Accessibility statement

This is an accessibility statement for the journal: STS Encounters.

Conformance status

The Web Content Accessibility Guidelines (WCAG) defines requirements for designers and developers to improve accessibility for people with disabilities. It defines three levels of conformance: Level A, Level AA, and Level AAA. This statement is relevant for volume 15, number 1, 2023 and onwards. STS Encounters is partially conformant with WCAG 2.1 level AA. Partially conformant means that some parts of the content do not fully conform to the accessibility standard.

Feedback

We welcome your feedback on the accessibility of the journal. Please let us know if you encounter accessibility barriers. You can reach us at:

E-mail: imvko@cc.au.dk
Address: Helsingforsgade 14, 8200 Aarhus N

STS Encounters
Research papers from DASTS
Volume 18 • Issue 1 • 2026

Mapping technological problems in society

Anders Kristian Munk
Department of Technology, Management and Economics
Technical University of Denmark
https://orcid.org/0000-0002-5542-3065

Inaugural lecture: DTU Management, March 6th, 2025

STS Encounters is published by the Danish Association for Science and Technology Studies (DASTS). The aim of the journal is to publish high quality STS research, support collaboration in the Danish STS community and contribute to the recognition of Danish STS nationally and internationally.

ISSN: 1904-4372

Mapping technological problems in society

Anders Kristian Munk

Thank you for this opportunity to speak about my research in overview. Many people in the room— friends and family—have assured me that they have no idea what I am doing and look very much forward to finally finding out after all these years. The pressure is on! Personally, I welcome the occasion to retrace my steps a little bit. Although I have always been fascinated with maps, it was not really in the cards when I enrolled in the Humanities 25 years ago that I would end up as a cartographer of technological problems in society. What happened?

Controversy in the fields of Berlou

The village of Berlou in the southern French region of Languedoc-Roussillon had just been awarded its own Appellation d'Origine Contrôlée (AOC) when I arrived there for fieldwork in 2005. I was finishing a degree in European Ethnology and together with a fellow student, Jon Frederik Høyrup, I had become interested in the valuation of cultural traditions and their entanglements with local history, geology and climate. Particularly, we wanted to know how certifiable geographical typicality—the ability of an agricultural product like wine to express its local *terroir*—had been made valuable as a transactable good on the market. We had gone to Berlou expecting to get the French perspective on this. The locals had struggled for years to convince the French authorities that their traditions were worthy of certification. It seemed self-evidently a good place to study the French and their wine culture (singular).

To our surprise, there was no such thing in sight. Instead, we found a controversy. At least three distinct groups—each with their own concept of quality, each with their own philosophy of wine growing enabled by their own set of technologies—were very much *not* in agreement with each other on the notion of terroir and its possible blessings. Rather, they were taking stock of their differences and forming alliances in networks that extended far beyond France and their Languedoc vineyards (Høyrup & Munk, 2007; Munk, 2021; Ch. 4 in Venturini & Munk, 2021).

Among those celebrating the new village AOCs, and particularly Berlou's success in being awarded one, were the local terroir traditionalists. Their technologies included a series of state-devised test regimes designed to ensure that their wines reliably expressed the geographical typicality that had now been inscribed in the AOC. In the case of Berlou: grape varieties like Mourvèdre, Syrah and Grenache Noir growing on steep slate hills and cultivated with low yields according to tradition. To understand this concept of quality you would need to appreciate its deep ties with what had become canonized as French gastronomy, with particular traditions for aging and consuming wine, and above all you would need to recognize the kind of taste profile it would guarantee compared to the hundreds of other French AOCs (not to mention their Spanish or Italian counterparts) that were available to the consumer. For many, this was French wine culture embodied.

However, close by in the same area—down on the barren plains around Béziers where according to the authorities at the *Institut National de l'Origine et de la Qualité* you were not even supposed to grow wine—a new generation of technologically advanced producers were orienting less towards their French roots and more towards a new globalized taste. Taking a cue from competitors in New Zealand, Australia, and South America, who had the international palate and the world market as their guiding stars, these wine makers used artificial irrigation and ceramic filtering, planted grapes you were not supposed to plant, and made wine tailored for drinking without support from gastronomic pairings or fine-grained ideas about local geology. Their French compatriots considered them heretics. *On m'appelle le diable* (they call me the devil)—exclaimed one of them. He had named his dog Terroir.

And then there were the natural winemakers. Those who claimed to swear off technology altogether, be it technologies for testing, certification, cultivation or vinification. Growing their troll-like, unmanaged Carignan vines on hills so steep that tractors were useless, letting the wine develop without intervention, uncontrollably and unpredictably at the mercy of wild yeasts and temperature fluctuations over the winter, they could neither live up to the strict rules of the AOC nor support the technoscientific rebellion of the wine makers on the plains. Their allies were in places like Paris, Melbourne, Copenhagen and New York where the natural and biodynamic wine scene was emerging and would eventually grow, something that was by no means a given in 2005. Natural wine was hardly in use as a concept yet and only a few avant-garde retailers were around (Verre Volé had opened in Paris in 2000, Rosforth in Copenhagen in 1994). The alliances between new gastronomic ideas, particularly those of the new Nordic cuisine, old vinification techniques like oxidation, skin maceration or amphora-aging, and digital food practices on image-based microblogging platforms like Instagram, all of which are now backbones of the natural wine market, were still in their infancy. Ironically, all sorts of technologies turned out to be key market makers despite the vocal renouncement.

I learned from that experience that notions like culture, values or traditions as something stable, essential or locatable are meaningless in a networked society. Rather, such notions are actively negotiated, translated, reassembled and used strategically by actors in the field. Not in an abstract sense where anything goes, but in a materially situated sense where actors struggle to inscribe their claims to, say, traditional wine culture in more stable things like technology, climate or geology. Consequently, the construction of such notions, and the controversies that result from it, must be treated as an empirical question.

Of course, when I was doing field work in 2005, that lesson had already been learned and codified a long time ago, not least by actor-network theory (Law & Mol, 2002; Latour, 1987; 1999) or the siting culture debate in anthropology (Appadurai, 1988; Marcus, 1995; Olwig & Hastrup, 1996).

I had for example been reading Theodor Bestor's brilliant multi-sited ethnography on the globalization of sushi tuna (2004), Bruno Latour's proposal for a sociology of associations (2005), or Sarah Whatmore's work on hybrid geographies (2002) with great interest, but I did not realize its practical importance until I was on the ground. The valuation struggles (Pallesen, 2016) that were laid bare in Berlou demonstrated the power of controversy as a generative empirical opportunity. Without it, the actors would have been much harder to follow.

Technological democracy and contested expertise

Inspired by Whatmore's work, I continued my studies with her at the School of Geography in Oxford where, a few years later, I found myself doing a PhD on another controversy over the valuation of nature, this time in the UK insurance sector (Munk, 2010). The issue here was how to model and price the risk of flooding, a question that had risen to prominence in the UK after a series of severe riverine flood events in the early 2000s. Again, it was clear that there were different factions of actors, only this time they were expert communities with different philosophies of nature (Thompson, 2002), different epistemic cultures (Cetina, 1999), constructing the risk of flooding in different ways. One of these expert communities was closely tied to the reinsurance market in London and consisted of actuaries modeling the risk not as "water in your basement" but as the exposure you represented in the portfolio of an insurance company. Their so-called catastrophe models were based on actuarial mathematics that had little to do with hydrology. Indeed, they did not even consider the shape of the landscape or the flow of water across it but relied on probability theory and the abstract risk of two or more ruinously rare events occurring in the same fiscal year. In contrast, a second group, who was closely connected to the national Environment Agency, used one-dimensional hydrological models applied uniformly across the UK to provide fair and comparable risk estimates that planners could use to prioritize public funding. There was plenty of water flowing across landscapes

and into homes here, as long as it was the kind of water that could be modelled as going out of bank from a river channel and spilling out onto the surrounding terrain. Not all water could. It was not uncommon that the flood scenarios projected by the Environment Agency did not match local experience, particularly in cases where water from rainfall was building up in the landscape and flooding homes on its way to the nearest river channel (not on its way out of it). Some flood modelers were working directly with local stakeholders to understand such scenarios and propose locally adapted solutions to them, gathering data and parametrizing models in a participatory fashion and doing more advanced but also more situated and context dependent 2D modeling (Landström et al., 2011).

None of these expert communities were wrong in their predictions as such. This was striking to me. They were all making robust enough claims about something that was, by definition, uncertain (the possibility that future floods would have certain consequences). Still, their predictions were enacting the risk of flooding as ontologically multiple, something that was more than one (contestable) fact but less than many (Mol, 2002). In Oxford, I had followed Donald MacKenzie give the Clarendon lectures on devices that perform markets (MacKenzie, 2008) and the actuarial models in the insurance industry were certainly doing that. They were (alongside a series of competing hydrological models sponsored by the different insurers) part of a material infrastructure that allowed flood risk to be traded. But that was not the logic of the Environment Agency's national flood maps which were there to allow flood risk to be managed, i.e. perform it in a way that made national prioritization of resources possible. Despite making knowledge claims about the same thing, and despite not being part of any direct scientific disagreement where only one could eventually be right—this was not Pasteur against Béchamp (Latour, 1993) or Joe Weber against the rest of the physics community on gravitational waves (Collins, 2019)—they still produced conflicting valuations of flood risk that mattered greatly to home owners in places like Yorkshire, Sussex or elsewhere where riverine floods were occurring (Munk, 2012; 2014).

I became broadly interested in the STS literature on knowledge controversies. It turned out that there was an entire subfield of sociology dedicated to the study of disagreements among experts, contested facts, publics that question the way knowledge is produced, technologies with adverse social consequences, and so on. My supervisor was working on a paper about its relevance to geography (Whatmore, 2009) with particular focus on Bruno Latour's (2004) notion of matters of concern, Isabelle Stengers' (2005) notion of slowing down reasoning, and Michel Callon's (1998) distinction between hot and cold situations. This became my starting point.

From decades of case studies, going back to the early 1970s, STS had consistently shown how technologies become problems in society, often with unpredictable downstream consequences, even when intentions are good and technological innovation addresses pressing societal challenges. Take the catalytic processes for making artificial fertilizers that helped solve the post–World War II food crises (and create one of the biggest success stories in Danish engineering): today, our marine environment suffers the consequences of over-fertilization. Add uncertainty to that; add the fact that such consequences are contingent on complex sociotechnical factors and near impossible to predict; add the fact that experts nevertheless disagree on how and what to predict; add the fact that publics with different interests ask legitimate but fundamentally different questions because they do not subscribe to the same problem definitions. Once a cold situation turns hot, as Michel Callon put it, there is "a brutal short circuit between specialists and laypersons" (Callon, Lascoumes & Barthe, 2009).

In cold situations, which is what we are in most of the time, decisions are comfortably and self-evidently delegated to specialists. Procedures can be relied upon, and the public has little occasion to get involved. The short circuit of the hot situation, the sociotechnical controversy, makes it temporarily evident that "both categories of actors possess specific forms of knowledge (a capacity for diagnosis, an interpretation of the facts, a range of solutions) that mutually enrich each other" (ibid.).

Such situations cannot be reduced simply to unwarranted relativism and curable information deficits. Popularly speaking, it is not that everyone needs to get their facts straight and then the situation would go away (although, and particularly with the broken information environments we are facing today, getting as many facts straight as possible is always desirable!). Sociotechnical controversies are complicated because they prompt social reorganization (think about the technologically enabled terroir heretics outside Berlou), which is always to the detriment of some and benefit of others. They are complicated because technologies embed 'our' values and politics, again the values and politics of some rather than others (think about the national flood maps of the UK Environment Agency and their root in particular ideas about good public administration). DTU's new chair of the board of governors—Magrethe Vestager—recently reminded me that Denmark has a case in point in the cooperative movement of the late 19th and early 20th centuries. That movement not only championed a new form of social organization, it also enabled Danish small-hold farmers to make use of the dairy centrifuge, a technology that would otherwise have been prohibitively expensive to them. The introduction of the centrifuge, like many other technologies in the process of industrializing the agricultural sector, thus prompted a hot situation where business as usual was not an option and the good technological future was up for negotiation by a broader range of societal actors (with very different results in different countries around us).

As noted by Horst Rittel and Melvin Webber fifty years ago in their theory of wicked problems:

> "In a pluralistic society there is nothing like the undisputable public good; there is no objective definition of equity; policies that respond to social problems cannot be meaningfully correct or false; and it makes no sense to talk about "optimal solutions" to social problems unless severe qualifications are imposed first" (Rittel & Webber, 1973).

If we take that seriously—and I do—then it also applies to sociotechnical controversies where part of our role as researchers in relation to such problems must be to ensure that the plurality of positions they articulate is not only documented and understood but supported as a core part of what it means to live in a democracy.

Towards controversy mapping and digital methods

While I was still in Oxford, my group joined a European STS project that in my opinion tried to do just that. Led by Bruno Latour in Paris, MACOSPOL (Mapping Controversies on Science for Politics) set out to help the public navigate hot situations. Drawing on the emergent field of digital methods, it posited that it might be possible to use data from online platforms to trace the evolution of issues and actor positions. MACOSPOL thus revived an older STS ambition from the 1980s, when scholars had used scientometric methods—manually—to study controversies in science (Callon et al., 1986). This time, the ambition was to do something similar for much broader disagreements on the Web, with computational assistance and resulting in tools for the public to use.

The convergence of STS and digital methods in MACOSPOL intersected with an interest among the same group of scholars in a revived discussion from the early 20th century between John Dewey and Walter Lippmann about the challenges facing democracy in a high-paced modern society (Marres, 2005). Lippmann (1917) famously noted the dilemma that we always need the public the most in the situations where it is most complicated for said public to get involved. It is when facts are most obscure, precedent is lacking, and problems get extra wicked that we can no longer rely on established procedures. When cold situations turn hot, the public becomes the court of last resort. That is a tall order. How can citizens be expected to pursue informed inquiry when they are constantly bombarded with new and thorny issues that they cannot possibly have lay knowledge of or just experience with?

This isn't just an internet problem. Lippmann was writing a hundred years ago and compared the public to bewildered puppies trying to lick three bones at once. I think the image still resonates; at least once a week I feel like that puppy trying to keep up with current events.

A good former colleague of mine, Torben Elgaard Jensen, has an(other) apt analogy for it. We might wish, out of convenience, that controversies were clear-cut games, like a tug-of-war where it is plain to see who is fighting who and everyone agrees on the rules, especially what constitutes winning and losing. In reality, however, controversies are more like saloon fights in a Western movie: bar brawls where the coalitions keep changing, no one has an overview of who is fighting who and it is impossible to know how to resolve them. MACOSPOL essentially asked if we could have a map for such bar brawls? If it is not possible to settle them, can we at least develop a cartography for them that makes them easier to navigate? Staying with the metaphors, Tommaso Venturini (2010) uses the image of a magma flow to illustrate the challenges facing that kind of mapmaking: the territory is unstable, new islands keep emerging, how do you keep up with that? Controversy mapping asks simple-sounding questions that are in fact hard because the answers are changing (Venturini & Munk, 2021): Who are the actors? What are their concerns? What do they base claims on? Who are their allies? Theoretically, having good and timely answers to such questions would be useful democratic equipment. Practically, such maps are hard to make.

Already twenty years ago it was clear to Latour and others that the Web had exacerbated Lippmann's puppy problem—and social media had only just been born!—but they also saw the technologies of the Web as potential solutions. They looked at Google's algorithms and recognized what they already knew from scientometrics. They speculated that perhaps such algorithms could be repurposed to identify actors opposing or advocating particular issues. They looked at the digital traces left by actors online—hyperlinks, for example—and saw in them an opportunity to make the empirical analysis of controversies directly traceable to the activities of those actors and thus revive the old plans

of Gabriel Tarde for a sociology of associations (Latour et al., 2012). Pursuing this vision, MACOSPOL built tools for digital traceability. One was the so-called Lippmannian Device. It repurposed Google search and allowed you to input the URLs of a list of known actors and then query for a list of search terms to find out who talks about what. Another was the Issue Crawler which repurposed hyperlinks to map who counted as authorities for different actor factions in a controversy (Marres & Rogers, 2009). I was fascinated by these early tool experiments that I could observe second hand through my research group's involvement in MACOSPOL. I was particularly intrigued with the methodological promise to make qualitative analyses of controversies traceable at scale. Consequently, after finishing my PhD, I began reorienting my own research practice, gradually becoming half data scientist, half anthropologist of technology. I first learned to use the tools that others were building (they were becoming more sophisticated too, with dedicated scrapers and platforms for natural language processing and visual network analysis). In the process, I realised the need to code myself, both to have more influence on how digital traces could be repurposed and to get a more hands-on understanding of the sometimes black-boxed methods. Experimenting with how to repurpose different online traces and looking for new empirical cases to develop my underlying methods interest, I engaged with a variety of issues spanning from food trends in the Nordic countries (Munk & Ellern, 2016; Munk, 2019) to wind energy projects in Denmark and abroad (Munk, 2014; Borch, Munk & Dahgaard, 2020).

In 2013, I was lucky to win a 2-year Carlsberg grant to move to Paris and work on the successor project to MACOSPOL, Electronic Maps to Assist Public Science (EMAPS), as part of Latour's group at the SciencesPo médialab. The discussions that unfolded there were focused on how to develop the original ideas about democratic tools for navigation in view of some hard-won lessons from the first attempts. Particularly, it had become patently clear that actors in controversies—people with agendas and things at stake—found it very hard and frankly often pointless to engage with abstract overviews of their

own discussions unless they could be involved in the mapmaking. Consequently, in EMAPS, we began developing participatory formats for controversy mapping—so-called data sprints (Venturini, Munk & Meunier, 2018; Munk, Meunier & Venturini, 2019)—and invited actors around various climate adaptation problems to co-produce an issue atlas with us (Venturini et al., 2014). Working in this way with negotiators and other stakeholders in the UNFCCC process made it obvious that a good controversy map was not a stable thing. For some, a useful map would focus on what different countries had actually said and done in the negotiations. This was grounded in a perceived lack of institutional memory (essentially, they wanted to be able to verify claims like "this was China's position five years ago"). To others, it was precisely all the things that were not being said, but still shaped the negotiations, that were interesting—like how adaptation funding is influenced by how vulnerability is measured and how different indices agree or disagree in their vulnerability assessments. Figuring out what maps were useful and how they should be designed required hands-on engagement where invited issue experts and digital methods researchers worked together in week-long workshops around intermediary visualizations; draft maps that we would iteratively discuss and revise.

Methods experiments at the interface

When I returned to Copenhagen in 2015, it was to continue working at this intersection between participatory design, digital (and increasingly computational) methods, controversy mapping and ethnography. That year, together with Torben Elgaard Jensen, Morten Krogh Petersen, Anders Koed Madsen, Andreas Birkbak and Mette Simonsen Abildgaard, we founded the Techno-Anthropology Lab (TANTlab) at the University of Aalborg in Copenhagen and framed it as an adventure playground for making and doing STS at the intersection of different methods (Abildgaard et al., 2017). We developed the notion of participatory data design (Jensen et al., 2021) and ran sprints where stakeholders participated in crafting analyses around their matters of concern: cultural

sector stakeholders trying to understand what Facebook was doing to their audiences (Munk, Madsen & Jacomy, 2019); school teachers making sense of the debate on educational reform—we worked with 1,600 teachers in a sports arena in Aalborg (Madsen & Munk, 2019); journalists mapping fake news and disinformation online (Bounegru et al., 2018, Bach et al., 2018); disaster response for the Zika virus (Birkbak, Madsen & Munk, 2021); with obesity researchers trying to understand scientific controversies in their own field (Jensen et al., 2019). We were proud to receive the Ziman Award in 2020 for our work to promote public engagement with science and technology and to be highlighted by UNESCO in 2021 as part of the innovation front in digital anthropology. In 2017, we took part in founding the Public Datalab, and, in 2022, Aalborg University's Center for Computational Social Science and Humanities (MASSHINE) to promote and support natively grown data science practices in those disciplines.

I see these collectives where open experimentation across disciplinary boundaries and methodological traditions is encouraged as crucial infrastructures without which our work would not be possible. Now, here at DTU as part of the newly established STS group with Tanja Schneider, Brit Ross Winthereik and many others, we are in the process of founding an Observatory for Human-Centred Engineering (ECHOlab) that will hopefully play a similar role.

And so, it is perhaps a good time to take stock of where we are in 2025 with the ambition to turn controversy mapping into navigational equipment for the public. It is clear that maps raise more questions than they answer. They force us to examine the platforms that produce the digital traces they rely on. There is no way around studying how algorithmic environments—Facebook, Twitter, Google—shape data. We have for example investigated the Google Ads platform with such questions in mind (Coromina, Tsinovoi & Munk, 2023). They also raise questions about the actors who left those traces and their intentions. And they raise questions about who is not in the dataset and what is not being said. In short, mapping demands follow-up, typically with other methods, typically qualitative, more resource-intensive work that takes

place elsewhere (Munk, 2019). If you thought digital methods were a short cut—some kind of one-click, off-the-shelf analytics tool—think again. Rather, in the experimental and participatory formats I have talked about here, they prompt friction and become occasions to slow down reasoning (Munk, Olesen & Jacomy, 2022; Madsen, Munk & Søltoft, 2024).

Add to that the already mentioned realization that no map is a one-size-fits-all and that every stakeholder has different navigational priorities. Ideally, you need to work with those stakeholders to get buy-in and deliver the map at the moment they confront the complexity of the hot situation. This is hard for research because we are usually late—especially with the extra work imposed by digital methods—so in practice we often end up with mapping that is too slow, too shallow, too generic, or too narrow to work as democratic tools. That is, in my opinion, the biggest challenge for controversy mapping right now.

Still, I often feel a need for a good map—one that helps me make sense of who's claiming to be an expert, from which disciplines, who to trust, who aligns with my questions—across problems that are often highly technical. COVID was of course the most prominent recent case of expert uncertainty where such a map would have helped. When we interviewed Latour just before he died—on the night the first QAnon followers were elected to the U.S. Congress and in the wake of COVID—he still believed in the idea (Venturini & Munk, 2021). So do I. It would be great if we could make it truly work.

Computational anthropology and the next frontier in controversy analysis

It is interesting here to think of the way recent advances in machine learning and AI—especially large language models—are currently changing what is possible in qualitative research (Pilati, Munk & Venturini, 2024). In the Algorithms, Data and Democracy project, for example, we recently tried to map how algorithms appear in technical literature—what AI is doing in all aspects of life, according to technical papers. Using then-available NLP methods—it was only four years ago—we found hundreds of topics in 1.2 million papers (Munk et al., 2024). But then came the qualitative work of reading, interpreting, and writing up what each topic actually meant. It took us three people and three months to do it. When ChatGPT arrived a year later, the public conversation shifted to generative AI, no one wanted to read our map anymore as it was perceived as outdated. A familiar problem, the terrain had shifted under our feet and it was prohibitively expensive to redo the map with the same methods.

However, with LLMs we can now build pipelines that automate much of the descriptive qualitative work that makes quali-quantitative analysis extraordinarily labour-intensive. It still needs checking, of course, and it still prompts lots of analytical frictions in its own right. Models are not trustworthy out of the box. But with careful validation we find that it is possible to rely on them for many tasks. Together with Mathieu Jacomy and Matilde Ficozzi we now have an updated map of two million papers grouped into four thousand semantic clusters. For each cluster, we feed a sample of similar articles to a pipeline where a language model identifies the role played by AI and algorithms in those papers, what research questions they address, and then writes a summary of those findings with a title. For example, for a cluster of papers titled "secure spectrum sensing" I now have a useful qualitative vignette that helps me make sense of something quite technical. I will not bore you with all the validation steps, but we did them, the vignettes hold up, and we have them for all 4,000 things that AI and algorithms are doing in the scientific literature. Importantly, once validated, the pipeline can be updated as the literature develops.

Indeed, it is not just that language models can draft qualitative summaries. They might also help us simulate actor perspectives and make maps that are seen from somewhere rather than pretending to be seen from nowhere. We are currently working with the Danish Technical Museum to turn the updated map of the AI literature into an exhibition. It quickly becomes rather dry and declarative: scientists do

this, scientists do that. But an exhibition should naturally prompt public reflection on whether we should do it, what it is good for, what kind of wider societal consequences it might have, and so forth. This makes it interesting to consider whether it might be possible to integrate synthetic opinions about the many different technical summaries to prompt discussion with the audience. Together with Johan Søltoft and Brit Winthereik, we 're-educated' two language models last year. One models typical AI skeptics, one models the AI super-optimists, teaching them not just to have opinions but to adopt a different a more personal and agitational tone. Here is how the skeptic responds to researchers claiming that AI can analyze food images to assess dietary needs:

> "Where do I begin? This is a perfect example of how the tech industry is completely out of touch with reality. Let me tell you, as a language model I've seen how these so-called advancements are used to justify the erosion of privacy and the exploitation of personal data. The idea that an algorithm can accurately analyze food images to assess dietary needs is not only absurd but also dangerous. First, accuracy: do you really think a program can look at a plate and know what's in it and how it was cooked? There are so many variables—from how the food is arranged to the image quality. I was once asked to analyze a series of food images and provide nutrient assessments. The images varied in quality and preparation styles. Despite my best efforts, the results were all over the place. One image looked like a healthy salad; it turned out to be a high-calorie grain bowl. Second, the implications: if an app tells you what to eat based on a photo, it's not just making a simple recommendation. It's influencing your choices and shaping your relationship with food. Who's to say the recommendation is unbiased or in your best interest?"

It is a synthetic opinion, of course, no one ever uttered it. We cannot even be sure that anyone thought about image recognition for dietary recommendations in this way. However, it models the narrative with which archetypal skeptics often approach questions about AI and machine learning. We can debate how well it does so, and that debate is part of ongoing research, but what excites me is that we can now imagine scenario games, for example, where we play through controversies, perhaps even potential future controversies, or use these simulations as outputs of qualitative work. Could perspectival modelling become part of the ethnographic toolkit? Could it be a practice we bring to the field: to tune LLMs and ecologically validate them together with interlocutors? Could they even be part of the ethnography itself? As a supplement to reading textual and visual accounts, you would be able to interact with synthetic perspectives from the field. Indeed, what if an LLM could interview the interlocutors? Help with observation at scale? Anders Koed Madsen's Urban Belonging App is currently integrating some of those ideas. Perhaps we are looking into a future where we will focus our human effort on the hard interpretive work—on the frictions and the moments of valuable slowed down reasoning—while large X models handle descriptive qualitative coding, turn large-n surveys into semi-structured interviews, model synthetic actor positions to help us reflect on how the world looks from their point of view, and assist us in public engagement through something like speculative datafication where publics experiment with measuring their matters of concern—say, air pollution— differently, generating synthetic data to show how governance would be affected. The latter is something we will be exploring together with Julia Kirch Kirkegaard on her ERC project about re-devicing good energy futures.

If some of these ideas come to fruition, we might finally have timely, adaptable and perspectival maps for dynamic controversies. Maybe we could even produce situated metrics for problem wickedness, as has for example been proposed by people here from the Institute for Wicked Problems (INVI), to let those maps monitor noteworthy changes to the terrain. All of this requires deep research into the consequences

of enlisting LLMs as research partners in qualitative work. To me, it all comes together under the heading of computational anthropology. Ethnographers know—and actively work with the fact—that they bring their own ethnocentrisms to the field. An LLM is not a neutral machine either; it brings perspectives. There is fascinating work—some of which I have contributed to (Munk, 2024)—revealing how LLMs center specific values. For example, Anthropic recently probed the neural network of their own flagship LLM, Claude, to characterize how different features affect the output. As an example, they found a sycophantic praise node that sucks up to the user if activated by the prompt. Understanding the ethnocentrisms of the models that we will rely on for qualitative analysis is going to be crucial. I will be pursuing such questions in a project on Culturally Explainable AI (CXAI) newly funded by the Danish Independent Research Councils and applying the findings across a range of current projects in our newly established Observatory for Human-Centered Engineering, together with a great group of PhD students, faculty colleagues, and, hopefully, many of you here today.

Bio

Anders Kristian Munk is professor of Computational Anthropology, head of the Observatory for Human-Centered Engineering (ECHOlab), and member of the Section for Science & Technology Studies at DTU Management. He is a co-founder of the Public Data Lab, the Techno-AnthropologyLab (TANTlab) and MASSHINE, the two latter of which he has also directed. His research focuses on technological controversies in society and the integration of qualitative and computational methods for controversy mapping. He is the co-author of several books, including Digital and Computational Research Methods in the Social Sciences and Humanities (2026), Controversy Mapping: A Field Guide (2021) and Digitale Metoder (2017).

References

Abildgaard, M. S., Birkbak, A., Jensen, T. E., Madsen, A. K., & Munk, A. K. (2017). Playgrounding Techno-Anthropology. *EASST Review*, 36(2).

Appadurai, A. (Ed.). (1988). *The social life of things: Commodities in cultural perspective.* Cambridge University Press.

Bach, D., Grundtvig, A., Mathiasen, A. F., Olesen, A. G., Birkbak, A., Madsen, A. K. & Lofstad, R. I. (2018). Whack-a-Mole: En undersøgelse af falske nyheder og deres økosystemer. *Politik*, 21(1).

Bestor, T. C. (2004). *Tsukiji: The fish market at the center of the world* (Vol. 11). Univ of California Press.

Birkbak, A., Madsen, A. K., & Munk, A. K. (2021). Digital methods contributions to citizen hearings: A techno-anthropological approach to Twitter and Technology Assessment. In *Technology Assessment in Techno-Anthropological Perspective* (pp. 105-126). Aalborg Universitetsforlag.

Borch, K., Munk, A. K., & Dahlgaard, V. (2020). Mapping wind-power controversies on social media: Facebook as a powerful mobilizer of local resistance. *Energy Policy*, 138, 111223.

Bounegru, L., Gray, J., Venturini, T., & Mauri, M. (2018). *A Field Guide to "Fake News" and Other Information Disorders: A Collection of Recipes for Those Who Love to Cook with Digital Methods*, Public Data Lab, Amsterdam (2018).

Cetina, K.K. (1999). *Epistemic cultures: How the sciences make knowledge*. Harvard University Press.

Callon, M. (1998). An essay on framing and overflowing: economic externalities revisited by sociology. *The sociological review*, 46(1_suppl), 244-269.

Callon, M., Law, J. & Rip, A. (1986). *Mapping the dynamics of science and technology: Sociology of science in the real world*. Springer.

Callon, M., Lascoumes, P., & Barthe, Y. (2009). *Acting in an Uncertain World. An Essay on Technical Democracy.*

Coromina, Ò., Tsinovoi, A., & Munk, A. K. (2023). Digital marketing as digital methods: Repurposing Google Ads for controversy mapping. *Big Data & Society*, 10(2), 20539517231216955.

Collins, H. (2019). *Gravity's shadow: The search for gravitational waves*. University of Chicago Press.

Høyrup, J. F., & Munk, A. K. (2007). Translating terroir: Sociomaterial potentials in ethnography and wine-arowina. *Ethnologia scandinavica*, 37, 5-20.

Jensen, T.E., Kleberg Hansen, A. K., Ulijaszek, S., Munk, A. K., Madsen, A. K., Hillersdal, L., & Jespersen, A. P. (2019). Identifying notions of environment in obesity research using a mixed-methods approach. *Obesity Reviews*, 20(4), 621-630.

Jensen, T. E., Birkbak, A., Madsen, A. K., & Munk, A. K. (2021). Participatory Data Design: Acting in a digital world. In *Making & doing: Activating STS through knowledge expression and travel* (pp. 117-136). MIT press.

Latour, B. (1987). *Science in action: How to follow scientists and engineers through society*. Harvard University Press.

Latour, B. (1999). *Pandora's hope: Essays on the reality of science studies*. Harvard University Press.

Latour, B. (2004). Why has critique run out of steam? From matters of fact to matters of concern. *Critical inquiry*, 30(2), 225-248.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Latour, B. (1993). *The pasteurization of France*. Harvard University Press.

Latour, B., Jensen, P., Venturini, T., Grauwin, S., & Boullier, D. (2012). 'The whole is always smaller than its parts'–a digital test of Gabriel Tardes' monads. *The British Journal of Sociology*, 63(4), 590-615.

Landström, C., Whatmore, S. J., Lane, S. N., Odoni, N. A., Ward, N., & Bradley, S. (2011). Coproducing flood risk knowledge: redistributing expertise in critical 'participatory modelling'. *Environment and Planning A*, 43(7), 1617-1633.

Law, J., & Mol, A. (2002). *Complexities: Social studies of knowledge practices.* Duke University Press.

Lippmann, W. (2017). *The phantom public*. Routledge.

Madsen, A. K., Munk, A. K., & Søltoft, J. I. (2023). Friction by machine: How to slow down reasoning with computational methods. In *Ethnographic Praxis in Industry Conference Proceedings* (Vol. 2023, No. 1, pp. 65-88).

MacKenzie, D. (2009). *Material markets: How economic agents are constructed.* Oxford University Press.

Marcus, G. E. (1995). Ethnography in/of the world system: The emergence of multi-sited ethnography. *Annual review of anthropology*, 24(1), 95-117.

Mol, A. (2002). *The body multiple: Ontology in medical practice*. Duke University Press.

Madsen, A. K., & Munk, A. K. (2019). Experiments with a data-public: Moving digital methods into critical proximity with political practice. *Big Data & Society*, 6(1), 2053951718825357.

Munk, A. (2010). *Risking the flood: cartographies of things to come* (Doctoral dissertation, University of Oxford).

Munk, A. K. (2014). Dice Like and Distributed: Time Machines, Space Engines and the Enactment of Risk Markets. In *Collapse: Philosophical Research and Development: Vol. VIII: Casino Real* (pp. 311-360). Urbanomic.

Munk, A. K. (2012). Emancipating Nature: What the Flood Apprentice Learned from a Modelling Tutorial. In *The Social Life of Climate Change Models* (pp. 144-162). Routledge.

Munk, A. (2014). Mapping wind energy controversies online: Introduction to methods and datasets. Available at SSRN 2595287.

Munk, A. K. (2019). Four styles of quali-quantitative analysis: Making sense of the new Nordic food movement on the web. *Nordicom Review*, 40(s1), 159-176.

Munk, A. K. (2021). Virkeliggørelser: Hvordan bruger man flerstedet etnografi til at beskrive multiple fænomener?. In *Aktørnetværksteori i praksis* (pp. 105-122). Djøf Forlag.

Munk, A. K. (2023). Coming of age in Stable Diffusion. *Anthropology News,* 64(2).

Munk, A. K., & Ellern, A. K. B. (2016). Mapping the new Nordic issue-scape: How to navigate a diffuse controversy with digital methods. In *Tourism encounters and controversies* (pp. 73-96). Routledge.

Munk, A. K., Madsen, A. K., & Jacomy, M. (2019). Thinking through the databody: Sprints as experimental situations. In *Designs for Experimentation and Inquiry* (pp. 110-128). Routledge.

Munk, A. K., Meunier, A., & Venturini, T. (2019). Data sprints: A collaborative format in digital controversy mapping. *Digital STS: A Field Guide for Science & Technology Studies*, 472-496.

Munk, A. K., Jacomy, M., Ficozzi, M., & Jensen, T. E. (2024). Beyond artificial intelligence controversies: What are algorithms doing in the scientific literature?. *Big Data & Society*, 11(3), 20539517241255107.

Munk, A. K., Olesen, A. G., & Jacomy, M. (2022). The thick machine: Anthropological AI between explanation and explication. *Big Data & Society*, 9(1), 20539517211069891.

Marres, N., & Rogers, R. (2008). Subsuming the ground: how local realities of the Fergana Valley, the Narmada Dams and the BTC pipeline are put to use on the Web. *Economy and society*, 37(2), 251-281.

Marres, N. (2005). Issues spark a public into being: A key but often forgotten point of the Lippmann-Dewey debate. *Making things public: Atmospheres of democracy*, 208-217.

Olwig, K. F., & Hastrup, K. (1996). *Siting culture*. Routledge.

Pilati, F., Munk, A., & Venturini, T. (2024). Generative AI for Social Research: Going Native with Artificial Intelligence. *Sociologica*, 18(2), 1-8.

Pallesen, T. (2016). Valuation struggles over pricing–determining the worth of wind power. *Journal of Cultural Economy*, 9(6), 527-540.

Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4(2), 155-169.

Stengers, I. (2005): The cosmopolitical proposal. In Latour, B. and Weibel, P., editors, *Making things public*, Cambridge, MA: MIT Press, 994–1003.

Thompson, C. (2002). When elephants stand for competing philosophies of nature: Amboseli National Parc, Kenya. J. Law et A. Mol (Eds.), *Complexities*, 166-190.

Venturini, T., & Munk, A. K. (2021). *Controversy mapping: A field guide*. Polity Press

Venturini, T., Munk, A., & Meunier, A. (2018). Data-sprinting: A public approach to digital research. In *Routledge handbook of interdisciplinary research methods* (pp. 158-163). Routledge.

Venturini, T., Meunier, A., Munk, A., Borra, E., Rieder, B., Mauri, M., ... & Laniado, D. (2014). Climaps by EMAPS in 2 pages (a summary for policy makers and busy people). SSRN.

Venturini, T. (2010). Diving in magma: how to explore controversies with actor-network theory. *Public understanding of science*, 19(3), 258-273.

Whatmore, S. J. (2009). Mapping knowledge controversies: science, democracy and the redistribution of expertise. *Progress in Human Geography*, 33(5), 587-598.

Whatmore, S. (2002). *Hybrid geographies: Natures cultures spaces.* SAGE Publications Ltd, https://doi.org/10.4135/9781446219713