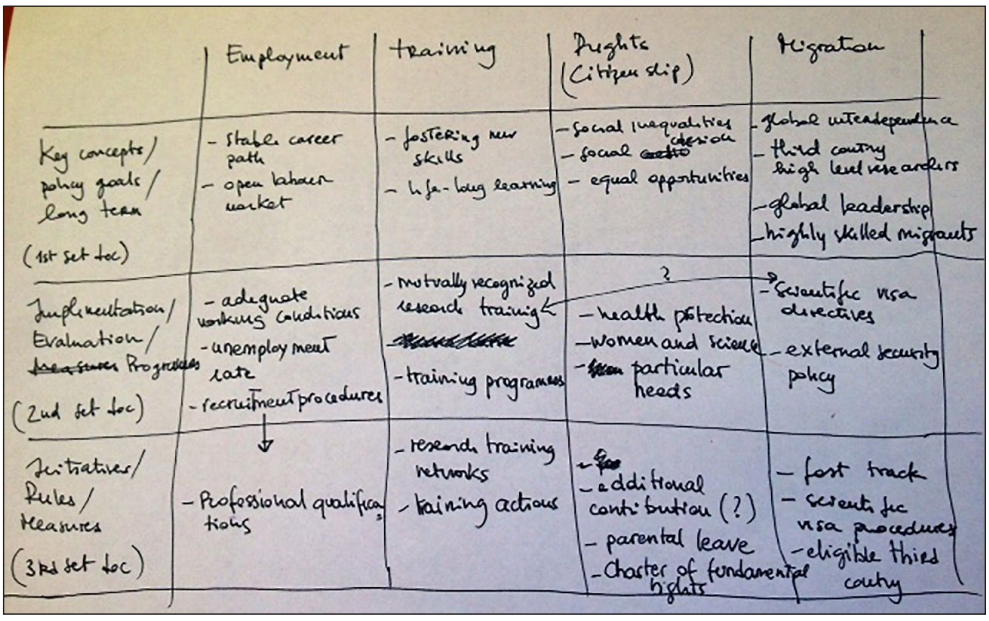

Fig. 6 One of the attempts to develop a coding system for entities, crossing kinds of documents (first column) with key issues (first row); each cell contains examples of entities from the list.

shop I focused entirely on tagging; with the help of the instructors I came up with at least four different code systems for coding my expressions (fig. 6 displays one of my attempts); none of them proved to work and with each attempt I got stacked with expressions that did not fit with the designed categories. The dataset was still unmanageable: in big data jargon, there was 'too much noise'. At the end of the second workshop, I was the only participant without a meaningful visual output – a network – of all the work done, which was definitely frustrating. However, I would not say that my work was in vain. By going through the list of expressions several times and reflecting upon it, I acquired a certain degree of familiarity with the content of the corpus; although I was not able to turn my intuition into a coding system, I got a clear feeling that scientific mobility *oscillates* in the EU discourse between the semantic universes of 'employment' and 'training' and that the key point to investigate the discursive shift from *migration* to *mobility* is the notion of European citizenship and its reconfigurations (developed through exceptions and extensions) in the case of European and 'third-Country' researchers.

In this respect, I am currently planning a new kind of digital engagement: collecting stories and fragments about my daily experience as a mobile researcher in a blog, in order to reflect about how the experience of mobility intersects all the aspects of daily life including the way in which I think about the future, practice political participation and enjoy social rights. In this respect, I am interested in experimenting with blogging not as a tool for research dissemination, but as a methodological device, as 'a crafting exercise for the construction of research questions'[12] (Estalella, MS, 7; authors' translation). At the same time, through this blog, I intend to reconnect my investigation with the political engagement that originally motivated my interest in this topic. By exposing tentative and provisional reflections on the topic as well as fragments of personal experiences, I intend to participate in and contribute to the debate about the precarization and individualization of research work, which I feel is relevant beyond my individual experience.

As for digital methods, I realized that a substantial investment is needed not only to learn how to use the tools properly – my exploration was marked by an initial decision (how to tag the documents) whose implications were unclear to me at that moment – but also to acquire familiarity with the different logic and practice of investigation, implying a lower 'degree of control' over the research process than usual for social scientists using traditional qualitative methodologies. Marres (2012) has discussed the digitization of social research as a process

of 'redistribution' among a diverse set of agents that potentially unsettle the established division of labour (ibid., 7). Although she mainly addresses a particular kind of redistribution, namely towards *devices*, her argument also fits with the redistribution of social research among different kinds of expertise, in the sense that digital social research appears to be a collaborative endeavour involving social scientists, developers, engineers, computer scientists etc., rather than being an exclusive domain of social scientists. Medialab's philosophy in developing tools is to automatize as little as possible the activities of the research chain: 'social scientists cannot use black boxes, because any processing has to be evaluated in the perspective of the methodology' (Jacomy et al 2014, 2; see also methodological considerations in Venturini et al.): as was referred to by one of our instructors during the ODM 'computers have to do just what they are good at, which is counting'.

However, as the story above illustrates, there is a trade-off between less automatization and usability: ANTA is an intuitive tool, but researchers don't know how the core operation of expressions' extraction is performed, while Gephi, on the other side, is a very flexible tool, but using it properly is quite far from being intuitive. If there is no need to expect that in digitized social research disciplinary sensibilities and skills will become irrelevant, performing some kind of contamination that overcomes the divide between technology and humanities seems necessary. The concept of *interactional expertise*[13] developed by Collins and Evans (2007) – the ability to master the language of a specialist domain in the absence of practical competence – seems quite appropriate to address such a contamination: during the ODM I worked with developers and engineers who were at ease in interacting with the methodological concerns and ways of reasoning from the social sciences and were able to provide suggestions about the interpretation of the data or the coding system in absence of a *practical* experience of social research. To become able to work with digital methods, in some way, social scientists need to go through a symmetrical kind of contamination, learning the basics of programming language.

Addressing the crucial question posed by Kirch (2014) 'does the digital give us new ways to think or only ways to illustrate what we already know?' the overall experience of the ODM, where several digital methods projects found confirmation of their starting hypotheses, seems to suggest that, in using digital methods, the clearer and the more delimited the research questions, the clearer the answers. However, my experience, albeit tentative, suggests another route to be explored, where digital methods were not instrumental to my research questions and eval-

uated for their potential to provide answers, but on the contrary, the questions themselves ended up being instrumental to my exploration with the methods, and the latter were appreciated for their *collaboration* in reformulating questions.

Conclusion: methods as prototypes

At the beginning of our experiments we were looking for different things: in the case of Andrea, she wanted to investigate what other *epistemic cultures* could bring to the social sciences in terms of knowledge production processes; Chiara, on the other side, started from an empirical work in progress related to scientific mobility and looked for 'allies' in her knowledge process. In this respect, while Andrea became interested in performing experimental collaboration inspired by digital cultures as a methodological *device* in her future research project, Chiara explored (digital) methodological *devices* in an experimental and interactive way, and at the end, the methods themselves turned into an epistemic object.

Notwithstanding the different trajectories, we see both our explorations as animated by aspects of *prototyping* as a cultural heuristic: we explored methods (both digital and traditional ones) as prototypes, allowing for experimentation and unexpected trajectories (see Introduction).

There are three particular features of the prototyping mode of knowledge production that we want to emphasize through our engagements. In the first place, the incorporation of *failure* as a legitimate and unavoidable component of knowledge processes: our explorations developed through frustrations and unsuccessful attempts, and by displaying them and the ways in which we reconfigured our trajectories, we would like to highlight both the usefulness of failures and the open and always provisional nature of knowledge production. In this perspective, research emerges as 'a technology of question formation' (Faubion in Marcus 2013, 400) rather than a problem-solver and as a practice-oriented more than theory-driven process (Rabinow and Marcus 2008, 84). In the second place, *expectations* played a fundamental role in our experiences: in line with the key lesson from the sociology of expectations (see Estalella 2011, 67–74) during the process we reconfigured the approach from the evaluation of the expectations of our 'objects' of study' to the analysis of the performative effect of our own epistemic expectations. In this respect, expectations are used as a methodological device rather than empirical material to be analyzed. Lastly, *collaboration*. Prototyping entails

'a shift in the experimentation as a 'collective' rather than 'collected' enterprise (Latour 2011, quoted in Corsín Jiménez 2014a, 386; Corsín Jiménez et al. 2015, 9). In Chiara's account, digital methods were explored as active (non-human) agents that both potentiate and at the same time limit the exploration of the research questioning, whose trajectory emerged from a collective process involving methods as well as different expertise. In Andrea's account, the 'collective' enterprise is instead formulated in terms of the relationships (technically mediated or not) to be *deviced* through the interaction between the researcher, the experts (designers and media professionals) and their environments.

It is not our claim that experimental knowledge is a new thing, nor that the digital – per se – creates such transformation. Nor do we want to suggest that knowledge as a craft is a new phenomenon: STS has long been engaged with showing us the processes of scientific knowledge in-the-making (Latour 1987; 1999); however, embracing open sourcing, prototyping and hacking as part of our knowledge-making practices gives us new ways to perform research as 'craft' – research as a process of 'making', rather than just extracting, knowledge. Making this 'craft' visible is performing what we – following Corsín Jiménez's provocation, as discussed above – understand as open-sourcing academic knowledge, beyond just opening access to its final products (texts).

To conclude, we subscribe to the suggestion of Les Back and Nirmal Puwar (2012, 10) that the social sciences need to take their research tools and devices for a walk. We believe that our non-instrumental methodological engagements – our epistemic walks with methods-as-prototypes – are already a modest contribution in that direction. Our point is that we can do it either with digital methods or with traditional ones: being experimental doesn't depend on the methods we use, but rather on what we do with them or where we take them. Thinking of methods as devices (Marres, 2012; Ruppert, Law and Savage, 2013), two related questions emerge from our trajectories: can we think of methods as ways for social scientists to prototype their knowledge; and if so, can we think of them as social science prototypes?

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Endnotes

1 The project is funded by the Portuguese agency for science, technology and innovation (Fundação para a Ciência e a Tecnologia, FCT); see http://bedigital.hypotheses.org/ for further details.

2 See http://medialab-prado.es/?lang=en%E2%80%8E

3 Another example is Sánchez Criado's work on a collective called 'En torno a la silla' (Around/on the wheelchair): 'a group for the joint exploration of open-source urban and personal devices for disabled people". In order to carry out his ethnographic work Tomás also had to infrastructure his presence by turning into the community manager of the digital infrastructures of the collective' (Criado and Estalella forthcoming a, 5).

4 https://wiki.digitalmethods.net/Dmi/ToolDatabase

5 See Rogers' profile on the University of Amsterdam website: http://www.uva.nl/over-de-uva/organisatie/medewerkers/content/r/o/r.a.rogers/r.a.rogers.html

6 http://www.medialab.sciences-po.fr/

7 See the blog of the project for details about the event http://bedigital.hypotheses.org/432.

8 For details, see the presentation https://www.academia.edu/8452690/Mobility_discourse_in_the_European_Research_Area

9 The set was composed of 43 documents organized in three groups: a) general political documents defining the overall political and economical agenda of the EU; b) reports about the policy implementation of the European Research Area; c) documents related to specific initiatives.

10 See the ANTA page on the Github platform https://github.com/medialab/ANTA for a graphic image displaying the steps of the analysis with the tool.

11 http://gephi.github.io/ Following ANTA's mode of operation, the kind of graph that is visualized is a bipartite graph, in which edges connect nodes of different types, in this case, documents and expressions.

12 "ejercicio artesanal para la construcción de problemas de investigación".

13 See the following interview of Collins for an account of the development of this concept http://www.americanscientist.org/bookshelf/pub/an-interview-with-harry-collins

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‘Do Differences Destroy a “We”?’ Producing Knowledge with Children and Young People

Doris Arztmann, Teresa Wintersteller, Veronika Wöhrer

ABSTRACT: Participatory action research (PAR) is a research approach that aims at egalitarian and inclusive knowledge production through collaboration between researchers and lay people. PAR’s aim is to not only enhance scientific insights, but even day-to-day practices. Although it is a promising concept in terms of applicability and of grounding research, this paper focuses on challenges arising from power imbalances and hierarchies between all participants involved. By analysing an empirical example from a two-year PAR project with children, we aim to critically reflect upon how all participants negotiate their demands and desires during the course of research. The article draws on Standpoint/Sitpoint Theory, as well as on disability studies, to understand how categories such as ability and disability play a significant role when it comes to the production process of knowledge. Focusing on tensions produced by the heterogeneity of positions, relations and conflicts, the article concludes with suggestions on how to deal with hierarchical power structures within and across different groups of research participants.

KEYWORDS: participatory action research, children and youth, research with children, standpoint theory, sitpoint theory, research methods.

This paper focuses on the opportunities and difficulties a participatory action research (PAR) approach creates for modes of knowledge production in schools and in academia. On the one hand, our article intends to illustrate how PAR approaches influence hierarchies and power relations in our own processes of knowledge

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production. Joanne Hill reminds us that 'the relationships that are developed between researchers and participants, the knowledge that is produced and the epistemological and theoretical foundations can be affected by how, as powerful researchers, we aim to observe and analyse" (Hill 2013, 133). On the other hand, we offer considerations on how power relations at play within (!) the group of co-researchers contribute to the complexity of the research process. While different positions, interests and resources between researchers and co-researchers are often described in the literature on PAR (e.g. Kemmis and McTaggart 2000; Reason and Bradbury 2008), we argue that these also have a significant impact on ways of knowing between and within different (groups of) researchers and co-researchers. We would therefore like to address the following questions in our article: how can we as researchers deal with heterogeneity among co-researchers? How does it affect the research process and the results? What can we learn from failed attempts to listen to one another? The handling of power imbalances between and within groups of participants poses challenges for the research process and the usage of research results, but we argue that PAR as an ambitious, participative research paradigm opens up space to reflect on these.

This paper presents empirical data, reflections and analysis gathered in the course of our work in a participatory action research project called 'Grenzgänge. Feldforschung mit Schüler_innen [Transgressing Borders. Fieldwork with Pupils],' conducted by the Vienna-based association Science Communications Research.[1] We – five scholars with transdisciplinary backgrounds in sociology, political science, cultural anthropology, arts education and psychology – conducted field work with 18 students at a Viennese secondary school, aged between 9 and 14 years. The school is an integrative all-day school with mixed-ability learners. It offers mixed-age classes, which are mostly geared toward Montessori and Freinet pedagogy. We were thus working with students of different ages, genders and abilities, from very different economic and educational as well as migrant and non-migrant backgrounds. In the course of five months, the students and social scientists worked together in eight different research groups around questions the students had chosen, within our overall topic of 'borders at school'. Within this research framework the students could choose any topic for their research projects. As the students were not involved in writing the project proposal, we as accompanying researchers tried to keep the topic as open as possible.

The empirical data consists of observational protocols of all the research group sessions, written by the relevant social science researchers, as well as audio transcripts of discussions and interviews conducted by the co-researchers. Additional material we were able to use includes entries in the research diaries and posters created by the students, summarizing their research content and their analysis. Our analysis is based on the Grounded Theory methods developed by Strauss and Corbin (1996), and on the technique of *Sequenzanalyse*, as elaborated by Froschauer and Lueger (1992).

Participatory Action Research – Aims and Ambitions

Participatory action research as a research paradigm not only fosters the active involvement of 'lay people' in the research process, but allocates them a central role as co-researchers: PAR aims at exploring research questions and using methods that are chosen by non-scientist actors in a social field. PAR is therefore a research approach that creates knowledge which questions the borders between academic disciplines, and between scientific and non-scientific ways of knowledge production (Reason and Bradbury 2008; Whyte 1999). By advising and supporting non-trained researchers in conducting joint research projects at school, we as researchers – in collaboration with the pupils – produced sets of (scientific) knowledge about their school and lifeworlds. This knowledge was not only developed to understand everyday practices, but also to challenge, change and enhance these practices. In addition, PAR as a research paradigm opens up space for critical self-reflection on epistemic preconditions, and on the ongoing academic boundary work within scientific fields.

In our case, the co-researchers are not only non-scientists, but also children and school pupils. This means that they, even more than adult co-researchers, are perceived as receivers of knowledge rather than as producers of knowledge. Due to their age, they are seen as less experienced and knowing (for a critical view of this see e.g. Kellett 2010; Groundwater-Smith et al. 2015), and at school they are often perceived as 'learners', not as 'knowers' or 'teachers' (e.g. Feichter 2014). Nevertheless, there is a growing number of studies that address children as researchers. Literature on participatory (action) research with children often focuses

on children's rights and the UN Convention on the Rights of the Child, arguing in favour of including the perspectives of children in social research (e.g. Groundwater-Smith et al. 2015; Trollvik et al. 2013; Prout and James 1996). We want to argue that in addition to political and democratic motivations, there are also epistemic reasons to do participatory research with children. Taking into account Standpoint and Sitpoint Theory (Harding 2004; Garland-Thomson 2002), as well as theoretical concepts of objectivity which draw on communities and networks as the main unit of knowledge production (e.g. Longino 1990; Haraway 1988), we argue that it is difficult to produce knowledge about borders at school without integrating the students' knowledge.

Standpoint and Sitpoint theorists argue that all knowledge is situated, and that every person speaks from a unique point of view, which is shaped by social categories such as race, class or gender, and by experiences, world views, or ideologies. Each standpoint enables us to see, question and address certain issues, but prevents us from seeing others. While this would lead to relativism if knowledge production were conceptualized as an individual process, authors like Donna Haraway (1988) or Helen Longino (1990) stress that scientific knowledge is and should be produced in communities or networks. Longino (ibid.) argues that the more heterogeneous the participants of these communities are, and the more democratic and egalitarian the process of communication is, the more valuable and objective is the knowledge elaborated in these communities. Therefore, the variety of knowledge producers should not be limited to scientists. Everybody affected by the results of scientific knowledge, including lay persons (Longino 1990, Rose 1994) should be involved. Accordingly, it seems a pressing matter to involve students' perspectives in research on schools. The validity of knowledge about school increases, if those who are most affected by it take part in its production. Additionally, this approach contributes to blurring the boundaries between science and its application, while trying to improve both. As we will see later on, the involvement of actors who are not experienced in using research methods often requires non-canonical procedures and takes unusual forms.

Currently, the consideration of students' perspectives takes different shapes in different research projects, and some involve students as objects of research rather than as active researchers (for a critical view of this see Kellett 2010; Feichter 2014). We believe that including students' perspectives means giving them a chance to

address and ask their own questions, and supporting them as they develop their own reflections and analysis. However, the results of this research are used differently by different participants. In another text (Wöhrer and Höcher 2012), we have tried to capture this way of working together, sharing ideas and reaching seemingly common results, while still having different understandings of the situation and different overall goals. For this we have used the concept of the 'boundary object' (Star and Griesemer 1989). In their analysis of the foundation of the Berkeley Museum of Vertebrate Zoology, Susan L. Star and James R. Griesemer show that objects which inhabit several social worlds and have different meanings in each of them may function very well as communication tools in processes of knowledge production. What is most interesting for us is their observation that these boundary objects never had the same meaning for all the different people involved. Nevertheless, they were able to cooperate successfully: boundary objects formed spaces that everyone could somehow identify or work with. In participatory action research, it is particular terms, concepts, ideas, tools or aims, or even research approaches that form such boundary objects. All the researchers and co-researchers involved can somehow find a use for this idea, tool, concept, etc. and deploy it for their own requirements. As researchers, it is our aim to discuss epistemic and methodological issues around PAR with academic communities, e.g. through publishing in this journal. This accounts for a part of our lifeworlds as scientists, while the students are more involved in researching and changing their immediate school environment. Our joint PAR research provided opportunities for various goals. This article represents our voices as researchers, however, we published texts and research presentations by the students on the webpage of our previous project (Tricks 2009), as well as in the forthcoming book on our research (Wöhrer et al, forthcoming).

Theories of Knowing: Contradictions, Partiality, and Legitimacy

Conflicts about whose voice is legitimate, reasonable and deserves a hearing are enmeshed in power structures, which can be found in schools and academia alike. As described above, the assertion that social position influences truth claims is a well-developed argument in feminist standpoint theory (Harding 2004). This the-

ory makes three principal claims: (1) knowledge is socially situated; (2) marginalized groups are socially situated in ways that make it more possible for them to be aware of things and ask questions than it is for the non-marginalized; (3) research, particularly research that focuses on power relations, should begin with the lives of the marginalized.

When we consider these claims of feminist standpoint theory, PAR seems to be well suited to including the perspectives of the marginalized – in this case the students. Yet these claims give no pointers on how to deal with the conflicting, contradictory and intersecting power imbalances within different groups of students and researchers. What if the claim that research should begin with the lives of the marginalized were ambivalent, because PAR researchers as well as co-researchers are enmeshed in privileged positions? Bringing participants together to engage in collective research on power relations is often simply not enough. We will quote disability scholar Margaret Price to point to some difficulties for participatory research processes:

> The notion that any rhetor, including a student or professor, can engage in dialogue about oppression presumes that all rhetors share a universal and 'reasonable' basis for that dialogue. But (…) all voices in the classroom are not and cannot carry equal legitimacy, safety, and power in dialogue. Nor do all rhetors bring an equal (or rather, equivalent) sense of what concerns are 'reasonable', what are 'rational' and 'appropriate' ways to voice ideas – in short what sort of human to be in the classroom. (Price 2009, 40)

The hierarchical power structures at play in the classroom influence the process of knowledge production, shaping it with *contradictory, partial, and irreducible means* (Price ibid.). If we think this position of disability scholar Margaret Price through, the position of the rhetor (signer) affects the attribution of abilities (and disabilities) to certain actors in the process of scientific knowledge production, in universities, classrooms and beyond.

Rosemarie Garland-Thomson (2002) therefore suggests an extension of feminist standpoint theory by calling her body of work 'sitpoint theory'. Her use of the term 'sitpoint' particularizes standpoint theory to disabled women by calling attention to the ableist, normative assumption that one perceives the world from

a standing rather than a sitting position. The author thus sees 'disability' as historically contingent, cultural and socially organized or constituted. From this sitting vantage point, Rosemarie Garland Thomson formulates a critique of ableism (the notion that a person always functions in a healthy and able manner and the construction of an other based on everything that is in any way deficient). A key point in this 'project of ableism,' as Fiona Kumari Campbell calls it (2009, 3), is the normative notion of a bodily and mental ideal standard that can be fundamentally distinguished from everything that deviates from it. The 'healthy' body/mind norm is constituted by distinguishing it from bodies/minds considered 'disabled' or 'dysfunctional.' In this sense, 'disability' does not refer to a physical impairment, but to the entire context of practices, structures and institutions, that is, mechanisms of exclusion that discriminate and, as such, create disability in the first place. Garland-Thomson uses the concept of misfit to grasp the relationship of bodies and environments, stating that the constitution or arrangement of an environment constitutes persons as not fitting, furthering exclusion, discrimination and alienation of people with disabilities (Garland-Thomson 2011, 597).

Ableist normative assumptions can be traced in ways of knowing in both academia and schools, with 'compulsory able-bodiedness' and 'compulsory able-mindedness' (Kafer 2013) at their normalizing centre, setting standards for ways of knowing. As Margaret Price (2009, 30.) puts it so poignantly, being reasonable, rational, appropriate, and in control of bodily and mental functions is a requirement that is highly valued and trained by academic and educational institutions. Failing these standards – as all humans do, some more often than others – also means failing as an intelligible human. However, various types of embodied knowledge might never become visible due to this normalizing power. Sara Bragg reminds us that most literature on students' research builds on an 'unwritten contract' that students 'speak responsibly, intelligibly and usefully' (Bragg 2001, 70), whereas we might possibly learn the most from those who seem to be 'incomprehensible, recalcitrant or even obnoxious' (Bragg 2001, 70). She argues that we should take our time and learn from the anomalous, from incidents that produce unexpected reactions or disrupt our assumptions.

In the following section we will analyse how differing positions within students' and scientists' voices make a difference in the process of knowledge production, by comparing and analysing ways of knowing from a research group that dealt

with differences within the classroom. Our considerations and findings reflect different strategies, interests, positions and power structures in an interview situation, all of which contributed to the group's knowledge production. Our empirical example might be described as a 'failed' research situation. However, it is this failure that made us reflect and learn important things about PAR.

Researching Heterogeneity in a Classroom. Where should we begin?

Participatory action research usually starts from problems or points of irritation (Wadsworth 1998). We encouraged our co-researchers to do the same, and to transform their displeasure into research questions. During the first term of our research project, three able-bodied students named Sascha, Nick and Jona[2] formed a research group around the question 'Do differences destroy a 'we"?'[3] The research topic soon focused on issues about what it means to be disabled in this classroom. Overall, the three able-bodied students had the impression that children with disability status were favoured by their teachers and that the status 'disabled' constituted a sort of unfair advantage for children who had it. Although they tried to understand why pupils with disability status had different sets of classroom rules, they wanted to focus on their criticism of unfair situations. In the classroom and in interactions with teachers, they felt that there was no space to articulate their own position – which was always subordinated to the discourse of inclusion and understanding. When talking to or in front of teachers about these problems, they already incorporated a socially accepted appreciation of why children with disability status are treated differently, and have advantages they do not have. But during the research project, the struggles between different orientations surfaced; the students had to combine personal interests and the feeling of being disadvantaged with the requirement to be appreciative and inclusive. After narrowing down their research topic, they decided to do interviews, one with the teacher about rules for disabled children, and one with Chris, the pupil with a mental impairment status they had been talking about a great deal. They decided to ask about different topics such as friendship, getting angry, being at school and participating in school activities. Chris hirself did a research project about 'Why do siblings fight?' and conducted several interviews with students from hir class,

including Sascha, Jona and Nick. The following situation captures the moment when they swap roles: Chris has just ended the last interview with Sascha and the three pupils now plan to interview Chris.

Chris: I am scared.

Nick, Jona or Sascha: Come on, Chris!

Manu, the researcher: Well, Chris, dear 'We'-research group, Chris is afraid of being interviewed. I think we first have to clarify what is ok for Chris as an interview and what is ok for you.

Nick: You know it's ok. Look!

Chris: No, no, no.

Nick: Wait, I'm not starting the interview. Well, would it be ok for you if we ask questions and if you don't want to, you just don't give an answer.

Sascha: Then you just say 'I'm not saying'.

Researcher Manu: Yes, you can always say, I'm not saying.

Sascha: Would that be ok?

Nick: It's not so bad.

Sascha: Look, Nick, if we split these two questions, then there are two other questions left.

Researcher Manu: And if you say, 'No, I don't want to answer this', is that ok? Is that ok for you?

Chris: I want to ask something.

(Sascha, Nick and Jona discuss their set of questions)

Researcher Manu: What do you want to ask?

Chris: I want to ask them what district they live in.'

(Interview session, We-group; 20140428; translated from German to English)

This initial sequence of the interview shows many of the positions and strategies that are enacted by the different protagonists throughout the interview. By repeatedly telling the others that the interview situation is intimidating, it got obvious that Chris was afraid. Nevertheless, the three interviewers continued to discuss their own agenda of dividing up the questions, and insisted on doing the interview with Chris. In later sequences, they oscillated between accepting Chris' refusal to answer questions, and pressing the student to give them answers by repeatedly posing questions, especially about the topic of friendship and anger. They continually overstepped the boundaries Chris tried to set. The researcher Manu attempted to mediate between the desire to conduct the interview and the wish to refuse or shorten it, but was also interested in letting it happen. Implicitly, these interests indicate that the researcher is the person supervising the situation meaning that zhe has the power to continue or end the interview and to intervene and redirect the group interactions due to the adult-child hierarchy. In a collaborative research setting however, the hierarchies between adults and participating students become blurred, for the children have – or at least should have – a say in the decision making process. Nevertheless, it is the accompanying researcher who is first and foremost accountable for research ethics. The situation described above illustrates how difficult it is to mediate between ethical conduct and discarding such principles while mediating different needs in a collaborative research process. Besides, our positionality as researchers is complex as it includes f. ex. being an adult, being a trained researcher, not being a teacher, being a confidential person for some students, being partial and sharing the experience of living in/with a temporarily abled mind/body.

Negotiations in Practice: Talking about. Talking for. Talking with. And what about Listening?

At the beginning of the interview, all the participants negotiated whether and under what conditions it could take place. Even though Chris initially refused to do the interview at all, the student reluctantly agreed to answer the questions on the condition to refuse to answer when desired. In the first minutes, the research group accepted Chris' refusal to answer a question about hir desire to play football, but then they insisted on answers to their questions about friendship and anger. This insistence partly put Chris in a difficult position, for example when the interview-

ers did not accept his answer that there is only one best friend in class. It seemed that the research group wanted some confirmation of their own theories about Chris' friendships instead of listening to hir experience. It is striking that Chris, who is preconceived as not being able to control anger, remained quite calm during the whole interview, despite the interviewers' attempts to imitate everything that might make Chris angry – to the point of explicit provocation (making awkward sounds, telling Chris names, tapping Chris' leg slightly). Although it was rather the interviewers who seemed emotional, and who became impatient when Chris did not say what they wanted to hear, this research situation echoes 'compulsory able-mindedness' in the classroom by trying but failing to re-stage two clearly separated modes of conduct: Acting reasonably and calmly on the one hand and 'freaking out' and getting angry on the other. This demonstrates how disability and ability – and the exclusion of the former – are iteratively re-constructed in the classroom. In reference to Price (2009), one could argue that the three students set themselves as rational and reasonable people, against Chris, who is staged as unreasonable. By using disability as a justification for differentiation, they repeated their own inclusion into the social fabric of the class, and demarcated their position as better off.

During the interview, the research group seemed to be more interested in their own social positioning in the research group and in the classroom than in obtaining information about and with Chris. Here and in other parts of the interview, the three researchers not only negotiated doing the interview with Chris, but at the same time distributed the tasks of asking certain questions among themselves ('Look, Nick, if we split these two questions, then there are two other questions left'). The division of the questions defined who was allowed to say what during the interview. Fairness and rules in this matter were very important for the group, especially for Sascha, one student who held a structuring position. The importance of structure became even more obvious during the interview, when one student asked a question beyond the prepared questionnaire, which was promptly criticised by another interviewer.

Chris' strategies for getting heard and being articulate for hir standpoint spanned from saying 'no', to explaining the reasons ('I am scared.') to changing positions ('I want to ask something'). In addition to these strategies, Chris sometimes refused to answer a question or seemingly changed the subject. This last strategy might be a strategy of resistance, but it may also be a strategy for contributing to the interview on a different level. Although it seemed at the time that Chris was simply changing

the subject, the student actually contributed to the interview, but with different examples that were more distanced from the socially charged group dynamics in class. Chris told family stories, which would have fitted perfectly well into the interview if the research group or the accompanying researcher Manu had listened more attentively. For example, Chris told a story about being forced to wear a suit and go to church, both things Chris did not want to do, at a point in the interview when Sascha, Nick and Jona were ignoring Chris' continual attempts to reject a question about what else makes hir angry. During the interview, none of the others interpreted this story a) as an answer to the question about what makes hir angry (namely to be forced to wear a suit and go to church) and b) as a way of articulating hir uneasiness with the interview situation. We realized this only later on in our analysis. This incident points to the crucial matter of listening to each other. At times, our ableist prejudices about Chris' status as mentally impaired hindered the research group as well as the accompanying researcher Manu to actually listen. In this failed PAR research moment, the researcher's and the research groups' ableism becomes visible as a network of beliefs, processes and practices that produces us as a species-typical, fully human self and body and prevents us from listening.

At school, as well as in the classical social sciences, linear thinking and concise arguing are highly valued skills and the focus of much of the training. Moreover, they seem to be a prerequisite for reaching enlightened ideas. This in fact fosters a rather narrow understanding of knowledge production in schools and academia alike. There is hardly any regard for associations or nonverbal modes of expression in interviews and other traditional modes of data gathering. Considering that different people use different modes of expression, the example above shows that we as researchers have to rethink the epistemic borders and methods that are used and taught to co-researchers. In our empirical example, it might have been better to use methods that encourage the skill of listening on the side of the epistemically privileged, instead of conducting a rather confrontational semi-structured interview.

Being a Social Science Researcher – Responsibilities, Strategies and Blind Spots

Supporting children and young people in completing a research process comes with some challenges. Social researchers come from outside this environment

and have few obligations to school requirements. They can create an environment where different topics can be discussed, and bring different tools for working together and getting information. What differentiates researchers from teachers in this setting is the lack of a pedagogical impetus on the part of the researchers, as they a) have a different goal when working with the pupils, and b) do not know the school-specific set of rules for communication. This difference might be especially important when it comes to the question of who has the authority, the voice and the means to articulate matters of interest. Yet, researchers do also have pedagogical as well as ethical demands in the situation. Moreover, they have the legal responsibility to watch over minors. These requirements may conflict with their role as observers and facilitators of open modes of exploration.

The concrete handling of hierarchies and power relations amongst and across researchers and co-researchers in a research group is a tricky task when, like in this case, we as researchers share the privileged experience of being temporarily able-minded. In our empirical example, the accompanying researcher Manu was in a position where zhe had to protect the interests of all the participants including hirs. On the one hand, zhe tried to mediate between Chris' reluctance to participate in the interview and the research group's desire to conduct the interview. Manu did this by suggesting alterations, e.g. that Chris could say no if zhe did not want to answer a question ('And if you say, 'No, I don't want to answer this', is that ok? Is that ok for you?'). On the other hand, we as social science researchers are not impartial, either. Although Manu tried to protect Chris, who was in a vulnerable position due to hir status as mentally impaired, Manu shared the desire to conduct the interview. This was because it was part of the research curriculum, and because it seemed fair, since the research group had been interviewed by Chris beforehand. Social scientists supporting such projects may find themselves in a position where they must choose between gathering data and acknowledging that some research situations may simply fail. It is a position full of ambivalences, in which the researchers have to keep in mind their own aspirations (e.g. publications about the project or reports for funding bodies), the different positions of the co-researchers and their needs and wants in the concrete situation, and their own role in the situation. In retrospect, it might have been more productive to cut off the interview at an early point to then collectively reflect on the situation, the power dynamics and the uneven capacity to listen to each other.

Circles of Reflections – Learning from Failures

In a collective process – such as the carrying out or the interpretation of an interview – the participants do not share the same standpoints or have the same technical and social skills. In our case, we observed that every standpoint facilitates some insights and prevents others. Jona, one co-researcher knew the position of being an outsider first hand, and could therefore articulate experiences and observations about Chris' social relations that the other group members were unaware of. Nick turned out to be very empathic towards the emotions and situations of others, but at the same time tended to be patronizing, since this co-researcher thought zhe understood other people better than they did themselves. Sascha was not really interested in understanding the positions and standpoints of others at all, but was good at structuring and planning the research process. Manu, the accompanying researcher, initiated a discussion about communication needs within the research situation, but was too torn to cut the interview off when Chris' borders were clearly overstepped. This led to different interpretations about Chris' answers. Their reflections about what Chris said in response to their questions about friendship, and why, started a discussion about friendship: who is friends with whom and why, what is a friend, and what is the difference between being friends and just being nice or not so nice to someone? The students also discussed methodological questions such as how to ask questions and how to interpret the answers in the course of a research process. The researcher Manu chose to take this failed research situation to ponder on prerequisites of knowledge production within participatory research.

Manu sensed the need to talk more about methodological issues, and gave some input about asking questions, conducting interviews and interpreting data, in order to prevent such an invasive situation in subsequent interviews. At the end of the process, all three co-researchers and we, the researchers, still had different interpretations of the question 'Do differences destroy a "we"?' but we had all gained some insights. Throughout the whole process, the co-researchers, we as researchers and at some points, the interviewee, had the chance to articulate and reflect on how to deal with these imbalances. We talked about our own positions and behaviour in the classroom, in academia, and towards students with mental disabilities. The collective process of reflection and discussion gave us an oppor-

tunity to articulate our own opinion, and to listen to and think about the opinions of others. Through the tools of social science research, both the students and the accompanying researchers could distance themselves/ourselves from concrete situations and reflect on structural causes and conditions. Sascha, Nick and Jona used the theme of disability to formulate a critique about school structures and rules, and to object to boring and repetitive content in lessons and strict teachers. They used students with disability status to project their own struggles within the institution. In the interview with the teacher they were able to make their points about their feelings of being treated unfairly, and about class rules that they felt should be changed.

As shown above, the process itself involved messiness and failures in interpretations and social interactions. Collective reflection about these allowed the students and us as researchers to gain some insights. We have to keep in mind that learning how to do research needs space to fail and try again, to reflect upon research situations and implicit presumptions, and to plan how to do better.

Conclusion

Participatory action research aims at actively including so called 'lay persons' and persons affected by scientific research in the process of scientific knowledge production. It seeks to provide academic knowledge grounded in the experiences of people living in the fields under examination, and to bring about an improvement in their conditions. In an ideal PAR research setting, one would fulfil these aspirations by striving to cooperate as egalitarian as possible. Here, however, we wanted to point to some difficulties which arise from power imbalances, and from the different aims and motivations of participants in a research project. While it is usually the difference between trained researchers and co-researchers that is most elucidated in PAR literature – and even texts explicitly addressing the challenges of PAR usually concentrate on this line of differentiation (e.g. Grant et al. 2008) – we focused on hierarchies, differences and conflicts within and across different co-researchers and researchers, and on our own (partly failed) attempts to handle these.

In the given example we can see that it is not easy to provide everybody with adequate space to articulate hirself equally in a research group setting. We could

show how the people involved – the interviewers, the interviewee and the accompanying social science researchers – struggled to find a common language to listen to and talk to each other, and negotiated interests and power while doing research together. As a conclusion, we suggest two points for consideration concerning hierarchies and power relations among co-researchers in participatory action research projects, and some possible strategies to deal with them.

1) One main aspect of knowledge production in PAR is co-operation between people with different social positions. Although every position is supposed to be equally heard and recognized, and although research opens up new spaces for articulating matters of interest, these positions are still hierarchically interrelated. Some students have more (socially approved) skills to articulate their issues than others. Researchers as well as teachers may share certain privileged/minoritarian experiences. These are shaped by and shape interactions with teachers, as well as with researchers. The concrete handling and counterbalancing of hierarchies and power relations among co-researchers in a research group is a tricky task when, like in this case, the researchers share the privileged experience of being temporarily able-minded/able-bodied. Reflecting on these power relations with the co-researchers is an important step in the research process, as it helps researchers and co-researchers to understand structures within the group as well as within institutions and organizations. Furthermore, it encourages the participants to reflect on their own actions, options and obstacles. Even in the planning phase of a PAR project, we recommend allowing space and time for conflicts. Otherwise the results and the implementation of the research in each of the social worlds involved will reproduce untroubled power relations.

2) Another important point for participatory action research practitioners concerns the use of methods during a project. In many PAR projects, three layers of research occur. There is the first layer of participatory research, conducted by researchers and co-researchers together. This layer is mostly well described in the literature about PAR, and often involves traditional as well as non-traditional methods. The second layer consists of project planning and scientific outputs such as this article, carried out solely by the social scientists. The third layer comprises the research that is done by the co-researchers themselves. The set of methods taught to co-researchers is hardly ever described in the literature. We suggest that co-researchers should be taught to use non-canonical, e.g. visual and performative

methods like theatre of the oppressed, etc. Having a broader repertoire of methods enhances the appropriateness of the tools deployed. This is important not only for young people, but for many kinds of co-researchers e.g. when researching people who are illiterate or do not have a good command of the dominant language.

Finally, we see it as the task of the trained social scientists to provide co-researchers – young and old – with the means, the time and the space to reflect on differences and power relations within and across all groups of research participants. By calling attention to the ableist, normative assumption as unfolded in Garland-Thomsons Sitpoint Theory (2002), we conclude that it is key not to perceive the world without scrutinizing the normative orderings of our location. From this vantage point, we daily have to unlearn the construction of an other based on everything that is in any way deficient to an imagined norm.

Endnotes

1 In our research project most of the 'academic' outcomes such as articles and conference papers were produced by the accompanying researchers without the pupils' cooperation. This is mostly due to the common focus of the project elaborated with the teachers and students, which prioritized the collaborative data gathering and analysis as well as presentations in the school context before the written text production. Nevertheless, pupils were authors and co-authors of several texts in our forthcoming book (Wöhrer et al. forthcoming). .

2 As the students used ambivalent gender identities for themselves in some of our interactions, we did not want to attribute them more rigid categories than they would use for themselves. Therefore we use gender-neutral names as pseudonyms for the students and the researcher as well. Accordingly, we also use the gender-neutral pronoun 'zhe', 'hir' and 'hirself'.

3 They chose the topic and created the research question, rather an abstract one in our view. The German original was 'Machen Unterschiede ein "wir" kaputt?'

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Internet of Everyone – Tools for Empowerment

Tom Bieling, Tiago Martins, Gesche Joost

ABSTRACT: Digital communication technologies and online social networking services are often referred to as systems of opportunities for social inclusion of people with disabilities, not least through the facility of communicating in relative anonymity, potentially free of certain prejudices and other social barriers. They are further described as tools for activism, empowering individuals and fostering autonomy (Shakespeare 2008). This opens up important questions in regard to participatory design approaches and political implications of collaborative research and technology development. In this discussion paper we will carve out a specific case study: a participatory design research project developed in the context of deaf-blind communication, interaction, empowerment and activism.

KEYWORDS: activism, deaf-blind, design research, empowerment, inclusion, interaction, social innovation

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Design, as an innovative cultural practice, is deeply entangled in our everyday life and is therefore intrinsically connected to the social sphere. In recent years, the social and political dimensions of design have seemed to increasingly gain importance[1]. Critical and cross-cultural as well as inclusive and socially-informed design approaches have helped to form an understanding of design as a practice with a high potential for societal transformation. (Papanek 1971; Lund/Lund 2014; Yelavich/Adams 2014)

It seems to be a logical consequence that a social orientation in design is now gaining currency. A "social active design," as Alastair Fuad-Luke has called it, focuses on society and its transformations toward a more sustainable way of living,

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working and producing (Fuad-Luke 2009:1978). Ezio Manzini describes the necessity for cultural change that can be propelled by a new awareness in society and by establishing new models of behavior (Manzini 1997:43-51). Design can play an important role here in that its artifacts – in the form of products, services or interventions – can create awareness and can motivate alternative patterns of behavior. As such, design is required to reflect on the scope of its actions and on the responsibility of the designed artifact's possible effects. It is a question of the social responsibility of design and the potential to design social responsibility.

The perspectives described above are based upon a crucial social challenge: namely, how to deal with diversity[2] in everyday life. A strong characteristic of humans is their diversity (Heidkamp et al. 2010, 8). This variety is also reflected in human-made artifacts and can, by implication, also be addressed by looking at the design of such artifacts. As such, a large potential is opened up to bring together people from a variety of contexts (whether those be cultural, social or demographic) into the processes of technological and/or social innovation, not least to clarify: the awareness that society is diverse can also be of aid in the design process in developing new and alternative approaches extending far beyond the stereotypical image of so-called standard users (Joost & Chow 2010). Such a standard or "normal" user stands in contradistinction to diversity and is thus far from reality.

But diversity in everyday life also entails calling the existing constructs of normalcy[3] into question: that is, which body is "normal"[4], and which behavior is "socially acceptable"? The conception of "normal" is often reinforced by design, not only by means of the images produced by advertisements, but also due to the fact that the design itself can discourage or exclude certain users from using specific services and technologies.

Design and Inclusion

Based on the assumption that there is a fundamental relationship between design and disability[5] (Bieling 2010), two different phenomena – "to be handicapped" and "to be hampered" – seem to be inextricably woven together. In particular, the link between people, artifacts and their relationships to one another plays an important role (Latour 2001; Moser & Law 1999; Winance 2006). Thus, a wheelchair

user becomes especially aware of their disability when confronted with designed things, such as stairs or sidewalks.

This raises the question whether "impairment" itself is the problem design should concentrate on or whether the focus should be on the culture dependent settings that produce such exclusions[6]. According to the Social Model of Disability, which blames the systemic and artificial barriers as well as societal processes of exclusion, design itself can be identified as one of the main contributing factors towards disability. Its operation range does obviously involve both a facility to "compensate" impairment (→ Medical Model) and the potential to help modifying the culture dependent settings (→ Social Model), thus changing or counteracting processes of exclusion.

In relation to the proximity of the two parameters "design" and "disability," design theory and practice proposes approaches to be disseminated under different concepts: first and foremost, "universal design" (Erlandson 2008; Herwig 2008; Mace *et al*. 1991; Mitrasinovic 2008), "design for all," "design for accessibility," barrier-free design," "transgenerational design" or "inclusive design" (Imrie & Hall 2001).

Universal design and *inclusive design / design for all* from the start contested a thinking in polarities and promoted an understanding that aligns design decisions with requirements that serve for *all* humans. Universal design strongly highlighted the importance of standards, norms and the legal basis that is needed to reach this goal. Inclusive design in comparison more practically suggested design approaches that aim at including the diversity of users' needs that manifest in a "variation in capabilities, needs, and aspirations"[7].

An inherent conflict to these approaches is that any attempt to define most clearly in which way any special needs has to be respected, will also induce the reduction and uniformization of the possible variety in design – the underlying moral obligation left out. And *including* people also means to declare somebody being previously excluded – which again entails critical debates.

If one assumes that technology design plays a role in social and cultural inclusion and exclusion as well as in the participation of social processes, then it becomes clear to what degree the influence of access to information has on the facilitation and initiation of social inclusion.

One potentially important message is that one should not necessarily emphasize the less positive aspects (that is, the disability), but instead recognize the real

skills and expertise of the disabled – a lesson that is as important for designers as for others. To understand disability as an expertise is a special point of view that indirectly allows a fundamental reinterpretation of widely anchored social evaluations and understandings of disability and normalcy.

Empowering Interaction

In the research project *Interaktiv Inklusiv*[8] we have been exploring possibilities and challenges in the design of assistive technologies within a context of communication with or between deaf-blind individuals.

Deaf-blindness is a dual sensory-impairment with a combined loss of hearing and sight. The lack of a common language makes it difficult for deaf-blind people to connect with the outside world. Particularly people with deaf-blindness acquired late in life have the opportunity to use the Lorm Alphabet ("Lorm", for short) for communication. Lorm, developed in the 19th century by deaf-blind inventor Hieronymus Lorm, is a tactile hand-touch alphabet, in which every character is assigned to a certain area of the hand. The "speaker" touches the palm of the "reader's" hand and draws Lorm Alphabet Signs onto it by tracing lines and shapes.

This requires both interlocutors to be familiar with Lorm. Physical contact is indispensable. These preconditions often lead the deaf-blind into social isolation and dependence on information relayed by people around them. Both on- and offline social networking, as well as independent information access are difficult, and are often hardly possible.

The research project *Interaktiv Inklusiv* addressed these issues with a sustainable impact in mind: with an ageing population also the role of technology design changes. The raising of awareness towards accessible design and technology is also related to the global demographic development and the associated certainty that an increasingly ageing population will be confronted with a growing number of physical limitations, such as age-related visual or hearing impairments.

In a collaborative research and design process[9], we developed the *Lorm Hand*. Users can write the Lorm Alphabet signs on the *Lorm Hand* as if they were *lorming* to another individual, holding the hand shortly to signal the end of each word (a white space character). The hand will vibrate slightly whenever a character is recognized and more deeply when the end of a word is signalled. The user may post

Image 1: The *Lorm Hand* gives access to various kind of digital information and social networks.

the message online by holding the *Lorm Hand* for a few seconds, and it will vibrate in a crescendo to confirm the operation is completed. An application performs the recognition of Lorm gestures based on sensor data, displays the resulting message on a screen (especially helpful for non-deaf-blind learners) and handles the posting of messages on the Twitter account @LormHand and a connected Facebook page. A small tactile push button was included, located in the wrist, that disables the capacitive sensing in order to allow blind users to get a feel of the hand's shape and position before or in-between actually *lorming*. Another button was added to the pedestal surface which deletes a single character or, when pressed for a few seconds, the whole message.

This hand-shaped device is based on conclusions drawn from previous work on a wearable interface[10] for translating the tactile Lorm alphabet for the deaf-blind into text and vice-versa (Bieling/Gollner/Joost 2012). The Lorm alphabet maps letters to gestures signed on the palm of the hand, making it easy to translate textual content into a haptic language. Both approaches are part of the research project *Speechless*, focusing on the difficulty of access for visually or hearing impaired people to information channels and communication systems; all the while based on the assumption that this development also brings an added value to a variety of other users (Bieling/Sametinger/Joost 2014).

Image 2: The *Lorm Hand* at the Protest March.

The *Lorm Hand* was originally devised as a public installation in the context of the deaf-blind protest march *Aktion Taubblind – Taubblinde in Isolationshaft,*[11] which took place on October 4 of 2013 in Berlin, culminating at Potsdamer Platz.

The installation would allow deaf-blind individuals acquainted with the Lorm Alphabet to post their thoughts on the social networks *Twitter* and *Facebook*, where they might potentially reach others around the world, raising awareness towards their situation. This created the opportunity for the deaf-blind and other attendants to share their thoughts and opinions with a wider audience, creating awareness towards the core topic of the protest, i.e. the experience of isolation that often accompanies the deaf-blind condition, while at the same time working against it.

Image 3 + 4: A participant tries the *Lorm Hand* in different orientations.

Additionally, the *Lorm Hand* would provide the opportunity for participants and passers-by to become acquainted with the Lorm Alphabet as a method of communication with deaf-blind individuals, creating awareness towards this form of communication and the possibilities it offers. The *Lorm Hand* installation allowed the research group to approach the issue of accessibility to digital media for deaf-blind individuals from a different angle: using a tangible interface with a natural shape. This in turn prompted experimentation with other crafting methods and sensor technologies.

The first prototype versions of the *Lorm Hand* have been ideated, produced, tested and exhibited collaboratively. Both the further development of the *Lorm Hand* and its display in several public exhibitions have been actively accompanied by a group of deaf-blind individuals and institutions. These were mainly represented by members of the ABSV (Allgemeiner Blinden- und Sehbehindertenverein Berlin)[12] and the Oberlinhaus Babelsberg[13]. The outcome: an interactive installation with a natural shape as its central feature, embodying a concept of inclusion and accessibility, its presence felt both physically and online. As such, it quickly gathered attention, especially on online social networks and related media and

became publicly perceived as a project aiming at empowering deaf-blind people to engage with a broader spectrum of people and gain access to a broader range of information, thus enhancing their independence.

Through its presence in events as public installation and in online social networks, the *Lorm Hand* has proven itself as medium for raising awareness towards accessibility issues in new technologies (and the role that technology can play in avoiding isolation) as well as an educational tool to introduce the Lorm Alphabet and demystify communication possibilities with deaf-blind individuals.

Discussion

The *Lorm Hand* has been frequently tested by deaf-blind users and Lorm experts during development; and provided observations of a qualitative nature during public events. These observations have guided further efforts in improving the prototypes and simultaneously raise awareness – both towards the deaf-blind cause and to the possibilities afforded by design and technology in the service of accessibility, social Media and social transformation in general.

Particularly with regard to social transformation, Tobin Siebers (Siebers/Bieling 2013 47–48) points up the (potential) role of disability:

> The disability community has the ability to drive social transformation, and it depends […] on at least two factors […]. First, disabled people have emerged as knowledge producers; […] This new knowledge of society frees people with disabilities from oppressive stereotypes because they understand that it provides a better explanation than existing ideas of their social location. The justifications for the oppression of disabled people no longer hold water, and once they realize this fact, they begin to gather together to fight oppression and to transform their society into one that will not only accommodate them, but accept their contributions as valuable. Second, […] identity politics and political action groups hold the key to leading disabled people to full citizenship. […] use […] political action to advance their goals. Disabled people have to hit the streets.

Thus “raising a voice” is a key tool to trigger social transformation. Design can intervene in cases, where certain voices hardly get heard, by offering tools again.

And peoples who are supposed to use these tools can also play a key role in (co-)developing them.

Conclusion

This case study addresses and discusses the issue around the cultural constructions of normalcy and the processes of social exclusion/inclusion raised by technology, opening up important questions in regard to the politics of design, research and technology development.

One of which is to clarify the positions design and design research can have in the social sphere and its construction, and thus in structuring of society. One approach is to more fully integrate disadvantaged, disregarded or marginalized groups through the design process – and in this sense, design also means the determination of decisions, situations and processes or participation.

Developed in the context of deaf-blind communication, interaction and empowerment, the collaborations between developers of technologies, their end-users and the devices themselves should play a central role in future investigations. It will be particularly interesting to understand the political implications of modes of collaborations in the processes of development, especially when reflected on how these practices of working together tie into their technological materialisation.

In the coming years it will be an important task to more firmly entrench such questions in the design discourse and to problematize them in design education. Thus the critical reflection of one's responsibility as a designer should play a more integral role in education in order to both understand and operate the social and political aims of the technology itself as it attempts to break down barriers. This includes to discuss the role-shift of the designer towards more participatory approaches, in which the user becomes an essential partner in innovation development. This implies new forms of bodily appropriation, the challenging of stereotypes of "normalcy".

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Video link

https://www.youtube.com/watch?v=TW2FoVVrkEg

Endnotes

1 The concept “Social” is understood here in a general sense as related to aspects of co-habitation or collective co-existence of humans, their intentional or non-intentional interaction with each other, as well as corresponding organisational patterns.

2 We are following a concept of Diversity that includes a variety of demographic characteristics, including gender, class, ethnicity or ability amongst others. Different models of Diversity have recently been discussed in the field of *Diversity Studies*, often aligned with a critical thinking about these social and cultural categories that constitute society. One of their central characteristics is embodied in a commitment or aim to social justice and change, emphasizing to identify and critique the processes and effects of institutionalized oppression, social inequality or dominant group privileges. As Bessing and Lukoshat (Bessing and Lukoschat 2013) indicate, diversity has increasingly been discussed and shown to contribute to the field of “Innovation”.

3 Lennard Davis indicates how the term “normal” coincides with the birth of statistics and eugenics in the mid 19th century, while replacing the former concept of “ideal” as the regnant paradigm in relation to bodies“ (Davis 2005). He further claims that “the introduction of the concept of normality […] created an imperative to be normal”. An understanding of the built environment as a key actor that privileges certain bodies and excludes others by producing barriers that construct disability (Davis 2002 31; Wendell 1996, 55) has established a basis towards a “shift form the ideology of normalcy to a vision of the body as changeable, unperfectable”. (Davis 2005)

4 Since what is considered “normal” is relative to cultural practices, definitions and locations in which the social interactions take place, the term appears in quotation marks throughout the paper.

5 Throughout the paper, the terms Disability/disabled and Impairment/impaired are used to illustrate (at least) two different perspectives: Especially in the academic field of *Disability Studies* “Disability” has been discussed as a social construct, whereas “Impairment” is often meant to describe certain physical or cognitive conditions of a human’s body or mind. Based on this distinction, (at least) two opponent models of disability have been discussed: The “social model” and the “medical model” of Disability. (Bick-

enbach et al., 1999) The further tends to identify disability from a clinical perspective, which corresponds to a concept of "curing" and "healing" a specific "illness" and refers to an understanding of norm and accordingly conforming with normative values. The latter identifies society and systemic barriers or exclusive practices as a main contributor towards disability.

6 More concrete, the question could be, whether the impairment or the techno-cultural settings are to blame for misfits, problems, etc.

7 According to the Inclusive Design Toolkit, developed at the University of Cambrigde (UK), »Inclusive design emphasizes the contribution that understanding user diversity makes to informing these decisions. User diversity covers variation in capabilities, needs, and aspirations.« http://www.inclusivedesigntoolkit.com/betterdesign2/whatis/whatis.html

8 English: Interactive Inclusive.

9 In an iterative process throughout regularly meetings the participants have been participating in all project phases, starting from the first explorations (regarding everyday-life-challenges in a deaf-blind person's life or specifics of deaf-blind communication); jointly formulating hypotheses and research questions; ideating and conceiving (regarding potential design approaches/solutions); and evaluating (process, methods and outcome).

10 The *Lorm Glove,* also developed at the Design Research Lab, is a wearable interface/device. It uses sensitive areas located on the palm of the glove to detect the wearer's touch and thus identify Lorm alphabet signs, composing a message to be wirelessly relayed to a mobile device, such as a smartphone or tablet. Conversely, messages received through the mobile device are wirelessly relayed to the *Lorm Glove*; and played back as simulated Lorm alphabet signs through haptic actuators, located on the glove. Thus communication goes both ways and enables the user to both send and receive messages.

11 English: Mission Deaf-blind – Deaf-blind People in Isolation (Isolated imprisonment).

12 Public Association of the Blind and Sight Impaired, Berlin

13 The Oberlinhaus (Oberlin House), named after Pastor Johann Friedrich Oberlin (1871), is an institution focusing on care and education for people with disabilities, based in Potsdam-Babelsberg near Berlin.

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Changing the world for whom? Some thoughts about trans*disciplinarity, feminist epistemologies and Participatory Design

Andrea* Ida Malkah Klaura

ABSTRACT: This is a two part paper about aspirations and obstacles for transdisciplinary research. The first part is a theoretical reflection on what it means to take transdisciplinarity serious and how it might help to change our worlds through research in a responsible and socially inclusive manner. With the first part, I suggest thinking about how we construct our publics, alliances and relations in our research practices. The second part of the paper adds reflections on a practical exercise of transdisciplinary intra-action among the Changing Worlds 2014 Conference participants. The hope of the overall paper is to inspire more tools, moments and interventions of transdisciplinary intra-action in the social sciences and beyond.

KEYWORDS: transdisciplinarity, Participatory Design, publics, intra-action, diffraction

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Part I – Changing Worlds with Transdisciplinarity?

"Why is life short?" Connie asked. "Your old people are healthy, sure, they live with everybody else. But they age. And they die, not much later than we do. Why not live longer?"

"We decided not to try."

"Who's 'we'?"

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"The councils. The town meetings. That's how general questions of direction of science get decided."
"You mean by people like me? How could I decide if they should build an atom bomb or something?"
A conversation between Connie (from past/present) and Luciente (from the/a future), in: *Marge Piercy: Woman on the Edge of Time* (1976, 271–272)

I wanted to take up some utopian vision for this article, although I am rather ambivalent about utopias. Therefore I chose Marge Piercy's *Woman on the Edge of Time* as a great example on how utopian visions unfold their full potential when they are entwined with a dystopian counterpart. In the above conversation, set in an utopian future, science and science policy are embedded in people's every day practices. This utopian world still holds environmental and social issues to be solved, but it seems the people have found better ways to deal with these issues, than those which seem to be available to us today. But yet, this future is only one specific future, always in danger of being replaced by its dystopian counterpart in which technoscientific development and agency is amassed in the hands of few, while their worst consequences are spread across those who are the most and have the least. Both visions are extrapolations of where we could go from here and now … well, these visions have been written 40 years ago.

At about the same time a discourse on transdisciplinarity in science arose and since then was intensified. The central issue was, that if contemporary science cannot solve certain social and environmental problems, a different sort of science is needed. Scientists should work across (here the *trans* comes in) different disciplines. In one version of *transdisciplinarity* (because a lot of different understandings of this term [1]) this also encompasses not only working with scientists from other disciplines, but with non-scientists and the general public[2]. Throughout all of the reconfigurations of what *transdisciplinarity* could mean and all its different approaches, a common promise of transdisciplinarity is, to solve issues that cannot be solved by traditional disciplinary science, and to change science itself towards more responsible research approaches. Certainly all the different actors within this discourse have some sort of vision where to go, and what this place and time looks like.

But I will come back to these approaches later. First, since this special issue is about *changing worlds*, I want to say something about what I think this issue and

last year's Changing Worlds Conference is about. The utopic introduction above serves to provide some background about my own vision of a better science – that is, a science which is self-reflective and inclusive of those perspectives and positions that are not necessarily its main protagonists, but nevertheless affected by its worldly workings. Of course we can always try to hide our aspirations and ideologies, but that does not save us from being partial, and it does not make science better or more aware of all the contingencies we have to face [3].

What is all this *Changing Worlds* stuff about?

Well, actually, everyone is changing worlds – whether we are cooking a nice meal for friends or members of our living collectives or we do science. In one way or another we are interacting with other people and the material artefacts around us. Or, rather we should say, we are intra-acting, for we all are constitutive parts of those systems and apparatuses through which we interpret and analyse the world[4]. So, we, as scientists, are changing worlds too, no matter if we accept it or make it explicit. At the Changing Worlds Conference 2014 we have been rather explicit about it – or, have we?

We were talking and listening to each other, differentiating us by our approaches and scientific disciplines, critiquing each other for naïve perspectives, applauding each other for seeing what others don't see. We were able to do so because, indeed, some people seemed to listen to us – or, because they now read our papers.

So, yes, not only at the conference, but we authors and readers alike, are changing worlds. Critical and self-reflective as we are, we also know we have to think about why and what we do and what the consequences of those actions might be. Or, do we? At least we are demanding this from the material-discursive powerful natural sciences and technologies. Of course we are not the only ones. Mainstream organisations and big governance bodies, like the European Commission, are calling for *Responsible Research and Innovation*. For example, the IPPA project[5] provides a "Public Participation Toolbox"[6], which assembles diverse tools and methods of public engagement and citizen participation in technosciences.

Now, take a step back – or rather some paragraphs – and think about the utopic visions I mentioned. Are we already in this bright and shiny future of responsible, self-reflective and inclusive science? Or are we already on the path towards

it? Maybe the dystopic countervision, that is always looming around the corner, brings us to ask ourselves: but do *they* do it for real? What forms of participation are *they* really using and how transdisciplinary is this in practice? Questions, critical analysts of science and technology have to pose – but what is *our* role in all of that?

As you may have noticed I am fond of the term technoscience[7]. Why? Because it refers to the entangled assemblages of science and technology, which are nowadays a prerequisite to do natural sciences, engineering and medical sciences. But, *we* too – now referring to those of us who situate themselves in the social sciences and humanities – are part of the technosciences, because *we* too, rely heavily on technologies to do our work. So, what are *our* stakes in *their* research? When *we* are demanding responsible research from *them* – that is, research that includes all the perspectives of those who have to bear the consequences – *we* might want to participate in these technoscientific developments as well. And at the same time *we* will have to think about how and why publics have to participate in *our* own research – or as a first step, think about why *they* usually do not [8].

… and who's those publics?

But what do I mean when I talk about publics? In my understanding, publics are diverse groups of people who are more or less affected by what we do. This reflects a more nuanced understanding of common versions of *"the public"* and the public sphere (cf. Dewey 1927/2010; Habermas 1964/1974). For that I rely on critiques and conceptual refinements by Nancy Fraser (1990) and Chantal Mouffe (1999).

Fraser makes it clear that there is no egalitarian public sphere where we could freely deliberate. Rather, for a post-bourgeois public sphere, we need spaces for all those *subaltern counterpublics* who first have to find their own voices and strategies to successfully participate in general public deliberation. "Successful" means that they are not just co-opted, to legitimize hegemonic practices, but that their own perspectives are actually integrated and lead to a transformation of social organisations and hegemonic practices. So it means that they really are able to change worlds towards their own needs. Chantal Mouffe, with hir[9] framework of agonistic pluralism, points toward the need for enabling dissent and contestation rather than to focus on generating consensus. Because, in a society of in-

equalities, to require consent at the end of any deliberation, privileges the powerful over the powerless, the literates over the illiterates, technoscientists over their publics.

Now that we have defined the *technosciences* and the *publics*, or *us* and *them*, or *them* and *us* (depending on our different situated positions in different contexts), how do we cope with all the differences, technoscientific-public entanglements and the social, ethical and ecological consequences of technoscience?

From the field of Science and Technology Studies, we often hear a call for participatory engagements of publics in technoscience, in order to make technoscience more democratic, or to enable responsible and accountable research. We also find a lot of critique on already established forms of public engagement within the technosciences, because they too often resemble mere forms of tokenism or pseudo-participation[10]. In other contexts, we hear calls for more transdisciplinarity, as a way to address these issues. But all of that is nothing new and not some innovation of (post-)modern 21st century science.

Transdisciplinarity, public participation in technoscience and Participatory Design

Already in the 1970s a discourse arose on transdisciplinarity as a solution to the increasing complexity of our world(s) and the problems therein. More inclusive science-society-relationships and interdisciplinary approaches to problem analysis and solving were called for, in order to tackle issues like climate change, sustainability, risk and emerging technologies.

At about the same time in Scandinavia, new approaches to technoscientific practices were developed within computer science. For the *Scandinavian approach to systems design*, or *cooperative design*, the participation of publics in concrete technoscientific practices is a key element in the design and development of technoscientific artefacts. This means, that publics are not just queried once or twice for their opinion, to then go on with the usual technoscientific practice, but that they are part of (at least some of) the daily processes of technoscientists, and they co-develop the artefacts that are being produced. Those artefacts often are material prototypes and tools or software, used in the working and living contexts of those affected – but these artefacts sometimes are also abstract concepts

or methods, demonstrating that public engagement could be applied to a broad range of technoscientific activities.

This approach inspired many other contexts within and around computer science to adopt such inclusive practices of design, research and development. As an umbrella term of the diverse approaches to public participation in computer science, "*Participatory Design*" emerged and since 1990, every second year, there is a Participatory Design Conference. At about the same time the discourse on transdisciplinarity was intensified and (in 1992) the journal *Public Understanding of Science* was founded – to mention just one example of the so-called participatory turn in Science and Technology Studies.

But until now, it seems, the example of *Participatory Design* was not noticed in many of those discourses on transdisciplinarity and public engagement in technosciences. I suppose this is due to a preoccupation with policy debates and public engagement in science policy discourses (cf. Klaura 2014). But while in these cases the inclusion of publics only pertains to the question of which technoscientific endeavours should be allowed and which prohibited, the inclusion of publics in Participatory Design serves concrete developments and reconfigurations throughout the research process. Their tools, notions and concepts are not so different from *ours*. Participatory Design even takes close looks towards Cultural Anthropology, Science and Technology Studies and Feminist Technoscience studies and theory. It is also inspired by Participatory Action Research approaches (see e.g. Arztmann, Wintersteller and Wöhrer, this issue). Participatory Design artefacts are used in a way that enables the participating publics to change these artefacts themselves or other artefacts under development. At the Changing Worlds Conference 2014, we even had a skype-in presentation by Tom Bieling, who showed us just one example of such a participatory design and development research, who told us how the technoscientific artefacts (in this case the LormHand[11]) only emerged after and as a result of the participatory process (see e.g. Bieling, Martins and Joost, this issue).[12]

While in classical public engagement in technoscience, the publics are participating in order to change *the worlds* we live in (which usually means to *decide* between different, pre-framed versions of these worlds), in Participatory design they are participating in order to *change* the worlds we live in. The focus is not on choosing between some pre-framed option but on changing concrete processes, to change how science is done. And while Participatory Design researchers learn

from *us*, *we* too, as critical scholars of science and technology and feminist technoscience researchers, might learn some things about changing worlds by engaging with the world(s) of Participatory Design.

Whether or not we call this approach transdisciplinary, it brings me back to this broader notion or vision of how science could be done differently, and how we could change our worlds towards environments that are "friendly to earth-wide projects of finite freedom, adequate material abundance, modest meaning in suffering, and limited happiness." (Haraway 1991, 187)

Conclusion Part I : What about the trans in trans*disciplinarity[13]?

Regarding this notion, or concept, or framework, or vision of transdisciplinarity, a consensus has nearly been reached that we need it in order to solve our worlds' problems (cf. Jahn, Bergmann, and Keil 2012, 1). But much too often the *trans* in transdisciplinarity is just an ornament on the corners of research project proposals, there to appeal to funding decision makers' ethical tastes. But this is not only true for the "others", those technoscientists out there. *We* too will have to take the trans in transdisciplinarity serious. *We* have to not only analyse and vocalise dissent, but *we* have to actively intervene in each others' work as well as in our own work to come to new insights.

In a recent publication Katrin Nikoleyczik proposed a form of *diffractive transdisciplinarity*, to engage in technosciences. Diffraction here means to read and interpret different disciplinary approaches through each other and pay attention to the technoscientific practices and how they matter for the people involved and the artefacts which stem from the whole technoscientific project. Nikoleyczik shows how this might be possible in the neurosciences, but this might just apply to other technosciences as well. A central question ze poses is: "What sense does it make to deal with this field of research in our own scholarship on the one hand and deny trying to influence, interact and intervene on the other hand?" (Nikoleyczik 2012, 241) Ze therefore suggests "framing and developing new transdisciplinary alliances." (ibid). This will "contribute to processes of transformation; however, it also demands a readiness for change, for the dealing with ambiguities, and for agreeing to compromise." (ibid) It is *us*, too, who will have to be ready for change.

This is something which in diverse feminist theories and practices was/is experienced for several decades. We would do good to take some inspiration from there on what it means to act transdisciplinary. For Catherine R. Stimpson the "multiplicity [of perspectives within feminisms] creates two needs" (Stimpson 2000, 1009):

1. "for a way of thinking about differences and their consequences" (ibid)
2. "to find some commonalities, some shared beliefs and commitments and principles" (1010)

When we think about all those differences, *we* – which means especially *us* in academia – might tend to think from supposedly detached positions. The dangers of essentialising difference loom around every corner we pass in our theoretical wanderings. But we have to think about those differences nonetheless, for we want to engage in changing worlds. For Stimpson, a way of thinking about differences that helps to avoid these pitfalls is to actively *transition* through and across those differences in our own thinking. Whether we notice it or not, in our academic practices we are permanently *translating* and *transporting* diverse concepts, notions and actors. And we are also permanently *transacting* with them. Within diverse feminist approaches to technoscience and theory we even find a *transgendering* of research, a going beyond gender to sensitize towards interdependencies of diverse forms of oppression and marginalisation.

It is this active component of thinking about differences, one's own transition to other states and positions in our entangled webs of intra-active relations within and across technosciences. In Stimpson's words "Feminists must be transminded" (1010). This means to be "constantly aware of the many differences among women and men [and I would add: all those other dichotomies] and then able to act among, with, and on these differences." (ibid)

And to act across those differences, Stimpson proposes "Bread, roses, [and] keyboards [as] rubrics for a unifying vision of the future" (1011). These rubrics are hir guides to a metaphorical image of a feminist (or we could also say: a collective emancipatory) future:

> It is first a place of sufficient bread where all of us have enough to eat and where all of us are physically secure. It is next a place of roses where all of us have

> a sense of self, the ability to participate in democratic communities, and the capacity to love fully and freely. Finally, it is a place of keyboards where all of us have access to literacy, education, and the technologies that will shape the twenty-first century. (1010–1011)

I want to further propose that, if we want to partially change worlds towards futures of sufficient bread, roses and keyboards, we have to take our *transmindedness* serious and develop trans*disciplinary research settings which allow for alliances beyond single issue politics/research. It is a trans*disciplinarity that has to radically go beyond the common practice of inter- or multidisciplinary research with some forms of exchange with the media and singular participatory moments in which the publics may have a peek on what it is we technoscientists do. But can we wander beyond those disciplinary demarcations?

Irene Dölling and Sabine Hark suggest that we can: "by a continual examination of artificially drawn and contingent [disciplinary] boundaries and that which they exclude." (Dölling and Hark 2000, 1197)

So not only we natural scientists and technologists have to do so, we feminist technoscientists and critical scholars of science and technology, too, have to ask ourselves how we are maintaining our borders to the diverse (other) technosciences and our publics. We have to move beyond those borders and wander around to find the right places where the bread, roses and keyboards for our promising futures may grow.

And while, in the opening keynote to the Changing Worlds Conference 2014, Els Rommes talked about how the media are focusing too much on adventurous, heroic scientists, who are usually white males, we can further reflect that we too, as critical scholars of science and technology, are often focusing on adventurous and heroic scientists and their practices. So, maybe it is time to focus on "the others"[14], the marginalized actors within technoscience, and on their practices. If we follow those, we will anyway encounter the "heroes" too – those encounters might just look a little different. In highlighting marginalized actors and practices within technoscience, we then would allow our audiences and ourselves to imagine different approaches to technoscience, and it certainly would encourage some of us to try out new approaches and interventions.

It will not be an easy Sunday afternoon stroll to change our technoscientific

pathways and practices. But we should encourage each other to leave the main streams of technoscience and to wander around the messy and beautiful landscapes of intra-action and activism, within our current sciences and around our diverse publics.

In the end it is always about changing worlds.

Part II – Trans*disciplinarity in practice?

Now, you could of course stop reading here. It was a nice ending, vague enough to perhaps inspire more reflections and questions to follow, maybe best while conducting a Sunday afternoon stroll. But of course you could also think that this is all nice and cosy theory talk. What does it mean, what could we really do? Well, this is up to us all to find out. I pointed in some directions where to look for inspirations, but what those directions are in your concrete situation, you will have to define yourself. Reflecting on your practices and how you construct yourself as a researcher/activist/* and your different "others" and publics is a good starting point.

In my concrete case, having finished my MA thesis and with the opportunity to give a talk at the Changing Worlds Conference, I wanted to try and do something differently at the conference and in the process of writing this paper. This second part of the paper is for those interested in a short story of what an ad-hoc method/experiment in our own contexts could do to trans* our practices.

Intra-acting with/in STS

After I was accepted as a speaker to the Changing Worlds Conference 2014,I was soon puzzled on how to present my "talk", how to perform. Should I just stand there and talk about how the world is changing? What's the change in that? So, with a little ambition and a small amount of creativity, I came up with a 'Reflective Collective Positional Mapping' exercise, which I integrated into parts of my talk and the conference setting.

It really wasn't a big thing. Actually, I came up with the fancy name only a day before my talk. It was some form of ad-hoc method, to enhance the intra-actions of this conference setting and to visualize our heterogeneous (or not-so-heterogeneous) assemblage of conference participants. The idea was to introduce some

other forms of connectedness than the usual talking-and-critiquing. Maybe it was an attempt to highlight that, despite our differences and commonalities, there are actual opportunities to engage in trans*disciplinary action and to really change our material-discursive surroundings. So what did I/we actually do?

Before the panel started, I put three index cards on each chair in the audience. In the back of the room, with some help of the conference organizers, I put up an empty poster wall and a flip chart containing a diagram. The diagram had two axes, one (pointing left) labelled 'analysing modes of production & technoscience', the other (pointing down) labelled 'producing technoscientific artefacts'. As a third layer, I added a legend with coloured stickers, green for 'activist', red for 'social science & humanities', yellow for 'technology / natural sciences', an empty circle for '…' and a green-red-yellow-mixed circle for 'hybrid'. The diagram was intended to be modified by those intra-acting with it. In image 1 you see the final result. But before this final artefact was co-developed, I presented my talk, on which this paper is based. At the end, I invited the audience to break out a little of our established conference habits and to participate in this exercise. Everybody was invited to write 0 to 3 cards with topics, issues or obstacles, which hinder them to engage in trans*disciplinary practices. After the panel they should cluster their cards on the empty poster wall and position themselves on the flip chart diagram[15].

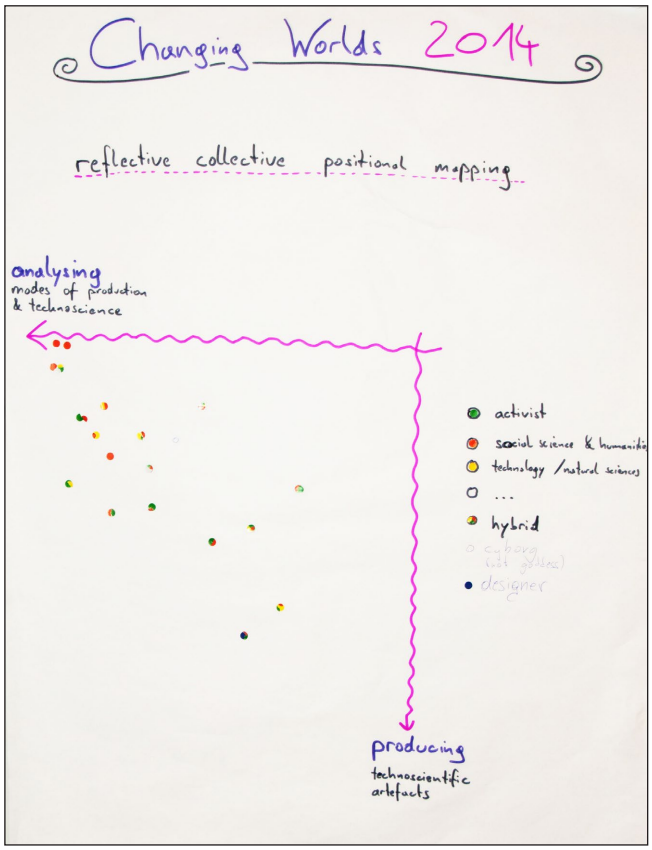

Image 1: Reflective Collective Positional Mapping of our technoscience landscapes. (A heterogeneous assemblage of CW 2014 participants 2014)

At least 20 people participated in this little experiment. I didn't count and it was not supposed to produce any quantitative result. All in all the flip chart and the cluster wall did provide space for additional intra-actions. Actually it is a good example of why I am (thanks to Karen Barad (2007)) talking about intra-action and not interaction. This little instru-

ment, the Reflective Collective Positional Mapping exercise, is an apparatus to gain insights into the reality of the Changing Worlds Conference and its connected contexts. At the same time as the instrument was changed by its users and their perspectives, it changed how the users interacted not only with the instrument, but with each other. The reality we tried to observe through this tool was a little bit transformed through its use. And now I am writing about this instrument, the ideas behind it, and I will try to provide some interpretations of what we might produce with it. But while I facilitated the initial development and application of this tool/method, in fact it was a cooperative work of a heterogeneous assemblage of Changing Worlds 2014 participants. Therefore, its first documented results are collected at https://jackie.diebin.at/2014/cw under a Creative Commons license, provided by *A heterogeneous assemblage of CW 2014 participants* (2014). Everyone is welcome to reconfigure the tool and its interpretations as long as they share along their results on the same conditions.

But now, what are actually my interpretations of these intra-actions?

Issues on Transdisciplinarity

In image 2 you see the clustering of issues and hindrances towards transdisciplinarity. As the clustering effect was limited due to time and space at the conference, I did a re-clustering of all the cards and transcribed them to digital plain-text[16].

The result of the (re-)clustering shows that there is a clear motivation to act transdisciplinary. Those who would prefer to not engage in transdisciplinary research out of onto-epistemological reasons, seem to have not participated. Only one card, labelled "personal prejudice", could be interpreted in this way. Yet, it can also be interpreted as a hint towards identity issues and the ability to trans* one's own position – as highlighted above with reference to Catharine Stimpson (2000).

Of course the invitation to this exercise and its framing did some pre-selection work. But the whole point was not to gain insights into how transdisciplinary 'we' are or are not, but what the issues and obstacles are that hinder those of us, who would like to trans* hegemonic academic practices [17].

Most of those stated hindrances refer to structural circumstances and the normative processes of disciplinary science. In a 2008 paper in *Organization*, Susan Meriläinen et al. present a common form of such hegemonic academic practices

Image 2: Ad-hoc clustering of obstacles to transdisciplinarity. (A heterogeneous assemblage of CW 2014 participants 2014)

(2008). Their perspective focuses on publishing issues and this was also highlighted in some of the index cards. Its main point is that it is hard to publish from disciplinary peripheries, and without publishing it is hard to gain acceptance in (a) disciplinary core(s) – taken together, a rather unfortunate position to foster transdisciplinary research. But beyond publishing patterns, there are many other normative, even hegemonic practices in academic institutions, which put transdisciplinary approaches at a disadvantage. Even in those fields which use transdisciplinarity as a key-notion in science policy, the normative use of a framework of transdisciplinarity provides obstacles to actually trans*ing disciplines (cf. Felt et al. 2013). The main problems seem to stem from working in academia itself, which demands a certain commitment, regarding disciplinarity, time and other resources as well as career decisions. This is addressed by the two biggest blocks in the re-clustering of all the index cards (cf. A heterogeneous assemblage of CW 2014 participants 2014).

But as Ulrike Felt et al. highlighted, there are opportunities to manoeuvre our 'epistemic living spaces'. When we search for our individual potentials for manoeuvre, it becomes rather frustrating to focus on the structural conditions, as these are

the most hard to change, especially for young researchers. So it might be more fruitful to focus on other aspects, which are more easy to address and change from an individual (young) researcher's perspective. Two of the cards complained about "lack of networking platforms for students in the very beginning (bachelor program)" and "missing contacts/connections". This we could address by making our approaches (or rather our desires for different approaches) visible and to bring different actors in our institutions together. Another block of cards addressed "language" as a general obstacle. While we speak different disciplinary languages, they still are academic languages. We can rather easily learn from each other, especially if we bring together different actors in our institutions. Much harder will it be to learn all those activist and/or non-academic languages, which we need if we want to engage in transdisciplinary practice[18]. Of course, all those things take time, and as long as the structural conditions do not change, engaging in such activities only is an "add-on" to our disciplinary work. Yet, these aspects are pointers to where we can manoeuvre to within our 'epistemic living spaces'.

Most important to highlight seems another card, which was singled out in the re-clustering of the cards and read "incapacity to be trans enough myself". This might be based on normative visions of transdisciplinarity. But while there are several perspectives on transdisciplinarity and how it has to be enacted, there actually is no real option to "be trans enough". One can try to settle in any of the different frameworks, but even those change. Rather to ask ourselves if we are trans enough, we should ask ourselves if we trans enough? It is the verb, the process that seems important here – to permanently trans transdisciplinarity.

Who are we talking to?

And what does all that mean for our social science contexts? Who do we encounter here and which fruitful connections can we gain from these assemblages? While the Changing World Conference was open to diverse approaches and invited activists and artists, it nevertheless situated in a broader social science and humanities context. The RCPM diagram was an experiment to highlight the assemblage of actors within this context.

While the majority of participants in this exercise situated themselves more closely to the "analysing modes of production & technoscience" axis in the dia-

gram, there still were people who were closer to the "producing technoscientific artefacts" axis. But in both cases we find hybrid identities, marked by the colour coded dots. Only three people situated themselves solely in the realm of "social science & humanities". One marked hirself as "cyborg (not goddess)", supposedly aspiring a hybrid position beyond the given categories. This category was one of the two which have been introduced by the participants themselves. The other one was the category of "designer", used by one person, who also put some strains of "activist" and "social science & humanities" into hir identity. Besides six "activist"/"social science & humanities" hybrids (one of them with half hir circle filled with the empty "…" category) we find two "technology/natural sciences"/"social science & humanities" hybrids and one "activist"/"technology"/"natural sciences" hybrid. And finally, there were five people who situated themselves in a triad between "activist", "social science & humanities" and "technology / natural sciences".

So, we found a lot of hybrids, or a lot of people who did not want to commit to one of those realms solely. What the diagram shows at this point is, that we are not lost in a realm of material insignificance, withdrawn to mere reflection and critique, which is usually blocked by those materially powerful realms which we try to address. If we start to take more serious the non-disciplinary and non-academic identities of our social science and humanities fellows, we might start to realize that indeed we would have opportunities to shape the concrete making of technologies[19]. We only have to start to listen to all the other languages our fellows speak, beyond our common social science vocabularies. And we also might encourage ourselves to wander around in the technoscientific landscapes. Of course the labelling of the two axes put some constraints on how people could position themselves. And for some, it seemed easier than for others to break up the provided notions and to enable shifts towards other identities. But this is a process that can only happen if we do engage with each other on this level.

Conclusion Part II: How to change our worlds?

But where to wander now with these limited, yet opening views of the social technoscience landscape? Can we really change our worlds significantly? There is no easy way, and while the burden to change most of the structural inequalities and

hindrances should lay on the powerful actors within the disciplinary centres of technoscience, we individually have some agency in all of that.

Maybe we should think about how to be unconventional, how to resist the norm. This does not guarantee that we will be unconventional, resisting the norm and creating something substantially new. But it is a good reference point where we can take a rest on our wandering through the technosciences (while wondering how live and manoeuvre with/in them). And it helps us to focus on what people say and not only where they come from (or: how they are situated).

While I wrote this paper, my thoughts constantly jumped between "Nah, it's all crap" and "Ok, there actually is an argument". But where does all the doubt come from? Did I use too few references? Did I place too few important names? Cited too few of the important journals? Might people find that I am not humble and modest enough, to just come up with this 'ad-hoc method' instead of relating to established methods by renowned people in the field?

All those doubts nearly lead to my throwing away the whole paper and not making any argument at all. But then I thought about how much it would be worth to settle in an institution that encourages me to think about all the ills in the world, while at the same time restricting me to not change my own circumstances and practices. I just do not want to only think about intra-actions with/in technoscience, I want to intra-act! Maybe these thoughts can encourage others to try out unconventional things and methods, to tie them back to their different disciplinary backgrounds and to interweave the diverse contexts in order to change practices and institutions towards more inclusive research and living spaces.

Endnotes

1 For a review of the diverse strands of transdisciplinarity and how transdisciplinarity is understood among different sciences see for example (Thompson Klein 2004) and (Jahn, Bergmann, and Keil 2012).

2 Of course this "general public" becomes more and more specific throughout a research project. In the end, usually, only a varying numbers of specific publics are engaged, as the concept of public(s) is one that is constructed and shaped through the research process itself (cf. Klaura 2014).

3 If you would like to see more of this background vision, take a look at Marge Piercy's Woman on the Edge of Time. Alternatively you can take a look at my master thesis which i finished last year and which is available for download (Klaura 2014). But beware, the former is probably more fun to read.

[4] For details on intra-action and the entanglement of researchers with their material and analytical apparatuses of measuring and observing nature-culture, take a look at Karen Barad's framework of agential realism (Barad 2007).

[5] "Implementing Public Participation Approaches in Radioactive Waste Disposal"

[6] http://toolbox.ippaproject.eu/index (last accessed: 2014-10-20)

[7] Depending on fields and perspectives there are different notions of *technoscience*. Often this term is used to refer to natural sciences and technology and their close entanglement. In a more self-reflective notion we can use it to refer to the increasing technological dependencies of most of the sciences – including the social sciences. Or in Judy Wajcman's summary of Donna Haraway's stance on this *"technoscience is a cultural activity that invents Nature, and constructs the nature-culture axis as a classificatory process."* (Wajcman 2004, 88) For some recent introduction on this notion take a look at the European Journal of Women's Studies 2010 special issue on feminist technosciene studies, especially it's editorial (Åsberg and Lykke 2010), which is publicly available online.

[8] By now you might have realized that my use of *we* and *they*, *us* and *them*, is not coherent and sometimes quickly shifts depending on context. This is, because there is no clear 'us' and 'them' in the matters of our interest here. The importance is to think along different dichotomies, which are established in our thinking as well as in our scientific and activist communities. The important thing, when thinking along those dichotomies, is to stay tuned to the shifts of these constructions and on our own positions. As scientists, or technoscientists, or natural scientists, or social scientists, or as activists, or even as hybrids of all of those, we have to think about what our agency is and whom we are excluding and including when we do science/technoscience/technosocial science/activist science/*.

[9] As for most researchers I don't know by which gender pronouns they want to be called, I use a the pronoun "*hir*" instead of "her" or "his" and "*ze*" instead of "she" or "he" to highlight potential ambiguities of gender assumptions.

[10] See Sherry Arnstein's ladder of citizen participation for a classification of different forms of public engagement or participation and its participatory quality (Arnstein 1969).

[11] For some detail about this artefact visit the project website: http://www.design-research-lab.org/?projects=twitter-hand (accessed: 2015-03-15)

[12] If you are interested in concrete examples of how Participatory Design can be enacted, take a look at (Wagner et al. 2009), who explain how they supported community engagement in urban planning processes. A lot more examples can be found in the International Handbook of Participatory Design (Simonsen and Robertson 2013).

[13] I am using the * in trans*disciplinary as a sort of highlighting marker, which should make us think about the many things between and across the "trans" and the "disciplinary". This way we might remind ourselves that "transdisciplinarity" is not just a new mode of scientific practice, but actually a trans-scientific practice, one that includes social, ecological and political issues as well the social dynamics of research projects themselves.

[14] By now it should have become clear that I base my propositions on the premise that we are always constructing some "others" as well as our "publics". I cannot tell you which

your "others" are, because your circumstances are maybe rather different from mine. The point is to pay attention on how we do construct our respective "others" and how this influences our actions.

15 I also announced that the results will be distributed to everyone. You can look at it (and the exact make-up of and invitation to this exercise) at https://jackie.diebin.at/2014/cw/.

16 For pictures of the re-clustering and the plain-text transcript see the web archive.

17 An important side effect was to make individual struggles visible and to create a feeling of individual and community ties among the participants. The Changing Worlds conference already created a space for caring, community engagement and participation. I wanted to add on that, by creating an opportunity where not only individual achievements could be celebrated but also individual problems could be made visible, because they also often can be seen as collective (or community) problems then. Trans*disciplinarity after all has a lot to do with communities and caring for each other.

18 One attempt of accomplishing this is the Changing World Conference, which tries to move even more beyond academia in its second edition in November 2015.

19 This, of course, includes all broader techno-social arrangements. The important point is, that we might start to see opportunities to shape things we otherwise would have thought of as too complex or too far away from our own abilities in order to engage in changing those things.

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Looking Back, Moving Forward: Reflection on STS Twenty Years after the Green Storm (Version of 15 March 2035)

Benedict Endler, Matilde Igual Capdevila

ABSTRACT: In this essay we present a broad picture of the development of Science and Technology Studies (STS) during the last 20 years. Through a historical approach and the use of fluid methodologies we study STS literature and the public reaction to it. The essay focuses on explaining the rise of this particular field of Social Sciences and the reasons for the recent conflicts within it. The authors argue that the developments of STS were intertwined with the retelling and repositioning of the events of the Green Storm attack. Taking this into account, this new approach provides valuable additions to our understanding and it contributes to a further theorizing of academic research, the role of academia in policy-making and the appearance of new schools of thought. Furthermore, while most previous research on the Green Storm events and history of STS failed to acknowledge this double contingency, our preliminary findings indicate that it is crucial not only to understand the past of STS, but also its future.

KEYWORDS: Green Storm, STS, year 2034, PLCT, critical botanism, paperclip theory, Art & Science, climate change, eco terrorism, sustainability, meat production, oil extraction, big data

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Disclaimer

The paper you are about to read is a fictional scientific paper, set in an alternate reality. Any resemblance to actual persons, living or dead, institutions or actual events is purely coincidental.

We spent the last year working on fictional future scenarios, which play with the notions of fears and hopes connected to science and developed them through different media. The starting point was a collaboration between the 'DokNE department (the Doctoral studies program specialized in sustainability and policy-making at the University of Natural Resources and Life Sciences, Vienna) and the 'Art & Science' department (University for Applied Arts, Vienna), resulting in a participatory theatre piece called 'The Green Storm'. The performance dealt with a variety of topics: scientific models, sustainability, game theory, institutional language, fear of terrorism, policy-making; and ultimately, humor. In the play the participants were asked to take up the roles of world leaders attending an International summit. On this fictional summit an emergency situation would suddenly occur, in which the group of radical eco-activists 'Green Storm' threaten the modern way of life with an unknown organic entity. The participants were asked to find solutions for the situation, thus influencing the course of the play.

We were invited to the Changing Worlds conference organized by the students of the Science and Technology Studies department at the University of Vienna, in order to present the structure and results of this interdisciplinary project. At the end of the lecture we asked the audience to tell us how they would have decided. The majority chose to oppose the 'Green Storm' in a non-violent way, by concentrating the resources of global community in scientific research in order to find appropriate counter-measures. The paper that follows unravels the consequences of this decision. Notice that the authors of this paper are not native English speakers, nor would they wish to be. We recommend reading this paper with your favorite continental accent.

Introduction

As former President Hillary Clinton wrote in her autobiography '[…] the big Apple blossomed, the world stood still and when it started turning again, we spoke,

thought and looked differently. We were a different kind of people'. (Clinton 2020, 32) This tragedy not only struck New York, but many capitals and industrial centers across the globe, causing the loss of vital infrastructures, invaluable historical heritages and, most of all, many lives, truly deserves to be called a paradigmatic shift for humanity. Unlike any other event humankind has ever witnessed, it affected the totality of the global community in an instantiate. (Stupr 2022, 5)

Until the summer of 2014, the group of radical environmentalists the 'Green Storm ' was not well known. Leaked documents[1] showed that even the CIA just considered them at the time as an eccentric smoothies start-up, with a tendency towards genetically enhanced spinach. It took the public as a surprise, when the genetically modified plant ravaged the complete island of Manhattan in a single day. Its devastating force stemmed from its rapid growth and the fact that it used cement and steel as nutrition. The 'Green Storm' argued in their video ultimatum that the world was on the brink of destruction and that this drastic step would be the only way to save life on this planet. The date of the attack was not only chosen because of the solstice (symbol of renewal), but also because it coincided with the 'International Summit for a Sustainable World', where most world leaders where gathered in Vienna to decide upon environmental issues. Showcasing the destructive power of the plant, the group ensured that their threat to destroy all major industrial centers of the world, had to be taken seriously. The world community was forced to decide in only 24 hours, if they agreed on a global halt of the industrial meat production and the oil extraction or face an attack of unprecedented proportions. Giving into the demands would have meant, skyrocketing unemployment rates, tremendous problems in food distribution and the collapse of the global economy. In this crossroad two other possible solutions dominated the discussion of the emergency conference. Either to unite military and intelligence services to find and eliminate the Green Storm following the scheme of a counter-terror-operation. Or to invest into finding and developing an herbicide that could stop this very resilient species. The emergency conference decided on not giving in to the demands of the Green Storm and instead investing in scientific means, to develop effective countermeasures to contain the plant, and re-examine the socio-political dimensions of the situation at hand. The researchers where successful in finding an effective herbicide, but it took them nearly a week, in which the released plants destroyed a vast amount of infrastructure around the globe. The green storm could

be captured and prosecuted, but the consequences of the attack meant the loss of many lives and a substantial setback for the world community.

The severity of this event made the examining and reflecting on it, a pressing issue for the social sciences. In the following paper we want to take a closer look at how the narratives and viewpoints Science and Technology Studies offered have changed over the last 20 years. We believe that the diversity of STS makes it impossible to offer one unquestionable definition, to what STS truly is. Instead we want to focus on the authors and institutes that consider themselves as STS scholars. By reflecting on the double contingent relation between STS and the transforming narratives of this event, we argue that a repositioning and restructuring of techno sciences in the scientific community occurred through and *with the retelling of the story of this event.* (Endler 2022) Reflecting on the emerging deliberations, considers the reflexivity of the actors involved, opening a discursive realm of the perpetrated descriptive alignments of thought through its diverse ambiguities of *beingness*.

Rise of the Phoenix

After the collapse of the institutional framework of science, big parts of essential infrastructures and means of scientific communication had to be re-established. It took three years[2] until *Out of Time. Looking at the Green Storm*, the first historical publication, a collection of articles on the topic could be printed and distributed. Because of the lack of alternatives it became an immediate bestseller. Many articles were controversially discussed, in particular the one of historian Lubomir Bradicich's on *the events of the 20 of June 2014* (Langstrom 2017, 1456).

> Back then nobody thought the eco-activist group 'the green storm' would get militant, much less threatening the world leaders to release a genetically enhanced plant hybrid, capable of tremendous growth and the power to devour complete cities. Nothing in the environmental movement indicated this penchant for violence. […] It is understandable that it was considered an empty threat, especially because it seemed ludicrous to assume, a small organization like 'the green storm', would really carry out a global attack in this scale, even after witnessing the destruction of Manhattan. It wasn't even a *wild card* scenario,

> rather a *no card* scenario. Giving in to their demands, by completely stopping the oil and meat production, causing the collapse of the entire economy and modern civilization was never a real option (Bradicich 2018).

Bradicich argued that the whole situation appeared so utterly absurd, that everyone involved in the decision process was either confused or in a state of skeptic disbelief, making them incapable of grasping the consequences. He refers to this state of mind as a 'Let's wait and see' mentality. Bradicich's position captured the discontent of large parts of the population, with the decision made by the emergency conference (Boktanova 2020).

The newly awoken social sciences reacted vividly on Bradicichs paper and soon split into two factions. On one side were Bradicich's followers, holding that the actors involved in the decision process were incapable of making a rational decision, due to their heightened state of confusion and skepticism, which we will refer to as *epistemic diffusion theory*. One of its most prominent proponents was the well-known media theoretician Philip Piung. He substantiated this claim two years after the publication, with a qualitative study, in which many of the involved decision-makers made statements such as, 'we thought the whole situation was an elaborated hoax, or some sort of art performance we accidentally stumbled upon' and that they might have chosen differently, if they would have been certain that it was not, 'a George Orwell invasion of the world type of thing' (Piung 2018, 68).

On the other side, a theory formed around the statisticians and historians of economy Aladdin Almanac, Sabina Gluehbirn and Fidela Doublefine. They regarded Bradicich's article and Piung's follow up study as fundamentally flawed, because they were strongly founded on the statements of the deciding actors themselves. 'We should not believe what people say, and what politicians say double so (Gluehbirn 2018, 440).' Employing a methodological triangulation of rational choice theory, data mining and epistatistics to reconstruct the narrative of the event. They argued, that the decision of the conference was in fact the most rational at the time and also in hindsight. With a tremendous amount of effort they gathered a vast number of quantifiable data, from the estimated number of potential victims to the phone numbers of the participants, to the number of times the letter 's' appeared in the dinner menu (Almanac, Gluehbirn and Doublefine 2018). The authors claimed to have found a conclusive proof, that the decision makers

were fully aware of the consequences of their choice. They were especially proud about the fact that '[…] not a single grain of fuzzy qualitative data was used […]' (Almanac, Gluehbirn and Doublefine 2018, 60). This was achieved by ruling out any potential factors, which could have primed the decision makers to one decision or another or frame the options in an unbalanced way. The study provoked the outrage of many politicians involved in the decision process, claiming that the degree of harm caused by the *Green Storm* was unforeseeable. But the authors regarded this as just more proof to the fact, that one should not trust politicians.

Although skeptic to both positions, the STS scholars could not offer a conclusive alternative to this narrative in an early stage of the debate. Not until 2019 when Ruth Gromwell published her book *Worlds of Paper*. In it she presented a compelling perspective through a thorough analysis of the material matrix of the emergency conference. Although she offered many possible aspects influencing the outcome of the event, she identified one factor as being the most crucial to this particular decision. The decision on how to respond to the threat had to be taken within 24 hours. Owing to the time pressure, the staff had to hastily prepare for the sudden change. The complexity of the situation required communicating most of the information through printed documents. Due to the amount of content, the staff were forced to print on both sides of every page. The pages were held together by R23P7 standard type paperclips. This particular model of paperclip had the advantage of having a firm grip on the inserted documents and being at the same time easy to remove and reattach. But soon after the release of the R23P7 standard type the manufacturers received complaints from custumers, that the clip was too tight for turning the pages properly, so the production was stopped. The remainder of the stock was thrown cheaply on the market. With the intention to save money for the conference the International Summit for a Sustainable World bought the cheaper R23P7 standard type paperclips instead of more expensive models such as the R23P9 or the standard R23P1 model. The use of the R23P7 and the fact that relevant information was printed on both sides caused most of the recipients to only be aware of half of the content, because the other side was not easily visible.[3] Gromwell argued that looking only on the odd numbered pages of the printed information would make it perfectly reasonable to opt for a scientist solution, because the consequences were drastically marginalized (Gromwell 2019, 233).

Gromwell's book was a huge success across the scientific community, since it offered 'a simple yet compelling explanation' and was '[…] written just as thrill-

ing as a crime novel […]' (as Kamp and García stated in different book reviews referenced). Even Bradicich admitted that the paper clips must have been a relevant factor in the decision process, although holding on to his *epistemic diffusion* theory. The widespread acceptance of this theory, which became better known as the *Paper clip theory*, did not only mean an immense boost in Gromwell's academic career, making her appear on the cover of Times magazine as *Thinker of the Year*, but also for the entire field of STS. The following section will examine how this victory of the *Paper clip theory* affected the position of STS, changing its role in both science and society. Ledershuh referred to this time period between 2020 and 2028 as the golden age of STS (Ledershuh 2033).

The Golden Age

The big success of STS is foremost visible in the institutional growth both in university programs and in the number of publications. In only 10 years, literally every university implemented some sort of STS related course. Hard science disciplines specially, became interested in incorporating it into their education programs. In the year 2025 alone, over five hundred thousand STS related articles appeared (Sabha 2030, 45).

This ferocious expansion into so many domains of sciences cannot be merely explained by its epistemic advantages. It was much more a result of the intensive media coverage that brought technoscientific approaches into the spotlight of a broader public, which in return affected its role within the academic realm (Schmalzgruber 2030, 323). The driving force was of course the leading figure Gromwell, which managed to translate complex theories charismatically into everyday problems. Her appearance in the talk show of Oprah Winfrey, where she presented her book *Living with things*, had such a media impact, that the CBS television group, producer of the popular television crime series CSI, considered the broadcasting of a show called STS, where an eccentric Science and Technology Studies professor fights social injustice (Cloestermann 2031, 68).

The psychologist Hopfentropf stated, 'thinking STS trickled into the vast seas of the collective subconscious, from which countless phantasma of this mindset emerged onto the pages and the screens of our brightest imaginations' (Hopfentrop 2033, 45). Many of its methods and approaches found their way into popculture. One of the most noticeable examples was the film noir 'Le cornichon af-

fligeant' directed by Michael Bay in which the protagonist, a cucumber, battles with inferiority issues, and Aldru Rodriges' novel *Printed Letters* a moving love story between a folio and a document in a Portuguese archive of colonial medical records facing modernity and the electronic age.

Rethinking the role of humans, science and technology also appears to have affected theological debates. The third Vatican Council also considered as the 22. Ecumenical council in 2027 appears to include methods of the Actor-network theory concerning topics such as the problem of trinity and transubstantiation, with the goal of reconciling with the other Christian confessions.[4]In the light of this endeavor the first cyborg theology program was created at the Sapienza university of Rome, aiming at reconsidering the ontological status of humans and technology on a metaphysical level (Add 2029, 262). Similar debates emerged in the esoteric community, focusing on the question of what an actor really is. Dupont challenged the idea that a relevant *actant* cannot simply be defined as the entity that realizes potential, but rather as the driving force behind it (Dupont 2020, 262). Considering this argument Fanny Zauner developed the theory that only a singular divine being can be truly considered an *acteur* or *actant*, since everything is part of causal chains[5] that have to lead ultimately to one single origin (Zauner 2023, 34).

The grown interest in STS and the huge number of related publications was also causing a bigger diversity of topics and the branching out to other fields, one of the most prominent developments being *critical botanism.* The ground laying publication *Plants in labs* by Sophy Giantree, offered an empirical and theoretical analysis on the presence of pot plants in research environments and their influence on the outcome of a research.[6] In the last chapters she examined the events of June 20, 2014 using a topological approach and a method she termed *agricultural hermeneutics*. She concluded that the arrangement of plants, as well as the specific flora present in the decision process, lowered the probability for choosing a military solution. Papadopoulus one of her scholars introduced in his acclaimed book *Generation clash: the plants of yesterday vs. the fauna of tomorrow,* the idea that the Green Storm events were in fact the culmination of a war among generations. He claimed that humanity was not only driven by its own decisions, but primarily by the needs of plants. Specific species, such as potatoes, tomatoes and cucumbers managed to conquer non-native environments by populating the shelves of supermarkets worldwide. This manipulation was only possible,

by granting humankind the power stored in the remains of their ancestors, in the form of oil and coal. But the influence of these ancient forces had become too predominant. The Green Storm attacks are thus to be understood as an attempt from the living flora to regain control (Papadopoulus 2025).

Interesting enough, another study concerning the event lead to a further branch of STS. Timothy Hunter's media analysis studied the role of the representation of the human figure in the video release of the *Green Storm*. Before him research was carried out concerning the wording and the high-inference language used in the video and the overall framing of the images. Instead Hunter started focusing on the depiction of body and body language. In his work he developed a connectivity analysis of the present physical bodies, based on the video recordings of the emergency conference, which were unavailable for the scientific community till 2027(Hunter 2028).

Brigitte Rosario, leader of the *Green Storm,* was shown in the video ultimatum merely as a shadow in front of a white, blank space, emphasizing her changing gestures and posture. In her silhouette a variety of depictions of human-made structures and nature appear, underlining and adding additional layers to her message. Simon Estragon concluded that it had a powerful effect on viewers, because of the '[…] dreamy photography of the superimposed footage and the inciting narration, created by the soft nuances in her voice'. Estragon stated that what truly made it one of the biggest achievements in the art of propaganda, were the allusions to well-known catchy slogans and quotes from pop-culture, which gave it its heroic utterance (Estragon 2032, 89–90).

Hunter regarded this as a fundamental misconception. In his analysis he claimed to have found universal connectors of body language he called *gwa* (gesture schwa). Much like the schwa in languages like Armenian, Bulgarian, Catalan, Dutch or English, which is not present in writing, but only in spoken language, enabling the speaker to talk more fluently, by decreasing the effort of the vocal apparatus, the *gwa* has a connective function of gestures, determined by the economy of movement. This very fact, that the *gwa* is not determined by cultural or social factors, but rather by the rationality of its use, grants it the ability to transgress cultural and language barriers. Hunter put a strong emphasis on the fact, that there are no universal gestures, but that connective functions are necessary in every form of human communication[7].

He states that the appeal of the *Green Storm* video ultimatum was due to the artful usage of the *gwa*, conveying a universal message of danger, hope and responsibility. At the emergency conference the scientific solution manifested through the speech of geneticist Dr. Spencer. He pleaded for further research, highlighting the risk of the unpredictable outcome of fighting the plant with conventional means of warfare, and the risk of harming civilians in the process. Hunter claims that the body-brain language managed to make it seem as a morally impeccable position. The idea of not making a deal with the enemy, while avoiding large scale conflicts, turned out to be attractive enough for the leaders, because and through the discursive nature of the embodied dialog. According to Hunter, the military solution lost a lot of its appeal due to the personal qualities of its spokesperson Colonel Pierce. His furious gestures and cruel observations created a constant negligence of conciliation. In particular his physical assaults on Dr. Spencer during his speech, led to negative priming towards this solution. The choice of Col. Pierce as spokesperson has been much discussed and was subject of a lot of speculation.[8] In Hunter's view, his presence at the emergency conference were certainly not beneficial to the cause he argued for.

Hunter concludes that regardless of the outcome, the discourse was not so much a result of fragmented information as depicted by the *Paper clip theory*, derived from the surrounding flora or a purely rational one, but rather a result of misleading entanglements of bodies and attributions. Based on this analysis he developed the PLCT (Post-lingual communication theory), which tries to achieve the most egalitarian, inclusive and balanced discourse, by banning spoken language and solve conflicts exclusively through dancing. 'If every lawyer, tax accountant and politician would dance instead of talk, there would be no crime, no social inequality and no war.' (Hunter 2038)

In the last section of the paper we want to have a look at the last couple of years pointing to a very different kind of trend.

The big divide

The STS field has developed a big influence in society, moving from a small community, to a scientific endeavor that has found its way deep into the scientific mainstream. As Heather put it jestingly,

> Science and Technology studies went on from being the geeky child, no one wants to pick into its baseball team, to the beloved prom queen. Now it is well established in the scientific realm and does not feel the need to pick every fight with her bigger brothers and sisters of academia and sometimes even prefers to drink a hot cup of tea in quiet, with a dash of milk, while the others quarrel (Heather 2029, 66).

Although this comment has to be taken with a grain of salt, it is very true that STS became part of the scientific establishment in the 20's. STS scientists were an intricate part of many ethic commissions, they guided participative projects in many countries to involve the public in political decision-making processes, and they gained a certain influence as councelors for governmental bodies (Sabha, 290–308).

In 2029 the city of Haarlem, in the Netherlands, had grown, to such an extent that it merged into the municipality of Amsterdam. To cope with the unbearable bicycle jams the Netherlands decided to connect both cities with a trans-municipal bike underground system. The ambitious aim was to create a functioning underground system, with wagons, which would be particularly designed to transport a vast amount of bicycles and their bikers. The Netherlands gathered an expert committee of STS scientists, to find an applicable answer on how to deal with the complicated entanglement of the stakeholders affected by this enormous construction plan.

Which parts of the city should be connected? Which buildings can be demolished? Should rollerblades be allowed? Many decisions had to be made. The Netherlands wanted to be at the forefront of innovation, envisioning its underground system to become, the gold standard of STS-approved infrastructure (Lear 2030, 56). This project was the first of its kind and the crowning symbol of the trust, placed in this scientific field. However, with STS's great success a new problem emerged. The rapid development of the field created differentiated approaches, sharing, over time, less and less common ground. The STS committee appointed by the Dutch government illustrated this diversity. The scientists involved in this project quickly started to split into three fractions: the Critical Botanists, the PLCTs and what we want to refer to as Gromwellians.

Although not completely homogenous in themselves, the Gromwellians had similar approaches in common. They hoped to tackle the issues by already well-

established scientific means, such as hyper networks analysis and participatory action research methods, to finding consensus or at least overlapping interests among the stakeholders. They aimed to design the underground-bike system, with an emphasis on the social interaction between the bikers and non-bikers. Trains should not be merely used as a means of transport, but to share time together and meet new people (Dinge 2031).

The critical botanists approach was concerned with the integration of plants as equals into the lives of the peoples and the process of development. A big concern was to find ways to minimize the harm caused by the construction, on the root system of trees and Rhizomes of Mushrooms (Busch 2031). This should have been achieved by creating the so-called 'root route', by mapping every deep-rooted relevant entity and circumventing them as good as possible. Some critical botanists even suggested designing the trains as mobile glasshouses, to ensure the mobility of plants. They stated that to create a truly egalitarian society, one must take into account not only the right for mobility of the fauna, but also of the flora.

The PLCT theoreticians on the other hand focused on the political and social realm of expressive gestures. They started initiating dances in public spaces, such as parks, bus stations and public toilets in order to explore the quality of embodied shared urban spaces. Stemming from this research, an early proposal was to remove all the seats in the trains to provide enough space for bodily expressions. Since they refused to publish papers in written form, it became increasingly harder to communicate among the scientists involved (Kondak 2034, 156).

Four months after the project started, conflicts emerged among the members of the expert committee. Baralla Kualo one of the Gromwellian scientists involved, was frustrated by the lack of progress and blamed publicly the critical botanists for showing no interest in catering to the needs of the people affected. She was particularly harsh towards the PLCT faction, stating that their entire methodology consisted in 'jumping around like a bunch of adolescent chipmunks (Spikey 2032, 12).' This evoked a broader discussion outside the confined borders of the Haarlem Committee. Latent conflicts in the STS field were voiced in reaction in the form of papers and tweets. Ledershuh for example tweeted: 'OMG. Crit botanists go green storm on Harlem!!! WTF #LoonyBoties'. The hash tag "LoonyBoties" became immediately a TT (trending topic) for months. His reaction did not only reflect, the disappointment brought by the incapability of the Haarlem Committee to work to-

gether on reaching this prestigious goal, but also the ideological proximity of critical botanists to the perpetrators of the Green Storm attacks. The critical botanists were outraged by this comparison. An open letter was released by Papadopoulus, Giantree and other academics sympathizing with critical botanist views, stating their strong and firm rejection to the goals and means of the Green Storm. Furthermore the letter expressed their disappointment towards the mammalocentric views of other STS scholars. 'It seems unacceptable to exclude other species which play such crucial role in our social life. Even from a mammalocentric position one has to admit that our very existence, would not be possible without our Plantae and Fungi kin'. Apart from that Papadopoulus stated, he admired the expressiveness of the PLCT faction and their work. But he was also very clear about the fact that he considered their research as a piece of performance art rather than as a

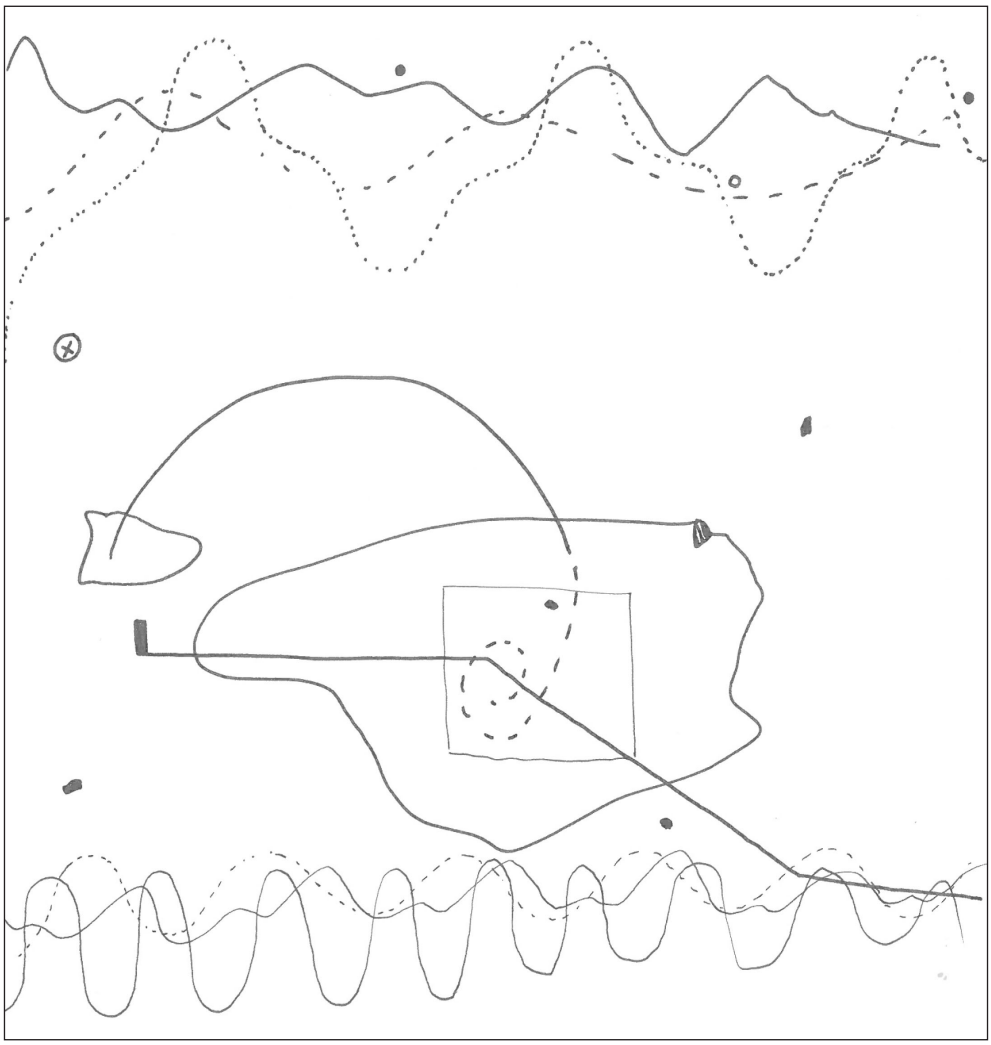

Image 1: Statement delivered by Hunter at the occasion of the Haarlem Underground dispute.

scientific endeavor. Hunter, the founder of the PLCT reacted with a video answer, in which his furious performance expressed the discontent with the direction this debate was heading. His scholars in the Haarlem Committee argued that it was impossible to get some serious work done with their colleges, because the others '[…] just kill the good vibes' and were unwilling to 'go with the flow'.

After only 18 months the project ended prematurely, as the parties involved refused to work together. The very symbol of the social acceptance of the STS field, turned out to be a painful reminder of a discipline falling apart, making the incident an infinite source of hallway quarrels in the STS departments.

In the winter of 2033 the Biannual 'Assembly for the Advancement of Academic Research' (BAAAR) took place in Gibraltar, to commemorate and prepare for the 20th anniversary of the Green Storm attacks. Due to its size and the long list of prominent keynote speakers, it was considered the most important STS conference of the year (Kosheen 2034). During the first days of the event, tensions were noticeable. Shivangi Bupta praised in her introduction speech the advances of the field, without mentioning any of the achievements of the critical botanists or PLCT scientists. On top of that, the critical botanists saw the fact that the conference was only decorated with plastic plants, as a personal offense. At the lecture performance of Hunter in which his research results on the effects of 'touchscreen technology on the emergency conference in 2014' were presented through gestures, the mood in the audience suddenly changed. One of the attendees described it as follows: 'Many ugly words have been said, many inappropriate gestures have been exchanged and it was an overall unpleasant sight.' Although Hunter's performance lecture was not particularly provocative in itself, it was the straw that broke the STS camel's back. The conflict spread throughout other lecture halls, causing a climate of heavy discussions and blame. Accusations of unsound methods or obtuse views circulated. The conference was planned for three more days, but since only a few people showed up the following day, the organizers decided to cancel it.

Twelve months after the BAAAR´s failure the STS community still seems to suffer from a hangover. Many signs seem to indicate, that a number of prominent STS departments and research groups are facing strong theoretical and personal conflicts. It is hard to tell whether this will result in a few minor splits or could develop into a major break in the field.

Conclusion

The paper tried to offer a historical overview of the development of the STS field in the last 20 years, by raising the question how the Green Storm attacks affected its sprouting. To do these question justice would require at least another essay, or rather an entire book, but we regard this paper as a first step of developing a conclusive narrative of the changing morphology of this scientific endeavor. Although STS remained always a fluid conglomeration of divergent approaches and goals, it has also reached a broad acceptance in the public eye, hence being perceived as a homogenous field. Projects like the Haarlem Underground, forced the blossoming science to act as a univocal entity, causing situations in which internal discrepancies had to be confronted. We tried to show that both theory and methodology of the recent developments of STS are closely related to the events of June 20, 2014. From the rise of the discipline to its current state, the reflection on the event has repeatedly being the turning point of major changes in the field. History was written, by rewriting it. Hardman said in his speech at the BAAAR in Gibraltar, that it might be time to consider going separate ways (Hardman 2033). We strongly disagree. Conflict is always a chance to grow, which STS has shown in the last 20 years again and again. Its very essence has always been to question the given and finding reveling ways of seeing the presupposed. Although it might have been at times a bumpy journey with many hurdles, one has to admit that it has been an exciting ride. The future lies in overcoming our differences, so we can keep on changing the world.

Endnotes

1 The embarassing unvoluntary release of the 'Smoothiegate papers' occured in 2020, when a high-rank CIA agent sub-rented his appartment to an investigative journalist of the international press agency Reuters.

2 Jefferson Polnja argues that it could have taken only one year, but the lack of auto correcting software added a considerable amount of effort for a generation of digital natives.

3 Richard Schweinfurt went even further by elaborating on the topic of incompatibility with the used paper type.

4 "The ontological status of God, Jesus and the Holy Ghost and their relation to each other were the theological cause of many schisms through out the history of the Christian community. The Actor-network theory offers a new language to find a common ground." – Pius Alumirasa 2028. *Praying Networks (*Roma: Vatican Press, 89)

5 In a recently published paper Lee Palatschinke develops the view that hindi and budhist communities have been influenced as well, but less noticeably, because the contingent conception of beingness and ontological statuses were already intrinsic part of their world framing.

6 Nearly at the same time the famous paper 'Rubber Roots' by Theodor Papadopoulus appeared, addressing the issue of technology and plants, pleading for considering plants in modern society as cyborg beings.

7 Even though the gwa may change from culture to culture, it always exists in some form, changing the quality of the information communicated.

8 Alois Deniken suggested that Pierce´s privileged position could be linked to the fact that he may be the illegitimate son of a former general of defense of the United States, but his sources have been proven unsound

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