ALGORITHMIC IMAGINARIES.

Visions and values in the shaping of search engines

Rahmenschrift for the habilitation

Dr. Astrid Mager
Institute of Technology Assessment (ITA)
Austrian Academy of Sciences (ÖAW)

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1. Introduction

Search engines have become central actors in providing access to web information. Similar to libraries, having traditionally organized access to knowledge, search engines have become essential gatekeepers to web information in contemporary knowledge societies. Both website providers trying to communicate their content and users trying to filter the mass of information along their needs heavily rely on search engines and their algorithmic logics. Google in particular has become an "obligatory passage point" (Callon 1986, Röhle 2009, Mager 2009) for both actor groups, but also for advertising clients, search engine optimizers, and the digital economy at large that operates with user profiling and targeted advertising. Google, however, not only passively transmits information from content providers to users, but rather actively filters, curates, and ranks websites in its result lists, as has been critiqued from early on.

In 2000, only two years after Google's initial launch, Introna and Nissenbaum (2000) pointed towards information hierarchies already. Brin and Page (1998), the founders of Google, described the PageRank algorithm as a mathematical way of ranking search results since it uses the number and quality of links a website gets as an indicator of the value of that website. In contrast, Introna and Nissenbaum (2000) argued that Google would systematically privilege big, well-connected, often commercial websites at the expense of smaller ones and would therefore undermine the early democratic ideals of the web (Introna and Nissenbaum 2000, see also Hindman et al. 2003, Rieder 2012). Empirical studies followed that reaffirmed these findings (Nettleton et al. 2005, Seale 2005, Mager 2009, Mager 2012a, Eklöf and Mager 2013). This initial search engine critique developed into a more fundamental criticism of gender and race bias in algorithmic systems. The more dominant Google became, and the more websites, data and images it ingested, the greater the biases grew over time, as Noble (2018) illustrated with devastating examples. My own PhD research contributed to this critique by investigating "sociotechnical practices of communicating medical knowledge via the web" (Mager 2010). Having analyzed practices of content providers and users it showed how Google not only impacts the way web information is provided, hierarchized, and distributed in search engine results, but also crucially influences the way users pick up, evaluate, and integrate web information into their own bodies of knowledge. It therefore concluded that search engines like Google, and their complex ranking algorithms, trigger not only information biases, but also fundamental epistemic implications.

Moreover, Google's revenue model based on consumer profiling has been critiqued since the 2000s. Van Couvering (2008) discussed the commercialization of search engines, tracing Google's history from its early roots in academic research at Stanford University towards the introduction of its AdWords and AdSense advertising platforms (see also Ridgway 2023). This lineage has been framed in terms of "informational capitalism" (Fuchs 2010, 2011), "cognitive capitalism" (Pasquinelli 2009) as well as "surveillance capitalism" (Zuboff 2015, 2019). At the heart of this critique is the "service-for-profile" business model (Elmer 2004), where users receive services for free, while paying with their data. User data are translated into user profiles and sold to advertising clients, to put it in a nutshell. Intrusive practices of user profiling have been conceptualized in the field of surveillance studies for some time now (Lyon 1994, 2003, 2007, Pasquinelli 2009, Christl and Spiekermann 2016). More recently, big

tech's means to turn user attention into “assets” through the measurement, governance, and valuation of digital traces and user engagement have been criticized in the tradition of audience commodification and the “attention economy” (Smythe 1977, Fuchs 2012, Birch et al. 2021, Pederson et al. 2021).

Starting from classical search engine critique, this habilitation goes beyond the political economy of search engines by using concepts from Science and Technology Studies (STS) to elaborate how search engines are socially constructed. It shifts the perspective from impacts search engines have on society towards imaginaries, sociotechnical practices, and power relations involved in the construction of search engines in different sociopolitical contexts. In doing so, a particular focus is put on the European context where more and more interventions have taken place over the past years to contain and control big tech companies like Google and their business practices – especially after the so-called “NSA affair”. In 2013, Edward Snowden accused big tech companies such as Google, Facebook, Apple, and others of collaborating with the US National Security Agency (NSA), which pushed corporate surveillance into the spotlight of public debates all over the world (Mager2014a). In the aftermath of the NSA affair, a number of significant court rulings and legislative acts have been passed in the EU. The first important court ruling was “the right to be forgotten case,” which the ECJ passed against Google in 2014. The ECJ forced Google to delete illegal or inappropriate information about a person from the Google index if the person concerned requests it. This judgment has been described as remarkable, since it successfully applied European data protection legislation to a US technology company for the first time. The right to erasure has later been integrated into the EU’s General Data Protection Regulation (GDPR), which is considered an important milestone in the containment of big tech companies; despite growing criticism (Mayer-Schönberger and Padova 2016, Marelli et al. 2020, Prainsack 2020). In 2015, Google was faced with its first antitrust actions when the European Commission accused the company of cheating competitors by privileging its own shopping service in its search results (Lewandowski et al. 2018). Two other cases have resulted in formal charges against the company for privileging the Android operating system as well as Google AdSense. More recently, the EU has adopted a number of legislative acts aimed at controlling big technology companies including the Digital Services Act (DSA) (Regulation (EU), 2022/2065), the Digital Markets Act (DMA) (Regulation (EU), 2022/1925), and the European Data Governance Act (Regulation (EU), 2022/868). A fourth, the Artificial Intelligence Act, is still under negotiation. Against this background, my habilitation understands European policy as an increasingly important arena where hegemonic search engines are shaped, negotiated, and renegotiated. Furthermore, it considers Europe as a place where a number of alternative search engines are growing at the margins of hegemonic search that follow a social cause rather than mere profit maximization.

The central aim of this habilitation is twofold:

Theoretically, it conceptualizes the notion Algorithmic Imaginaries as an analytical tool enabling us to shift the perspective from impacts search engines have on society towards visions, values, and practices involved in the shaping of search engines. More specifically, it allows us to investigate the making and governing of search engines at the nexus of discourse and practice. To theorize Algorithmic Imaginaries, the habilitation draws together and builds upon a bricolage of concepts from STS and Critical New Media Studies useful to grasp how ideologies, imaginaries, and counter-imaginaries co-produce sociotechnical practices of search engine design and governance. Three research projects have been conducted over the past 13 years that provide the groundwork for this theoretical

endeavor. In each of the projects a particular concept has been developed to analyze the shaping of search engines in different geographical, cultural, and sociopolitical contexts, the European context most importantly. These concepts have been derived inductively following a Grounded Theory approach (Glaser and Strauss 1968). The Grounded Theory is a research methodology enabling the researcher to develop a theory "grounded" in empirical fieldwork by cyclically going back and forth between data collection, analysis, and theory-building. Since the in-depth qualitative fieldwork has been conducted over a span of more than 10 years, the cyclical research process has continuously led to a saturation of the overarching theory of Algorithmic Imaginaries.

Empirically, this habilitation investigates Algorithmic Imaginaries in practice by asking how ideologies, social values, and imaginaries form search engines in three different empirical sites: 1) the social construction of hegemonic search engines, 2) European search engine governance, and 3) developments of alternative search engines in Europe. Three central research questions are guiding the overall empirical fieldwork:

1) How does the capitalist ideology get embedded in and intertwined with search engines by way of sociotechnical practices?
2) How do European values shape the governance of search engines and how is a European identity co-produced in governance practices?
3) What counter-imaginaries drive alternative search engines and what notions of Europe are enacted in practices of search engines design?

To answer these questions, I conducted three research projects over the past years all focusing on the making and governing of search engines at the nexus of discourse and practice: 1) The first project investigated how the "new spirit of capitalism" (Boltanski and Chiapello 2007) gets inscribed in hegemonic search engines and how it acts through algorithmic logics. Moreover, it analyzed how corporate dynamics impact the way scientific controversies play out in search engine results compared to classical media. In this project, the notion Algorithmic Ideology has been coined to conceptualize the mutual shaping of search engines and capitalist society. 2) The second project analyzed how European "sociotechnical imaginaries" (Jasanoff and Kim 2009) shape practices of search engine governance and how a European identity is both made and unmade in tough negotiations of the General Data Protection Regulation (GDPR) (Regulation (EU), 2016/679). In this project, the concept Search Engine Imaginary has been developed to theorize how European values are configured and reconfigured in EU policy, Austrian media discourses, and different stakeholder communities. 3) The third project explored visions and values driving alternative search engines in Europe, how they are embedded in technology, and what challenges arise in the European context. In this analysis, a particular focus is put on different notions of Europe that co-emerge with the developers' narratives and practices. After revisiting the notion Algorithmic Ideology to investigate alternative search engines and their ideological underpinnings, the notion Counter-Imaginaries (Kazansky and Milan 2021) has been employed for an in-depth analysis of three European search engines and their developers' attempts to counter-imagine and counter-act hegemonic search with their search engine projects.

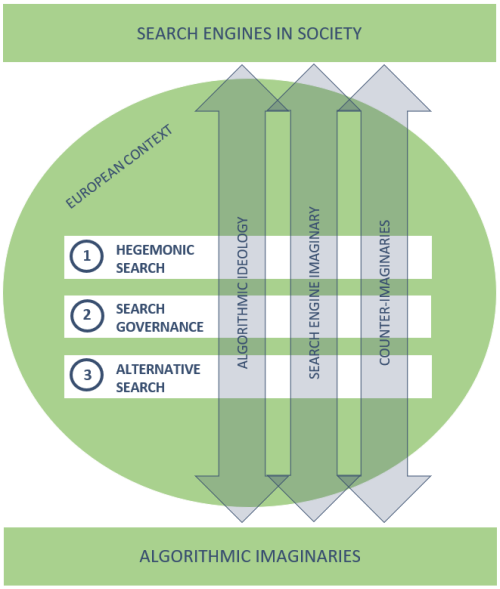
The three notions conceptualizing visions and values in the shaping of search engines from the three different empirical sites and contexts – Algorithmic Ideology, Search engine Imaginary, and Counter-Imaginaries – jointly feed into the overarching theory of Algorithmic Imaginaries. The notion Algorithmic Imaginaries therefore enables us to analyze, theorize, and potentially intervene in the co-production of search engines and society. Only when understanding how search engines are shaped

and negotiated in different cultural and sociopolitical contexts, can we start thinking about renegotiating search engines and their Algorithmic Imaginaries in the future – especially in Europe where values like privacy, independence, and digital sovereignty are strongly pushed in EU policy, but tend to get lost along the way of creating, implementing, and regulating digital technologies, platforms, and infrastructures.

In the following pages, I will first describe the analytical toolbox out of which the three concepts 1) Algorithmic Ideology, 2) Search Engine Imaginary, and 3) Counter-Imaginaries are built and how they contribute to the theory of Algorithmic Imaginaries. I will then draw on eight articles to discuss the three concepts, and their relation to Algorithmic Imaginaries, in detail. To briefly summarize each of the articles I further provide their abstracts and a cue of how the three concepts emerged from the respective research sites and their specificities. In conclusion, I will discuss the contributions of this habilitation to the fields of STS and Critical New Media Studies and what future research directions may be taken.

2. Algorithmic Imaginaries: A Conceptual Toolbox

The three search engine projects that I conducted to investigate and conceptualize Algorithmic Imaginaries draw on different conceptual tools from Science and Technology Studies (STS) and combines them with insights from Critical New Media Studies most importantly, but also from Critical Theory, Internet Governance Research, and European Studies. This analytical bricolage enabled me to account for the specificities of each empirical case study and develop a larger theory of Algorithmic Imaginaries grounded in rich qualitative and multi-sited fieldwork. In the following, I discuss the conceptual groundwork for each of the notions in turn: 1) Algorithmic Ideology, 2) Search Engine Imaginary, and 3) Counter-Imaginaries by following the order of the three research projects that feed them.



The first project, Opening the Black Box of Search Engines, was conducted as part of my postdoctoral fellowship at "HUMlab", a digital humanities lab at Umeå University in Sweden (2010-2012, funded by HUMlab). In this project, I coined the notion Algorithmic Ideology to show how search engines and capitalist society are intertwined and how corporate dynamics impact scientific controversies in search engine results and classical media. Building on this groundwork, the second project, Glocal Search, was conducted at the Institute of Technology Assessment (ITA) at the Austrian Academy of Sciences (2012-2015, funded by the Jubilee Fund of the Austrian National Bank/OeNB). In this project, I developed the notion Search Engine Imaginary to describe how practices of European search engine governance and notions of Europe are co-produced in formal EU policy, in national media discourses, and local stakeholder communities. The third project, Algorithmic Imaginaries, was

hosted by ITA (Austrian Academy of Sciences) and by the Humboldt Institute for Internet and Society (HIIG) during a two-months research stay in Berlin in 2018 (2016-2022, funded by FWF, Elise Richter program). In this project, I revisited and refined both the notions of Algorithmic Ideology and Search Engine Imaginary and brought them in conversation with the notion of Counter-Imaginaries. The concept of "counter-imaginaries" (Kazansky and Milan 2021) helped me to conceptualize how alternative search engine providers counter-imagine and counter-act hegemonic search and come up with alternative imaginaries of both search technology and Europe. Altogether, these conceptual tools enabled me to develop the overarching theory of Algorithmic Imaginaries, as will be discussed next by grouping the eight articles along the three projects and conceptual tools.

ALGORITHMIC IDEOLOGY

1) Mager A (2012) Algorithmic Ideology. How capitalist society shapes search engines, *Information, Communication & Society* 15(5), 769-787, DOI: https://doi.org/10.1080/1369118X.2012.676056

2) Eklöf J and A Mager (2013) Technoscientific Promotion and Biofuel Policy. How the Press and Search Engines Stage the Biofuel Controversy, *Media, Culture & Society* 35(4), 454–471, DOI: https://doi.org/10.1177/0163443713483794

3) Mager A (2014a) Defining Algorithmic Ideology: Using Ideology Critique to Scrutinize Corporate Search Engines, *Triple C. Communication, Capitalism and Critique* 12(1), DOI: https://doi.org/10.31269/triplec.v12i1.439

SEARCH ENGINE IMAGINARY

4) Mager A (2017) Search engine imaginary. Visions and values in the co-production of search technology and Europe, *Social Studies of Science* 47(2), 240–262, DOI: https://doi.org/10.1177/0306312716671433

5) Mager A (2018) Internet governance as joint effort: (Re)ordering search engines at the intersection of global and local cultures, *New Media & Society* 20(10), 3657–3677, DOI: https://doi.org/10.1177/1461444818757204

COUNTER-IMAGINARIES

6) Mager A (2014b) Is small really beautiful? Big search and its alternatives, in: König R and Rasch M (eds) *Society of the Query Reader. Reflections on Web Search*, Amsterdam: Institute of Network Cultures, 59-72, DOI: https://doi.org/10.25969/mediarep/19289

7) Mager A (2023) European Search? How to counter-imagine and counteract hegemonic search with European search engine projects, *Big Data & Society* 10(1), DOI: https://doi.org/10.1177/2053951723116317

8) Mager A (forthcoming) Digital Europe from below. Alternative routes to the Digital Decade, in: Hoyweghen IV, Dratwa J, and Verschraegen G (eds) *Project Europe. Remaking European futures through digital innovation,* Edward Elgar Publishing

Moreover, two editorials of special issues that I co-edited during my habilitation research are listed here because they are discussed in the last section: Contributions of the Habilitation and Outlook.

9) Mager A, Katzenbach C (2021) Future imaginaries in the making and governing of digital technology: Multiple, contested, commodified, *New Media & Society* 23(2): 223–236: DOI: https://doi.org/10.1177/1461444820929321

10) Mager A, Norocel OC, and Rogers R (2023) Advancing search engine studies: The evolution of Google critique and intervention, Big Data & Society 10(1): DOI: https://doi.org/10.1177/20539517231191528

2.1 ALGORITHMIC IDEOLOGY

In the first project, Opening the Black Box of Search Engines, I developed the notion Algorithmic Ideology by bringing together concepts from STS, Critical (New) Media Studies, and Critical Theory. I started out with analyzing how the "new spirit of capitalism" (Boltanski and Chiapello 2007) gets embedded in search algorithms by way of social practices following the long-standing STS tradition of the Social Construction of Technology (SCOT). Together with Jenny Eklöf, I then used concepts from STS and Critical (New) Media Studies to investigate how Algorithmic Ideology, and the sociotechnical practices co-producing it, influence the way scientific controversies are staged in search engine results and how these dynamics overlap with classical media. Finally, I drew upon concepts from Ideology Critique to theorize how Algorithmic Ideology gets stabilized through algorithmic logics, search queries, and result lists, but also how search engines could be renegotiated in moments of struggle. The first three publications summarize these arguments and build the groundwork of Algorithmic Imaginaries by showing how hegemonic search engines, Google in particular, are shaped in capitalist society and how this impacts the way controversial knowledge is presented, crafted, and hierarchized in European contexts like the Swedish one. This section will summarize the notion Algorithmic Ideology and discuss how it feeds into Algorithmic Imaginaries.

2.1.1. The Social Construction of Algorithmic Ideology

The concept Algorithmic Ideology was initially developed ***in Article 1) Algorithmic Ideology***, published in *Information, Communication & Society* (Mager 2012). In this article, I combined insights form the Social Construction of Technology (SCOT) with Boltanski's and Chiapello's (2007) concept of the "new spirit of capitalism" to analyze how the capitalist ideology is practically inscribed in search engines and what actor-networks are at play. In the late 1980s, a number of scholars started to challenge the idea that technology development would follow a simple, linear model explaining a technology's trajectory from production to usage. They demonstrated that "our technologies mirror our societies. They reproduce and embody the complex interplay of professional, technical, economic, and political factors" (Bijker and Law 1992: 3). The most well-known case study showing how societal values are embedded in technologies is the analysis of the social construction of the bicycle. Having traced the historic development of the bicycle, Pinch and Bijker (1987) exemplified how the bicycle was negotiated and constructed in a complex network of actors and their interests. Focusing on the economic context, Carlson (1992) further argued that the failure and success of a technology should be seen in relation to the "frames of meaning" attributed to a technology and how they correspond to socio-economic cultures present at a particular point in time. Edison's invention of motion pictures, for example, failed because Edison's own frame of meaning was deeply anchored in the producer culture of nineteenth-century America, while Edison's movie audience and competitors were part of the twentieth-century consumer culture.

Drawing on this line of work, I elaborated how search engines are negotiated in a network of actors, interests, and practices within contemporary frames of meaning, the capitalist ideology in particular. According to Boltanski and Chiapello (2007: 3), ideology is "a set of shared beliefs, inscribed in institutions, bound up with actions, and hence anchored in reality". This definition enables us to go beyond the concept of ideology as a moralizing discourse and argue that ideology is intertwined with and embedded in actual practices. The new capitalist spirit has managed to incorporate the "artistic critique" raised by the generation of 1968 and the emerging left according to Boltanski and Chiapello (2007). The artistic critique framed industrial capitalism as hierarchical, dehumanizing and restricting the individual's freedom, authenticity, autonomy, mobility and creativity (compared to the "social critique" focusing on inequality and class differences). The integration of values like self-management and flexibility in the workplace helped the new spirit of capitalism to endure. Google's success, for example, is built on flat hierarchies, a flexible work force and a global scale, illustrating central characteristics of the new form of capitalism. Google, however, also well corresponds to the new mode of exploitation that rose with the new spirit of capitalism: "*A form of exploitation that develops in a connexionist world* – that is to say, a world where the realization of profit occurs through organizing economic operations in networks" (Boltanksi and Chiapello 2007: 355; italics in original). Rather than taking over classical business models based on audiences (such as portals that collapsed during the dot-com crash), Google followed a new business model based on the "traffic commodity" (Van Couvering 2008). Contrary to Edison, who failed to understand the economy of the day when developing motion pictures, Google succeeded with aligning its technology with a business model that perfectly fits the "connexionist world" and its "global informational network capitalism" (Fuchs 2010a): "Google thinks in distributed ways" according to Jarvis (2009).

Building on concepts from the Social Construction of Technology (SCOT) and the "new spirit of capitalism" (Boltanski and Chiapello 2007) enabled me to empirically investigate how hegemonic search engines, and their capitalist ideology, are stabilized in social practices. Focusing on "relevant social groups" (Pinch and Bijker 1987) and their interests involved in the construction of search technology allowed me to analyze how Algorithmic Ideology is embedded in and stabilized through sociotechnical practices, as discussed in detail in Mager (2012).

2.1.2. How Algorithmic Ideology Co-Produces Scientific Controversies

Building on this groundwork, I used concepts from Critical (New) Media Studies ***in Article 2) Technoscientific Promotion and Biofuel Policy***, published in *Media, Culture & Society,* together with Jenny Eklöf (Eklöf and Mager 2013). In this article, we investigated how Algorithmic Ideology impacts the way scientific controversies figure in search engine results and how strategies of "technoscientific promotion" overlap with classical media and their corporate foundation. To explore how Algorithmic Ideology co-produce scientific controversies we chose the Swedish biofuel controversy as a case study. Conceptually, we drew on STS research having investigated the blurring boundaries between industry, academia, and government in the context of science communication – considered as "new mode of knowledge production" (Gibbons 1994, Nowotny et al. 2001): "The transition from "mode 1" to "mode 2" in the terminology of Gibbons (1994) involves, among other things, that knowledge production is taking place in the "context of application", as we argued (Eklöf and Mager 2012). We further drew on Critical Media Studies conceptualizing mass media as actively shaping the very conditions under which controversies play out in the public domain. These conditions have to do with the economic interests of media corporations as well as journalistic framing practices, such as what is considered newsworthy (Allan, 2010). Herman and Chomsky (2002) introduced the concept of the "propaganda model" to

exemplify how commercial interests and business models influence the content mass media produce since corporate media have to satisfy not only their audiences, but also their advertising clients. Furthermore, the emergence of public relations has been described as tightly connected to the needs of capitalist democracies (Davis 2000, Herman and Chomsky 2002). Public relation strategies –pushing forward both industrial and governmental interests – have been criticized as constructing "hegemonic discourses" about scientific issues, such as genetic engineering, and undermining public debate (Weaver and Motion 2002: 337). Press releases, in particular, function as highly effective strategies to influence news coverage on science-related controversies from the outside and increase the media presence of public and private institutions. A successful press release mimics journalism in style and content, shortens the time and effort needed to produce news, and maximizes the chances to catch a journalist's attention.

Similarly, search engines, Google first and foremost, have become important sites of struggle in the attention economy, as we further discussed. While Brin and Page (1998), the founders of Google, initially described the PageRank algorithm as a mathematical way of ranking search results, criticism rose quickly framing search engines as systematically privilege major, well-connected websites at the expense of smaller ones, often those providing counter-cultural viewpoints, as argued earlier (Introna and Nissenbaum 2000). Accordingly, website providers have started to use search engine optimization (SEO) techniques to gain a better position in search results. Furthermore, advertising-based business models such as the "service-for-profile" model (Elmer 2004) contribute to commercialization tendencies of web information. We therefore framed search engines as having incorporated the capitalist ideology in a way mass media had 100 years ago.

Following this body of work, we empirically investigated how the Swedish biofuel controversy played out in search engine results and classical media. In this analysis, we focused on actors and institutions, visibility strategies such as hyperlinking, SEO techniques, advertising, and press releases, and the way strategies of "technoscientific promotion" – a style of communication that hybrid actors use to succeed in the day-to-day struggle for media attention – shaped the controversy in both media arenas, as discussed in detail in Eklöf and Mager (2013).

2.1.3. Defining Algorithmic Ideology with Ideology Critique

In Article 3) Defining Algorithmic Ideology, published in *Triple C. Communication, Capitalism and Critique*, I used concepts from Ideology Critique to conceptualize how Algorithmic Ideology works through algorithmic logics, search queries, and engine results and how power relations could be renegotiated and changed in moments of struggle (Mager 2014a). Althusser's (1971) notion of ideology as a matter of lived relations, for example, helps us to conceptualize how individual users relate to "transnational informational capitalism" (Fuchs 2011a) as a whole and how the capitalist ideology spreads through search algorithms (see also Eagleton 1991). Google uses websites and links provided by content creators to index the web and rank its search results. It further employs user data to improve its algorithm and, more importantly, to adapt sponsored links to users' preferences and needs. In Marxist terms Google uses both content providers' and users' practices to create surplus value, as has been argued (Pasquinelli 2009, Fuchs 2011a, 2011b). Algorithmic logics, code, external content, link structures, user data, clicking behavior, user-targeted advertising, financial transactions all act together and take effect in a single Google search. Capitalist modes of production are enmeshed with technical features and individual practices. The ideological superstructure and the economic base meet with and feed each other in every singly Google query. Similar to sustaining racist ideology by

sitting on a park bench marked “Whites Only”, conducting a Google search may hence be seen as sustaining capitalist ideology; whether consciously or not. The ideology is in the search engine and acts through algorithmic logics and computational systems. Search engines like Google may hence be seen as perpetuating the capitalist ideology through their supposedly neutral search algorithms, as I argued (Mager 2014a).

To better understand how content providers and users are steeped into Google’s capital accumulation cycle and why they play by the rules I turned to Gramsci’s (2012) notion of hegemony. Google has become an “obligatory passage point” providers and users have to pass to reach their own goals (Callon 1986, Röhle 2009, Mager 2009), as argued above. Also, services like Google AdWords and Google AdSense would not work if people would not advertise with or click on Google ads. This dynamic exemplifies Gramsci’s central moment in winning hegemony over hegemonized groups, the moment “in which one becomes aware that one’s own corporate interests […] become the interests of other subordinate groups” (Gramsci 2012: 181). It is the moment where “prosumers” start playing by the rules of transnational informational capitalism because Google (and other IT companies) serve their own purposes; a supposedly win-win situation is established. Prosumers are “steeped into” the ruling ideology to speak with Althusser (1971). Gramsci’s concept of hegemony, however, further enables us to identify moments of struggle that open up the view for counter-activity and alternative futures. Röhle (2009) described Google’s strategy of convincing website providers and users to play by the rules as a clever system of “punishments and rewards”. This shows how Google makes both website providers and users play by the rules, but it also exemplifies that Google’s hegemony should not be seen as fixed or stabilized, but rather as constantly negotiated and made. “As a concept, then, hegemony is inseparable from overtones of struggle” (Eagleton 1991: 115). This struggle has the potential to challenge powerful actors like Google and their Algorithmic Ideology. If content providers and users broke out of the network dynamic, the power of Google and its whole business model would fall apart. If the media would feature more critical stories about Google’s data collecting practices, privacy violations and possible collaborations with secret services dissatisfaction and protest would significantly grow in the public domain; as we have seen after Snowden’s revelations. If politics and law took on a stronger role in the regulation of search technology, limits would be set regarding the collection and use of personal data, but also business practices and advertising schemes, as the third article concludes (Mager 2014a).

To sum up, the notion Algorithmic Ideology enables us to shift the focus of attention from impacts search engines have on society towards sociotechnical practices and power dynamics involved in the construction of search engines. It further allows us to understand that search technology, as every other technology, could be otherwise. It could be renegotiated and changed, especially in moments of struggle. Edward Snowden’s revelations of tight entanglements of big tech and governments could be interpreted as such as moment of struggle. It was the moment in time when a European Algorithmic Imaginary started to take shape, but also got challenged due to European multiculturalism and diversity, as my second research project has shown.

2.2. SEARCH ENGINE IMAGINARY

In the research project Glocal Search I coined the notion Search Engine Imaginary to investigate how European search engine politics and a European identity are co-produced in the context of negotiations

of the EU's General Data Protection Regulation (GDPR) (Regulation (EU), 2016/679). In this project, I used the notion "sociotechnical imaginaries" (Jasanoff and Kim 2009) to analyze how European values are constructed and deconstructed in formal EU policy and national media discourses. I further showed how different imaginaries of search engine governance are shaped not only in specific cultural contexts but also within particular stakeholder groups and their situated knowledges. To conclude, I argued that joint efforts are needed to challenge powerful search engines and their governing abilities cutting through different societal arenas and areas of expertise.

2.2.1. Search Engine Imaginary in EU Governance Practices

In Article 4) Search Engine Imaginary, published in *Social Studies of Science*, I used the concept "sociotechnical imaginaries" (Jasanoff and Kim 2009) to analyze and conceptualize the notion European Search Engine Imaginary (Mager 2017). The concept of sociotechnical imaginaries is rooted in research on the co-production of technoscientific developments and society (Latour, 1992; Marcus, 1995, Jasanoff, 2004, 2005). Jasanoff and Kim (2009: 120) initially defined sociotechnical imaginaries as "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects". Drawing on a growing recognition that the capacity to imagine future is a crucial constitutive element in social and political life (Jasanoff and Kim 2009: 123), they compared imaginaries to discourses, metaphors and cultural meanings out of which actors build their policy preferences. Accordingly, sociotechnical imaginaries not only include tightly bound belief systems, ideologies in a narrow sense, but also policy imaginations containing implicit understandings of what is good or desirable in the social world. In comparison to policy agendas, they were characterized as less explicit, less goal-directed and less politically accountable. The notion "sociotechnical imaginaries" (Jasanoff and Kim 2009) thus serves the purpose of investigating how search engines are imagined in the EU policy context, but also how they are negotiated and shaped in the larger "European technological zone" (Barry, 2001). Barry (2001) argues that the European technological zone is not only made up of classical political institutions and the actions of political parties, interests, networks and lobbies, but also of the political agency of scientific and technical materials. Thus "technical controversies are *forms* of political controversy" (Barry, 2001: 9, italics in original). There is no doubt that classical political actors and bureaucratic processes are a central component of the harmonization of the European Union: "Brussels is above all, for its critics, a bureaucracy" (Barry, 2001: 65). Barry, however, further argues that if we want to understand the cultural policy of the European Union we should not only be looking at culture in a classical sense, but also examining the material culture, the politics of regulation and technology. Following this line of thought, the fourth article (Mager 2017) analyzed the tough negotiations over the EU's General Data Protection Regulation (GDPR) as a political issue drawing together political institutions, technical standards, modes of private ordering, lobby interests, social norms and civil society. The overarching question is how a European identity is imagined in this technopolitical controversy. According to Jasanoff and Kim (2009: 124) political territories like states or nations should not be seen as fixed or immutable either, but rather as "reimagined, or re-performed, in the projection, production, implementation, and uptake of sociotechnical imaginaries". This particularly applies to the political construct of Europe, as Jasanoff (2005: 10) argued in the context of biotechnology:

"Europe in particular is a multiply imagined community in the minds of the many actors who are struggling to institutionalize their particular versions of Europe, and how far national specificities should become submerged in a single European nationhood – economically, politically, ethically – remains far from settled."

Along these lines, I used the concept of "sociotechnical imaginaries" to understand how "Europe itself is *in practice* being allowed to unfold" (Waterton 2002: 198; italics in original). To trace how the European Search Engine Imaginary is translated into national contexts, I analyzed Austrian media discourses related to the EU data protection reform. Each European country has its own technopolitical history that plays into the perception and construction of technoscientific developments. A number of scholars described Austria as following a restrained technology policy (Felt 2015, Felt et al. 2008, Müller and Witjes 2014, Torgersen 2002). Torgersen (2002) argued that Austrians should not be seen as technology-averse in general, but rather as abhorring certain large-scale technological systems that carry menacing images, most importantly nuclear power and agricultural biotechnology. Felt (2015) coins Austria's restrained technology policy as "keeping (certain) technologies out". Austria's strong opposition to nuclear power plants and its rejection of genetically modified food crops serve as important frames of reference when nanotechnology is discussed in Austria. One central component of the Austrian "repertoire of sociotechnical resistance" (Felt, 2015: 6) is the picturing of Austria fighting against mighty economic actors. This imaginary was originally shaped in the context of genetically modified foods that are represented as profiting big, industrial players and threatening local culture (Felt 2015, Torgersen 2002). Felt (2015: 121) concludes that resisting a technological innovation also means resisting a certain mode of politics: "Imposed from outside rather than developed from within, driven by lobbies rather than by the ideal of the public good, imposed from above rather than developed from below, artificial rather than natural."

These concepts allowed me to analyze how a European Search Engine Imaginary is forming in the EU policy domain conceptualizing fundamental rights as core European values, but also in national media debates, where strong images and metaphors are used to solidify a European identity. They further enabled me to explore how national particularities also contribute to the unmaking of a European identity, when it comes to the translation of the European vision into actual text of the GDPR. Europe is in this context no longer shaped as a coherent whole, but rather as a "multiply imagined community" (Jasanoff 2005) rooted in different historical, cultural, political, and economic traditions, as discussed in detail in Mager (2017).

2.2.2. Search Engine Imaginaries in Stakeholder Communities

In Article 5) Internet Governance as Joint Effort, published in *New Media & Society*, I elaborated how "sociotechnical imaginaries" (Jasanoff and Kim 2009) of search engines are shaped not only in specific cultural and sociopolitical contexts, but also within particular stakeholder communities and their respective experiences and expertise (Mager 2018). Conceptually, this article draws on STS-inspired Internet Governance (IG) literature in the context of search engines, the notion of internet governance as "private ordering" most importantly (Katzenbach 2013). The term IG has been constructed and deconstructed multiple times in recent years. Van Eeten and Mueller (2012) argue that the field labeling itself as IG research only captures a narrow field of study, primarily focusing on transnational institutions like the "Internet Governance Forum" (IGF) or the "Internet Corporation for Assigned Names and Numbers" (ICANN). The authors thus concluded that "There is a remarkable absence of governance in what is commonly called Internet governance" (Van Eeten and Mueller, 2012: 728). To broaden this narrow concept of IG, STS scholars suggested investigating IG in practice. Rather than providing yet another IG definition, they proposed to investigate how IG figures in Internet architecture, sociotechnical practices, and private modes of ordering (DeNardis 2009, 2014, Ziewitz and Pentzold 2014, Musiani 2015; Ziewitz 2016). DeNardis (2009, 2014) has analyzed technical infrastructures as arrangements of power and politics, negotiations over Internet architecture as

conflicts of norms, values, and rights, and IG as increasingly privatized endeavor enacted by corporations and nongovernmental bodies. Katzenbach (2013) argued that technological devices and Internet services should not be seen as external triggers for regulation but as parts of the heterogeneous networks that constitute the social, just like norms or power. He used the notion of "private ordering" to capture how mechanisms of private law, including contracts, licenses, and end-user agreements, increasingly complement, and even undermine, traditional mechanisms of public law, especially concerning copyright and privacy issues (Katzenbach 2013: 402). Compared to governance, the notion of "ordering" focuses on practices and procedures rather than formalized institutions and regulations, which makes it a useful tool for STS-oriented IG research. Ziewitz and Pentzold (2014) referred to Law's (1994) concept of ordering to analyze how IG is enacted and performed in different contexts. They multiplied the notion of IG by showing that different versions of reality relate to different "modes of ordering" (Ziewitz and Pentzold 2014: 2008). Discussing five versions of the "Twitter Joke Trial," an Internet-related conflict in Great Britain, they showed how different readings of the "Twitter Joke Trial" invoke different solutions to the problem. This example illustrates the interdependence of different versions of reality and visions of governance, an aspect I further explored in my analysis. Hofmann et al. (2017) suggested grounding IG in mundane practices of coordination. They explain that "grounding governance in coordination means studying ordering processes from the bottom-up rather than proceeding from regulatory structures" (Hofmann et al., 2017: 8). The authors argued that mundane activities of coordination become reflexive when ordinary interactions break down and become problematic. Drawing on Boltanski and Thévenot (2006), they called such moments "critical moments", which resemble the "moments of struggle" discussed in the first project. In critical moments, they argued, actors begin to redefine the situation in question since routines are challenged, contested, and displaced through acts of articulation and justification. The authors concluded that "'critical moments' open temporary windows to the precarious conditions underpinning social coordination, which, more often than not, may be in need of adaption" (Hofmann et al. 2017: 14) – such as Edward Snowden's intelligence leaks, as I argued earlier.

Drawing on Critical New Media Studies, I further conceptualized different modes of governing performed by globally operating search engines like Google. First, search engines have been discussed in terms of their central role in ordering web information (Introna and Nissenbaum 2000). Since Google constitutes a powerful source of access in wide parts of the world, the "inherently political qualities" (Musiani 2013a: 5) of Google are particularly discussed. In reference to Wu (2010), Musiani (2013b: 4) argues that Google, "as the 'master switch' of the internet (Wu 2010: 279–280), centralises and organises the circulation of information in the network of networks, and for every search interrogation and request, arbitrates on what's important and relevant." Second, corporate search engines have been described as governing by shaping users' behavior. Badouard et al. (2016: 3ff) elaborate how Google governs by "directing" users' behavior. Drawing on Foucault's (1982) notion of governmentality and discussing Google's Webmaster Tools, the authors explain how Google directs publishers' actions by installing an incentive-oriented governmentality regime and making publishers play by the rules, see above. Moreover, they argue that designing a website, content management system, or social network can be interpreted as an act of making users adopt a certain behavior, while developing a mobile operating system (e.g. Google's Android) can be seen as an act of framing what can and cannot be done with a mobile phone. Finally, private modes of ordering performed by corporate search engines like Google have been discussed (DeNardis 2009, 2014, Katzenbach 2013). Belli and Venturini (2016) argue that contractual agreements like terms of service can be directly implemented through technical means like algorithms, online platforms, or Internet traffic management techniques. These

agreements may be considered as a kind of private law-making system, because the substantive provisions set in the agreements—which may apply transnationally—regulate the relationships between the parties with a binding force that may be analogue to or even stronger than the one exercised by law. (Shapiro, 1993, quoted in Belli and Venturini, 2016: 2) Given the great number and variety of Google services, its power to govern by private ordering has been discussed in regard to commodification, privacy, and surveillance (Fuchs, 2011). In reference to Hardt and Negri (2000), Google was described as having established a "technological empire" (Pasquinelli, 2009: 158), for example.

Building on this research, I analyzed IG in practice. Having investigated the narratives of four distinct actor groups—policy-makers, legal experts, civil society, and IT professionals—I analyzed how different perceptions of Google's "governing by algorithms" were coupled with different suggestions regarding the "governing of algorithms" (Musiani 2013b, Saurwein et al. 2015). This analysis shows that the sociotechnical imaginaries of search engines are not only shaped in specific cultural contexts (Mager 2017), but also within particular "communities of practice" (Wenger 1998) and their respective experiences and expertise. It further shows where limits of the various governing modes lie and how to overcome them through joint efforts, as discussed in detail in Mager (2018).

To sum up, the notion Search Engine Imaginary enables us to trace and conceptualize how European Algorithmic Imaginaries take shape in EU policy discourses, how national technopolitical identities contribute to the making and unmaking of Europe, and how larger European imaginaries trickle into, transform, and multiply in different stakeholder communities. It further shows how a European identity is both constructed and deconstructed in governance practices and what conclusions could be drawn in terms of renegotiating search engines through rules and regulations. Building on the notions of both corporate Algorithmic Ideology and European Search Engine Imaginary, the last project focused on emerging Counter-Imaginaries in the context of alternative search engine projects based in Europe.

2.3. COUNTER-IMAGINARIES

Finally, in the most recent project titled Algorithmic Imaginaries, I focused on visions and values driving alternative search engines from Europe, how they are embedded in search technology, and what challenges arise in the particular European context. To start with, I revisited work from my first project in which I used the notion Algorithmic Ideology to lay the groundwork of mapping the landscape of alternative search engines and to outline the spectrum of alternative Algorithmic Ideologies driving them. Zooming into three particular search engines based in Europe, I employed the notion Counter-Imaginaries (Kazansky and Milan 2021) to provide an in-depths analysis of the three search engines and how their developers aim at counter-imagining and counter-acting hegemonic search with their search projects. Finally, I deepened this analysis by focusing on the way search engine providers anchor their counter-imaginaries in larger European search engine imaginaries, but also how they come up with alternative notions of Europe co-produced with their developer practices. Two book chapters and one article contribute to the understanding of Algorithmic Counter-Imaginaries, as I discuss in the following.

2.3.1. Alternative Algorithmic Ideologies

In Article 6) Is Small Really Beautiful?, a book chapter published in the *Society of the Query Reader*, I employed the notion Algorithmic Ideology to pluralize the ideologies driving search engines and the

scholarly understanding of these alternative ideologies (Mager 2014b). Starting from the concept of "ideology in practice" (Boltanski and Chiapello 2007, Mager 2012), I argued that not all search engines are driven by "the new spirit of capitalism" (Boltanski and Chiapello 2007), but that alternative search engines also commit to social values instead of mere profit maximization. To map the landscape of alternative search engines, I focused on search engines that claim to have a particular ideological agenda that clearly distinguishes them from big, corporate search tools. There are a number of so-called alternative search engines that are not as big as Google, Bing, or Yahoo! and that lead their lives at the margins of the search engine market. Of course, Bing could be conceptualized as an alternative to Google too in terms of its index and algorithm. However, Bing may also be considered yet another for-profit search engine that is no true alternative from an ideological viewpoint. Accordingly, all search engines included in this analysis explicitly devoted themselves to a particular ideological framework. Four ideological categories were chosen for the analysis of alternative search engines: Privacy-friendly search engines like StartPage or DuckDuckGo, "green" search engines like Ecosia, peer-to-peer search engines like YaCy, and "knowledge engines", Wolfram|Alpha in particular. Further, all of them were general-purpose search engines with no particular topical focus, even though Wolfram|Alpha is specialized in answering factual questions rather than cultural, social scientific, or commercial ones.

Following the notion of Algorithmic Ideology (Mager 2012, 2014), the book chapter analyzed what norms, values, and ideologies are driving alternative search engines and how they figure in their actual practices. This analysis showed that when considering alternative search projects in the limelight of ideology, we can see that the capitalist spirit is by far not the only ideology shaping contemporary search engines. Quite on the contrary, there are multiple algorithmic ideologies at work. There are search engines that carry democratic values, those that incorporate the green ideology, some that believe in the commons, and others that subject themselves to the scientific paradigm. This means that we can set an ideological example by choosing one search engine over the other. In daily practice, however, the capitalist ideology appears to be hegemonic since not all ideologies are equal in terms of exercising their power. The majority of users turns to big search engines and hence solidifies the capitalist spirit more than any other ideology. Moreover, most alternative search engines are subordinate to "informational capitalism" (Fuchs 2010, 2011) due to entering alliances with big search engines by using their search results and advertising networks. Their ideological agendas are not deeply embedded in technical layers and algorithmic logics because both the index and the algorithms they use are borrowed from other search engines. This indicates that opting out of big search and its capitalist underpinnings is not as easy as it may seem at first sight. Everyone is free to choose alternatives, but selecting a true alternative, both in terms of technology and ideology, would require not only awareness and a certain amount of technical know-how, but also effort and patience. Building on this analysis of alternative search engines and their ideological roots, I selected three alternative search engines from Europe for a closer analysis.

2.3.2. Algorithmic Counter-Imaginaries

In Article 7) European Search, published in *Big Data & Society*, I used the notion Counter-Imaginaries to capture and conceptualize visions and values driving alternative search engines from Europe, how they are translated into search technologies, and what challenges arise in the specific European context (Mager 2023). Given the hegemonic position of big tech companies in imagining and shaping digital technologies, "sociotechnical imaginaries" (Jasanoff and Kim 2009) have been described as

increasingly commodified, but also as multiple and contested at the same time (Mager and Katzenbach, 2021). Accordingly, a growing body of research has started to investigate the role imaginaries play in citizen engagement with datafication and data infrastructures (Mansell 2012, Milan and ten Oever 2016, Lehtiniemi and Ruckenstein 2019). Lehtiniemi and Ruckenstein (2019: 3) have used the concept of "alternative social imaginaries" to investigate a data activism initiative aiming to shape a more sustainable citizen-centric data economy. Kazansky and Milan (2021) have introduced the notion "counter-imaginaries" to capture counter-cultural voices and practices of technology development that aim at social change. "These counter-imaginaries make apparent how civil society seeks to respond to the ever-complex technological change and the risks it conceals" (Kazansky and Milan 2021: 366). Like dominant imaginaries, they not only enable us to understand how civil society counter-imagines digital futures, but also to observe practitioners in action as they try to shape their technological present and future (Kazansky and Milan 2021: 366). In the words of Hilgartner (2015), alternative search engine developers may be seen as an "avant-garde" that aims to drive a wave of change. In his research on "sociotechnical vanguards," the author defines them as "relatively small collectives that formulate and act intentionally to realize particular sociotechnical visions of the future that have yet to be accepted by wider collectives, such as the nation" (Hilgartner 2015: 36). The notion of Counter-Imaginaries is thus well suited to investigating not only how search engine developers counter-imagine hegemonic search, but also how they try to build their search technologies and infrastructures accordingly, as discussed in detail in Mager (2023).

In this article, I further elaborated what strategies developers of alternative search engines follow to grow their projects beyond their own "communities of practice" (Wenger, 1998) and how Counter-Imaginaries can be anchored in larger European imaginaries. The issue of scaling was an important one for all three projects, in very different ways though. Their perceptions of scaling also fundamentally differed from the common understanding of scaling that is strongly shaped by big tech companies and their CEOs. Research on the politics of scaling conceptualizes figures like Mark Zuckerberg, PayPal founder and venture capitalist Peter Thiel, and Tesla CEO Elon Musk as "obsessed" with scaling, while framing it as an indispensable part of contemporary innovation discourses and social, political, and economic life at large (Pfotenhauer et al. 2022: 4). Against this background, Tsing (2012) argues for a nonscalability theory that pays attention to the "mounting pile of ruins that scalability leaves behind" (Tsing 2012: 506). Not because nonscalability is necessarily better, but because it opens up the view on "diversity-in-the-making." Nonscalability hence enables us to analyze how diversity, local specificities, and moral values—the "situatedness" of my case studies—contribute to developer practices. The term "situatedness," which has a long tradition in STS (Haraway 1988; see also Butler 1990, Thompson 2001), allows for considering differences in social, cultural, political, economic, and institutional positionality, but also for a "normative critique of hegemonic power structures and colonial tendencies that threaten to erase epistemic and political diversity" (Pfotenhauer et al. 2022: 6).

Despite crucial differences, all three search engines chosen in my research situated themselves in the larger European context whereby constructing different notions of Europe tightly intertwined with their practices and experiences, as I analyzed in detail (Mager 2023). This analysis shows that alternative search providers collectively build out counter-imaginaries to hegemonic search that are devoted to privacy, independence, and openness. Moreover, European values, and broader notions of Europe, turned out to be context-dependent and co-produced with sociotechnical developer practices and search infrastructures. This corresponds to research having shown how European values are

differently constructed and co-produced with data practices, governance of digital technology, and large-scale research infrastructures (Ruppert and Scheel 2021, Mager 2017, Mahfoud 2021, Mobach and Felt 2022). All this research complicates clear-cut notions of Europe by showing how "Europeanness" (Mobach and Felt 2022) is co-produced with practices of shaping digital technologies and infrastructures.

2.3.3. Counter-Imaginaries Co-Producing Notions of Europe

In Article 8) Digital Europe From Below, a book chapter soon to be published in the book *Project Europe*, I extended this research by combining STS literature with European Studies to zoom into different notions of Europe the three search engine providers enacted and co-produced with their developer practices, the divergent notions of Europe as "unified or pluralistic" (Mahfoud 2021) most importantly (Mager forthcoming). In this contribution, I drew on the growing body of work investigating "sociotechnical imaginaries" (Jasanoff and Kim 2009) in the European policy context, often by comparing it to the US-American and Chinese context (Mager 2017, Guay and Birch 2022, Aho and Duffield 2022, Krarup and Horst 2023). More specifically, I used research pointing us towards the fragility and multiplicity of European imaginaries relevant for my study. Having analyzed EU policy discourses on Artificial Intelligence (AI), Ulnicane (2021) identified a crucial tension running through EU policy that she captured with the notions of Normative Power Europe and Market Power Europe. More specifically, the author referred to competing narratives between the "human-centred approach" towards digital innovations and the rhetoric of the EU's economic interests widely captured with the notion of the Digital Single Market. Ulnicane (2021) concluded that the EU strongly emphasizes Normative Power Europe, while at the same time repeating its competition discourse inherent in Market Power Europe. In the context of European infrastructure projects, yet another long-standing tension within Europe has been observed: the tension between a unified and pluralized Europe. The European Organization for Nuclear Research (CERN), one of the oldest and largest European research infrastructure projects has not only been praised for its scientific success, but also as "manifest evidence of European unity" (Mobach and Felt 2022). Similar ambitions were expressed with the launch of the European Human Brain Project (HBP): "The EC's vision for the flagships brought up quite a few European techno-scientific tropes – competition with the United States, and the role of science and technology in unifying Europe" (Mahfoud 2021: 331). European attempts to build digital technologies and infrastructures with flagship initiatives were accompanied by big announcements of a similar kind. The recent initiative GAIA-X, a project to build a European cloud ecosystem, was framed as "Europe's moon shot", but also in terms of a geopolitical fight for "European sovereignty" in the IT sector (Baur 2023).

In the context of search engines, the notion of European sovereignty was mobilized when announcing Quaero in 2005, which was promoted as an attempt to build a European search engine. Quaero was presented as a joint German/French search engine project meant "to rival Google and Yahoo", which were interpreted as a "threat of Anglo-Saxon cultural imperialism" at the time[1] (see also Lewandowski 2014). The aim of strengthening Europe's sovereignty by developing its own search engine failed, however, due to "misguided and unnecessary nationalism", as critics put it bluntly.[2] This rhetoric evokes a tension between attempts to unify Europe through digital means and the notion of a

[1] https://www.telegraph.co.uk/finance/2921407/Chirac-backs-eurocentric-search-engine.html (accessed January 2023)

[2] https://en.wikipedia.org/wiki/Quaero (accessed January 2023)

pluralized Europe standing in the way of coordinated digitalization efforts. Tensions between a unified and pluralized Europe were also identified in regard to large-scale infrastructure projects such as the European Human Brain Project (Mahfoud 2021). In the course of building this large research infrastructure, tensions between the EC's singular, top-down vision of doing "big science in a European way" and the need to represent the diversity and plurality of neuroscientific efforts in different European countries and research communities were expressed. Mahfoud (2021: 338) therefore concluded: "And through these narratives, Europe itself is posited as a problem – the tension between unification and pluralism serving as both metaphor and backdrop to contestations over how scientific communities should be bringing data together in European 'big science' projects". This corresponds to Mobach and Felt's (2022) analysis of 60 years of CERNs narratives of organizational identity, which showed how different notions of "Europeanness" were enacted and co-produced with the building of such large-scale research infrastructure over time – relating to European values such as unity, cohesion, collaboration, and geography. Investigating counter-imaginaries (Kazansky and Milan 2021) and their role in shaping both alternative search engines and different notions of Europe, this book chapter deepened the analysis of alternative notions of Europe that are co-produced with sociotechnical developer practices.

To sum up, the notion of Counter-Imaginaries allows us to understand not only the visions, values, and ideologies driving alternative search engines, but also how different notions of Europe are co-produced with sociotechnical developer practices. It contributes to research having shown that European technology politics and infrastructure projects not only contribute to the making of Europe, but also to the unmaking of Europe due to the crucial differences at stake. Moreover, it shows how Algorithmic Imaginaries take shape in particular "communities of practice" (Wenger 1998) and their respective experiences and expertise (Mager 2018, Barker 2015, Lehtiniemi and Ruckenstein 2019). Together with the conceptual tools of Algorithmic Ideology and Search Engine Imaginary the notion Counter-Imaginaries feeds into the overarching theory of Algorithmic Imaginaries enabling us to understand how search technology and society co-emerge in different sociopolitical contexts, the European context most importantly.

3. Summaries of articles

In this section, I collected the abstracts of the articles to give a very brief overview of their individual foci and how they contribute to the conceptual work that I have discussed above.

ALGORITHMIC IDEOLOGY

1) **Mager A (2012) Algorithmic Ideology. How capitalist society shapes search engines, *Information, Communication & Society* 15(5), 769-787.**

Abstract: This article investigates how the new spirit of capitalism gets inscribed in the fabric of search algorithms by way of social practices. Drawing on the tradition of the social construction of technology (SCOT) and 17 qualitative expert interviews it discusses how search engines and their revenue models are negotiated and stabilized in a network of actors and interests, website providers and users first and foremost. It further shows how corporate search engines and their capitalist ideology are solidified in a socio-political context characterized by a techno-euphoric climate of innovation and a politics of

privatization. This analysis provides a valuable contribution to contemporary search engine critique mainly focusing on search engines' business models and societal implications. It shows that a shift of perspective is needed from impacts search engines have on society towards social practices and power relations involved in the construction of search engines to renegotiate search engines and their algorithmic ideology in the future.

Contribution to Algorithmic Imaginaries: It outlines the notion Algorithmic Ideology to investigate the practices and actor-networks involved in the shaping of hegemonic search engines.

2) **Eklöf J and Mager A (2013) Technoscientific Promotion and Biofuel Policy. How the Press and Search Engines Stage the Biofuel Controversy, *Media, Culture & Society* 35(4), 454–471.**

Abstract: What are the conditions for the public understanding of biofuels and how do the media shape these conditions under the influence of a new production of knowledge? This article investigates how the biofuel controversy plays out in the Swedish press and Google search engine results and analyses winners and losers in the tight attention economy of contemporary media. It describes different visibility strategies biofuel stakeholders employ in both media arenas, and identifies a form of technoscientific promotion that hybrid actors use to succeed in the day-to-day struggle for media attention. To conclude, it raises broader societal questions of the contemporary blurring of knowledge boundaries and the emergence of new information hierarchies and their biases. By understanding how contemporary media shape controversies, we can address the democratic potential of both mass media and science.

Contribution to Algorithmic Imaginaries: It puts Algorithmic Ideology into practice by investigating how it contributes to scientific controversies in search engine results compared to classical media.

3) **Mager A (2014) Defining Algorithmic Ideology: Using Ideology Critique to Scrutinize Corporate Search Engines, *Triple C. Communication, Capitalism and Critique* 12(1).**

Abstract: This article conceptualizes "algorithmic ideology" as a valuable tool to understand and critique corporate search engines in the context of wider socio-political developments. Drawing on critical theory it shows how capitalist value-systems manifest in search technology, how they spread through algorithmic logics and how they are stabilized in society. Following philosophers like Althusser, Marx and Gramsci it elaborates how content providers and users contribute to Google's capital accumulation cycle and exploitation schemes that come along with it. In line with contemporary mass media and neoliberal politics they appear to be fostering capitalism and its "commodity fetishism" (Marx). It further reveals that the capitalist hegemony has to be constantly negotiated and renewed. This dynamic notion of ideology opens up the view for moments of struggle and counter-actions. "Organic intellectuals" (Gramsci) can play a central role in challenging powerful actors like Google and their algorithmic ideology. To pave the way towards more democratic information technology, however, requires more than single organic intellectuals. Additional obstacles need to be conquered, as I finally discuss.

Contribution to Algorithmic Imaginaries: It further defines Algorithmic Ideology by drawing on Critical Theory, Ideology Critique most importantly.

SEARCH ENGINE IMAGINARY

4) **Mager A (2017) Search engine imaginary. Visions and values in the co-production of search technology and Europe, *Social Studies of Science* 47(2), 240–262.**

Abstract: This article discusses the co-production of search technology and a European identity in the context of the EU data protection reform. The negotiations of the EU data protection legislation ran from 2012 until 2015 and resulted in a unified data protection legislation directly binding for all European member states. I employ a discourse analysis to examine EU policy documents and Austrian media materials related to the reform process. Using the concept 'sociotechnical imaginary', I show how a European imaginary of search engines is forming in the EU policy domain, how a European identity is constructed in the envisioned politics of control, and how national specificities contribute to the making and unmaking of a European identity. I discuss the roles that national technopolitical identities play in shaping both search technology and Europe, taking as an example Austria, a small country with a long history in data protection and a tradition of restrained technology politics.

Contribution to Algorithmic Imaginaries: It develops the notion Search Engine Imaginary to analyze how EU search engine politics and a European identity co-emerge in the context of the GDPR.

5) **Mager A (2018) Internet governance as joint effort: (Re)ordering search engines at the intersection of global and local cultures, *New Media & Society* 20(10).**

Abstract: In this article, I investigate internet governance in practice by focusing on search engines, Google in particular. Building on STS-grounded internet governance research, I ask how different stakeholders interpret governing by algorithms, the governing of algorithms, and the limits of various governing modes when considering local specificities. To answer these questions, I conducted 18 qualitative interviews with key experts involved in search engine governance from four distinct societal domains: policy, law, civil society and the IT sector (from Austria and/ or the European level). In this analysis, I show that perceptions of search engine governance are shaped in specific cultural contexts, but also within particular social groups and their situated knowledges. I further elaborate how joint efforts are imagined as a means to challenge powerful search engines and their governing abilities cutting through different societal arenas and areas of expertise. Finally, I discuss implications of this analysis regarding the complex relationship between global technology and local cultures.

Contribution to Algorithmic Imaginaries: It analyzes how European Search Engine Imaginaries are co-produced with governance practices of different stakeholder communities and their situated knowledges.

COUNTER-IMAGINARIES

6) **Mager A (2014) Is small really beautiful? Big search and its alternatives, in: König R and Rasch M (eds) *Society of the Query Reader. Reflections on Web Search*, Amsterdam: Institute of Network Cultures: 59-72.**

Abstract: Google is a flourishing company, and its algorithm incorporates and strengthens the capitalist ideology. Rather than blaming Google for doing evil, however, this book chapter suggests thinking of Google as being shaped by society. Google shows us the face of capitalism because it was born and raised in a capitalist society. Accordingly, Google is not the only actor to blame. Quite on the contrary, actors such as policy makers, jurists, journalists, search engine optimizers, website providers, and, last but not least, users are part of the game too. If users would turn away from Google, the whole business

model, including its sophisticated algorithm and database of personal data, would fall apart. But where can people turn to? Are there true alternatives to Google and their algorithmic ideology? The goal of this article is to examine and discuss critically a selection of so-called alternative search engines and their ideological underpinnings. If Google embodies the capitalist ideology, what ideology do alternative search engines incorporate? What values do privacy-concerned search tools such as DuckDuckGo carry? What is green about green search engines? Can peer-to-peer search engines such as YaCy be interpreted as communist search engines? Could search be seen as a scientific endeavor as Wolfram|Alpha suggests?

Contribution to Algorithmic Imaginaries: It revisits the notion Algorithmic Ideology to map the landscape of alternative search engines and their ideological underpinnings.

7) **Mager A (2023) European Search? How to counter-imagine and counteract hegemonic search with European search engine projects, *Big Data & Society* 10(1).**

Abstract: This article investigates how developers of alternative search engines challenge increasingly corporate imaginaries of digital futures by building out counter-imaginaries of search engines devoted to social values instead of mere profit maximization. Drawing on three in-depth case studies of European search engines, it analyzes how search engine developers counter-imagine hegemonic search, what social values support their imaginaries, and how they are intertwined with their sociotechnical practices. This analysis shows that notions like privacy, independence, and openness appear to be fluid, context-dependent, and changing over time, leading to a certain "value pragmatics" that allows the projects to scale beyond their own communities of practice. It further shows how European values, and broader notions of Europe as "unified or pluralistic," are constructed and co-produced with developers' attempts to counter-imagine and counteract hegemonic search. To conclude, I suggest three points of intervention that may help alternative search engine projects, and digital technologies more generally, to not only make their counter-imaginaries more powerful, but also acquire the necessary resources to build their technologies and infrastructures accordingly. I finally discuss how "European values," in all their richness and diversity, can contribute to this undertaking.

Contribution to Algorithmic Imaginaries: It conceptualizes the notion Counter-Imaginaries to analyze visions and values driving alternative search engines from Europe.

8) **Mager A (forthcoming) Digital Europe from below. Alternative routes to the Digital Decade, in: Hoyweghen IV, Dratwa J, and Verschraegen G (eds) *Project Europe. Remaking European futures through digital innovation,* Edward Elgar Publishing.**

Abstract: This book chapter investigates how developers of alternative technology projects imagine "digital Europe" from below. More specifically, it sheds light on three alternative search engines from Europe that follow a social cause: the privacy-friendly search engine Startpage, the peer-to-peer search engine YaCy, and the Open Web Index initiative. Drawing on literature from Science and Technology Studies (STS) and European studies, this analysis shows how search engine developers draw on "European values" to situate and promote their projects, but also how alternative notions of Europe are enacted that make it possible to see the challenges and constraints that search engine developers experience in the particular European context, as well as opportunities for change that are worth pursuing. To conclude, it will discuss what we can learn from bringing marginal voices to the table of

European technology politics to embrace European pluralism and diversity, but also to bring Project Europe closer to public concerns.

Contribution to Algorithmic Imaginaries: It deepens the analysis of Counter-Imaginaries by focusing on different notions of Europe co-produced with practices of alternative search engine design.

4. Contributions of the Habilitation and Outlook

This habilitation has developed the notion Algorithmic Imaginaries to theorize, investigate, and potentially intervene in the shaping of search engines at the nexus of discourse and practice. The overall theory Algorithmic Imaginaries is fed by three conceptual tools that are deeply grounded in in-depth, multi-sited fieldwork: 1) Algorithmic Ideology, 2) Search Engine Imaginary, and 3) Counter-Imaginaries. These notions help us understand how search engines are shaped and stabilized in society and what possible interventions could be made to renegotiate search technology – especially in Europe where the "human-centred approach" to digital technology is strongly pushed in EU policy, but seems to get lost along the way of practically developing, implementing, and governing digital technologies, platforms, and infrastructures.

This habilitation therefore provides a valuable groundwork for future research agendas and policy initiatives. *Theoretically*, it makes important contributions to the fields of STS, the growing body of research on future imaginaries, and counter-imaginaries, in the making and governing of digital technology, most importantly – closely connected to the special issue "Future Imaginaries" that I co-edited together with Christian Katzenbach for *New Media & Society. Empirically,* it contributes to Critical New Media Studies, the field of Search Engine Studies more specifically – related to the special issue "The State of Google Critique and Intervention" that I co-edited together with Ov Cristian Norocel and Richard Rogers for *Big Data & Society*. *Socio-politically*, it formulates three points of intervention that may help to pave the way towards a more sustainable "Digital Europe" rooted in multiculturalism and technological diversity, as I finally discuss.

Theoretically, this habilitation contributes to the field of STS by showing how search engines are socially constructed in corporate contexts, European governance, and communities of practice. More specifically, it feeds into the growing body of research on future imaginaries by complicating and complementing clear-cut notions of "sociotechnical imaginaries" (Jasanoff and Kim 2009) in the context of digital technology, search engines most importantly. In the editorial of the special issue "Future Imaginaries" (*New Media & Society*) we argued that "sociotechnical imaginaries" are increasingly commodified, but also contested and multiple (Mager and Katzenbach 2021). In the process of negotiating digital futures, it is often no longer state actors or governmental institutions that act as primary agents of powerful imaginaries, as originally held in the concept of "sociotechnical imaginaries" (Jasanoff and Kim 2009), but corporate actors: "Especially in the context of digital technologies, this discursive embedding of technological developments and commercial products is pervasive. Entrepreneurs routinely attire their products and services in utopian visions of the future, narratives of community-building, and the promise of technological fixes for social problems (Turner 2006, Katzenbach 2019)." (Mager and Katzenbach 2021: 227) The notion Algorithmic Ideology has contributed to the understanding of search engines as tightly intertwined with capitalist ideology from early on.

The notion Search Engine Imaginary further helps us understand how corporate Algorithmic Imaginaries are increasingly challenged by European imaginaries rooted in "European values", the fundamental right to data protection most importantly. It shows how a coherent European Search Engine Imaginary is formed in EU policy discourses, but also how it travels into, transforms, and multiplies in national sociopolitical contexts and local stakeholder communities (Mager 2017, 2018). It therefore underlines that "sociotechnical imaginaries" (Jasanoff and Kim 2009) should not be seen as "monolithic or stabilized, but rather as multifaceted and dynamic" (Katzenbach and Mager 2021). Finally, the notion algorithmic Counter-Imaginaries elaborates how alternative imaginaries of search engines take shape in the context of practices of search engine design and how these Counter-Imaginaries are both anchored in larger sociotechnical imaginaries rooted in "European values", but also challenge them by envisioning alternative notions of Europe co-emerging with search engine developer practices. These insights exemplify the multiplicity of "sociotechnical imaginaries" (Jasanoff and Kim 2009) once again and adds to research on "alternative imaginaries" (Mansell 2012, Milan and ten Oever 2016, Lehtiniemi and Ruckenstein 2019) by showing how particular communities of practice not only counter-imagine hegemonic search engines and their intrusive data and business practices, but also try to build their technologies accordingly. Further research is needed on alternative Algorithmic Imaginaries growing at the margins of dominant sociotechnical imaginaries, which tend to hide "diversity-in-the-making" (Tsing 2012) and its potential for change.

Empirically, my habilitation advances classical search engine critique by focusing on imaginaries, practices, and power relations involved in the shaping of search engines – a necessary prerequisite for practically rethinking and renegotiating hegemonic search and coming up with more diverse digital technologies in the future. In the editorial of the special issue "The State of Google Critique and Intervention" (*Big Data & Society*) we traced the evolution of Google critique and European interventions. In conclusion, we made a plea for putting long-standing Google critique into practice and for providing "frameworks and imaginations for critical intervention" (Mager, Norocel and Rogers 2023). My habilitation provides the groundwork for such interventions by going beyond the political economy of search engines (Elmer 2004, Van Couvering 2008, Pasquinelli 2009, Fuchs 2011) and showing how search engines are socially constructed at the nexus of discourse and practice. Such an analysis makes us understand how capitalist ideology gets inscribed and anchored in hegemonic search engines and how change can be reached through critical interventions in the complex sociotechnical practices and actor-networks at play. It further adds to STS-oriented Internet Governance research (Katzenbach 2013, Ziewitz and Pentzold 2014, Musiani 2015, Ziewitz 2016) and European Policy/ Infrastructure Studies (Marelli et al. 2020, Mahfoud 2021, Ulnicane 2021, Mobach and Felt 2022, Guay and Birch 2022, Baur 2023, Krarup and Horst 2023) by showing how Europe tries to participate in the shaping of search engines through rules and regulations, but also how hard it is to reach a common understanding due to Europe's multiculturalism and diversity. Finally, my habilitation feeds into the growing body of research on alternative digital technologies, practices, and imaginaries (Mansell 2012, Milan and ten Oever 2016, Lehtiniemi and Ruckenstein 2019, Kazansky and Milan 2021) by elaborating how particular communities of practice envision not only alternative technologies, but also alternative notions of Europe helping us to embrace multiculturalism, federalism, and diversity in technology design rather than trying to mimic big tech companies and their intrusive data practices. Further research is needed on alternative Algorithmic Imaginaries helping to pave the way towards a more sustainable "Digital Europe" better suited to European values – in all their richness and diversity – than empty notions of "catching up" with the US, and increasingly China.

Socio-politically, my habilitation contributes to European innovation politics and technology developments. It offers a repertoire of possible interventions to not only rethink, but also rebuild search engines, and digital technologies more broadly, in specific European contexts. Three possible interventions are discussed: 1) "Long-term funding and slow scalability" are needed as important preconditions for developing open search infrastructures – such as an open web index that could become an important backbone to search engine diversity. Moreover, 2) the "opening up of data" is a necessary prerequisite for developing alternative digital technologies and infrastructures and for training algorithms and machine learning models. How to open up commercial data, to share public data, and to create collective data pools that go beyond individual responsibility and ownership of data are thus central questions that need to be tackled in the future. The 3) intervention, "continuous auditing and advice", calls for the establishment of new processes and institutions with enough resources and interdisciplinary expertise to provide guidance in the creation and implementation of algorithmic systems: "Especially in the phase of developing digital tools and infrastructures, constant advice and public scrutiny are needed with regard to legal requirements, ethical and governance issues, as well as social implications." (Mager 2023) This repertoire of interventions applies to the corporate sector, but even more so to the public sector where more and more algorithmic systems are developed nowadays to "profile" citizens and provide scarce resources efficiently, as our work in the context of public employment has shown (see Allhutter et al. 2020).

Accordingly, future research is invited to extend the notion of Algorithmic Imaginaries to the public sector where larger political trends such as the ongoing austerity politics in many European countries translate into and are made effective through profiling algorithms, digital technologies, and data infrastructures. Insights from this habilitation can help to better understand the envisioning and shaping of algorithmic systems in the context of larger sociopolitical contexts, but also the making and unmaking of Europe through digital technologies and infrastructures. In our current research project Automating Welfare (FWF I 6075) first steps towards this important research endeavor are made by investigating (semi-)automated decision-making systems and data infrastructures in eight European countries and their different welfare regimes. More studies will have to follow both in Europe and beyond. The globalized nature of digitalization attempts calls for studies on a broader scale including geographical regions and political regimes where authoritarian leaders increasingly try to use data and digital technologies to control populations without any public scrutiny like in Israel or Brazil, for example. Also, data bias, discrimination, and surveillance tie into social inequalities in countries of the global South that need to be considered in future studies – especially in the age of the "transboundary crisis" (Boin 2019) where datafication can become a matter of life and death, as both the disruptive event of the COVID-19 pandemic and the "slow disaster" (Knowles 2014) of the climate crisis show.

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6. Appendix: 10 Articles

Information, Communication & Society

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ALGORITHMIC IDEOLOGY

Astrid Mager [a]

[a] Institute of Technology Assessment (ITA), Austrian Academy of Sciences, Strohgasse 45/5, A-1030, Vienna
E-mail:

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Astrid Mager

ALGORITHMIC IDEOLOGY

How capitalist society shapes search engines

This article investigates how the new spirit of capitalism gets inscribed in the fabric of search algorithms by way of social practices. Drawing on the tradition of the social construction of technology (SCOT) and 17 qualitative expert interviews it discusses how search engines and their revenue models are negotiated and stabilized in a network of actors and interests, website providers and users first and foremost. It further shows how corporate search engines and their capitalist ideology are solidified in a socio-political context characterized by a techno-euphoric climate of innovation and a politics of privatization. This analysis provides a valuable contribution to contemporary search engine critique mainly focusing on search engines' business models and societal implications. It shows that a shift of perspective is needed from impacts search engines have on society towards social practices and power relations involved in the construction of search engines to renegotiate search engines and their algorithmic ideology in the future.

Keywords search engine; social construction of technology; new spirit of capitalism; Google; information economy; ideology

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Introduction

Yesterday I did an online search on the controversy around biofuels for a project I am currently working on in Sweden. Like the majority of users, I employed the search engine Google. I put keywords such as 'biofuel' or 'biofuel debate' in the search box and browsed through a couple of websites, mostly going back and forth to Google. Besides links to research institutions working on biofuels, informative Wikipedia articles and newspaper debates on societal implications of biofuels, a range of commercial links were presented to me in the sponsored search results (the links appearing in the right column or on top of the main,

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'organic' search results). Tightly intertwined with my topical interest and my current location, different biodiesels and bioethanols were advertised to me, all in Swedish. Biofuel commercials were haunting me through the web – from search engine results to websites and blogs I visited. My need for information was clearly transformed into a costumer desire that Google tried to satisfy by showing me commercials related to my own search. More and more of the same advertisements were supposed to convince me to put a 'green car' and the suitable biofuel in my virtual shopping cart – despite the fact that my original interest involved negative impacts of biofuels on environment and society.

This online search on biofuels points right to the focus of this article, the tight entanglement of search technology and capitalist society. In the last decade, search technology underwent a radical process of commercialization according to Van Couvering (2008). Along with it grew criticisms of the business models underlying search engines, primarily based on user-targeted advertising like the one I introduced above. While early critiques of search engines scrutinized the increasingly popular PageRank algorithm and the information biases it constructs at the turn of the century (Introna & Nissenbaum 2000; Hindman *et al*. 2003), they switched over to questioning search engines' models of revenue and profit maximization more recently, as I discuss in the following pages. This research has contributed to a valuable understanding of the economic dynamics and the 'capital accumulation cycle' (Fuchs 2011) search engines embody and the implications these pose on a societal level. Röhle's (2009) and my own work (Mager 2009, forthcoming), however, have shown that search engines, and Google's powerful position in particular, are negotiated and stabilized in social practices.

Building on this line of work, this article seeks to unfold the heterogeneous network of actors and interests participating in the negotiation of search technology. Drawing on the tradition of the social construction of technology (SCOT) (Bijker *et al*. 1987) and 17 qualitative interviews with various stakeholders involved in the development of search engines, I investigate how the capitalist ideology gets inscribed in search algorithms by way of social practices. I show how the 'new spirit of capitalism' (Boltanski & Chiapello 2007) gets aligned with and woven into the mathematics of search algorithms and how website providers and users comply with and stabilize this dynamic. Further, I exemplify how privately owned search engines and their commercial orientation are enacted in a socio-political context characterized by a techno-euphoric climate of innovation, a neoliberal policy of privatization and legal frameworks that fail to grasp global search technology. This analysis broadens our understanding of how search technology and its algorithmic ideology are negotiated in a wider societal context and helps to reconsider its commercial orientation since:

> the processes that shape our technologies go right to the heart of the way in which we live and organize our societies. (. . .) Understanding them would

> allow us to see that our technologies do not necessarily have to be the way they actually are. (Bijker & Law 1992, p. 4)

Commercialization of search technology

Having investigated the search engine industry over time, Van Couvering (2008) argued that search engines started out in the academic realm and got commercialized over time. She identified three chronological periods: in the first period of 'technological entrepreneurs' (1994–1997), a number of search engines – mostly directories at the time – developed from the academic discipline of information retrieval, a combination of computer and information science. The second period of 'portals and vertical integration' (1997–2001), which coincided with the dot-com boom and bust, was characterized by a shift from search engines to portals such as Yahoo! During this period, developers created content channels to segment the audience and make lucrative sponsorship deals. An exception was Google, which introduced its new PageRank algorithm in 1998. The innovative algorithm used the number and quality of links a website gets to evaluate a website's value (based on the much older tradition of citation analysis, as Mayer 2009 discussed). In the third period of 'syndication and consolidation' (from 2002 onwards), search was passed from media corporations to technology companies and great revenues were generated from pay-per-click advertising, which enabled big companies like Google to buy their rivals.

In 2000, Google presented an automated advertising system called AdWords that targeted advertisements based on users' search terms. Imitating a technology originally invented by the search engine GoTo Google allowed advertisers to bid on how much they would like to pay to appear on top of sponsored search results in relation to individually chosen search terms. While previous business models were taken over from classical media and hence focused on audiences, such as those by portals like Yahoo!, the new models had traffic, the flow of visitors from one website to the other, at the core of their mechanism. Especially, Google was very successful with its business model based on the 'traffic commodity' (Van Couvering 2008). Later it began to syndicate cost-per-click advertisements to partner websites through its AdSense program, which allowed advertisers to relate their advertisements to a website's content.[1] The last decade of search engine history shows that Google has become a big player on the search engine market because of its PageRank algorithm, and also because of its clever business strategy. Jarvis (2009, p. 5) described its success as follows:

> Google thinks in distributed ways. It goes to the people. There are bits of Google spread all over the web. About a third of Google's revenue – expected to total $20 billion in 2008 – is earned not at Google.com but all its sites all over the internet.

While techno-utopians such as Jarvis have celebrated Google as a new 'role model' to follow to become successful, critics have started to scrutinize the multi-faceted impact Google and other search engines have on our culture and economy (Halavais 2009; Vaidhyanathan 2011[2]). A major criticism in this body of work concerns the 'consumer profiling' conducted by search engines enabling to adjust advertisements to users' individual interests. 'Consumer profiling is broadly defined as an ongoing distribution and cataloguing of information about desires, habits, and location of individuals and groups' (Elmer 2004, p. 9). Based on users' search history, locations and search terms, search engines develop highly detailed 'user profiles' capturing desires and intentions of individuals and groups of users. Especially, the multitude of Google services including Google Search, Google Mail, Google Maps, Google Earth, Google Analytics, Google's recently launched social networking platform Google+, and its share in the smart phone operating system Android provide a myriad of 'data points' to create detailed user profiles.[3] These user profiles are turned into value through selling them to advertising clients. Elmer (2004) coined this business model the 'service-for-profile' model. Users get services for free, while 'paying' with their data.

The concentration and interconnection of large sets of heterogeneous user data within a single company triggers serious privacy concerns. This aspect has been conceptualized in the field of surveillance studies, where Google – and other technologies such as social networking platforms – is discussed as new 'Panopticon' exerting user surveillance (Elmer 2004). Pasquinelli (2009, p. 153) further argued that the metaphor of the Panopticon must be reversed: "Google is not simply an apparatus of dataveillance from above, but an apparatus of value production from below". Drawing on Marxian thinking, he elaborated that Google's PageRank algorithm exploits the collective intelligence of the web since each link Google uses to measure a websites' value represents a concretion of intelligence to create surplus value. Fuchs (2011) further hinted to the importance of including users' activities to understand Google's 'capital accumulation cycle'. Google not only exploits website providers' content, but also users' practices and data. It sells the 'prosumer commodity' (Fuchs 2011) to advertising clients. He thus concluded that 'Google is the ultimate economic surveillance machine and the ultimate user-exploitation machine' (Fuchs 2011). The question, however, is why both website providers and users comply with this scheme of exploitation and how other socio-political actors stabilize its dynamic within the broader context of capitalist society? To answer this question, I draw on concepts developed in the tradition of the SCOT.

SCOT and capitalist spirit

In the late 1980s, a number of scholars started to challenge the idea that technology development would follow a simple, linear model explaining a

technology's trajectory from production to usage. They convincingly demonstrated that 'our technologies mirror our societies. They reproduce and embody the complex interplay of professional, technical, economic, and political factors' (Bijker & Law 1992, p. 3). One of the first, by now well-known, case studies showing how societal values are embedded in technologies was the analysis of the social construction of the bicycle. Having traced the historic development of the bicycle, Pinch and Bijker (1987) exemplified that the bicycle was negotiated and constructed in a complex network of actors and their interests. The bicycle, as we know it today, may be seen as satisfying both sporting cyclists with their interest in fast bicycles and the general public with their interest in safe bicycles. Reaching this compromise was facilitated in a wider societal context characterized by the emancipation of women towards the end of the nineteenth century because women became central users of bicycles at that time. This case study outlined the central analytical categories for the analysis of the SCOT including the identification of 'relevant social groups' and their interests. Focusing on the economic context, Carlson (1992) further argued that the failure and success of a technology should be seen in relation to the 'frames of meaning' attributed to a technology and how they correspond to socio-economic cultures present at a particular point in time. Edison's invention of motion pictures, for example, failed because Edison's own frame of meaning was deeply anchored in the producer culture of nineteenth-century America, while Edison's movie audience and competitors were part of the twentieth-century consumer culture.

Drawing on this line of work, I elaborate how search engines are negotiated in a network of actors, interests and practices within contemporary frames of meaning, the capitalist ideology in particular. According to Boltanski and Chiapello (2007, p. 3), ideology is 'a set of shared beliefs, inscribed in institutions, bound up with actions, and hence anchored in reality'. With this definition, they aimed to go beyond the concept of ideology as a moralizing discourse and argued that ideology is intertwined with and embedded in actual practices, such as management practices. On the basis of French management literature, supposed to motivate mangers and their workforce, they elaborated how the capitalist ideology transformed from the 1960s until the 1990s and culminated in a globalized capitalism employing new technologies and being dependent on multinationals' interests. Coinciding with this shift is a preference for flexible, mobile and unattached employees, such as those who work at internet companies in Silicon Valley. The new capitalist spirit has managed to incorporate what Boltanski and Chiapello (2007) coined, the 'artistic critique' raised by the generation of 1968 and the emerging left. The critique of industrial capitalism as hierarchical, dehumanizing and restricting the individual's freedom, authenticity, autonomy, mobility and creativity (compared to the 'social critique' focusing on inequality and class differences). The integration of values like self-management and flexibility in the workplace helped the new spirit of capitalism to endure. The

artistic critique may hence be seen as indirectly serving capitalism, which turns critique itself into a fundamental crisis, as Boltanski and Chiapello concluded.

Google's success, for example, is built on flat hierarchies, a flexible work force and a global scale, illustrating central characteristics of the new form of capitalism very well. Google, however, also well corresponds to the new mode of exploitation that rose with the new spirit of capitalism. '*A form of exploitation that develops in a connexionist world* – that is to say, a world where the realization of profit occurs through organizing economic operations in networks' (Boltanksi & Chiapello 2007, p. 355; italics in original). Rather than taking over classical business models based on audiences (such as portals that collapsed during the dot-com crash), Google followed a new business model based on the 'traffic commodity' (Van Couvering 2008). Contrary to Edison, who failed to understand the economy of the day when developing motion pictures, Google succeeded with aligning its technology with a business model that perfectly fits the 'connexionist world' and its 'global informational network capitalism' (Fuchs 2010a). 'Google thinks in distributed ways', as Jarvis (2009) argued. How search engines and their capitalist ideology are stabilized in social practices will be elaborated in the analysis by focusing on "relevant social groups" and their interests involved in the construction of search technology.

Study and methods

The empirical basis for this analysis consists of 17 qualitative expert interviews. Following the method of theoretical sampling, I identified central actors involved in the development of search technology. Theoretical sampling is a method from the Grounded Theory methodology (Glaser & Strauss 1968) and enables the researcher to choose new research participants and data sources on the basis of data gathered earlier in the research process. I started this process with technical people including computer scientists, programmers, software developers and people working in information retrieval (mainly from big, universal search engines); six interviews altogether. To go beyond the technical realm and investigate how search technology is shaped by the broader societal context, I identified further actors on the basis of dominant issues discussed in the first interviews including search engines' business models, privacy issues, media debates and legal frameworks. Accordingly, I interviewed an expert in search engine optimization (SEO), an economic journalist, a net activist, a jurist and two policy-makers concerned with search technologies; also six interviews. My interviewees were partly from the United States-American context, where most big search companies are developed and based (primarily the first category of interviews with technical people) and the German context to cover the European perspective and challenges global search technology pose in local socio-political contexts (especially the latter category of interviewees).[4]

Finally, I interviewed five scholars working on search engines and their societal implications as contextual material to saturate my data (both from the United States and Germany, and one from Ireland). Given the dominant role Google plays on the search engine market, these interviews strongly circulated around Google, but not exclusively.

All 17 interviews were conducted between October 2010 and February 2011, half of them were carried out face to face and the other half using video Skype. The qualitative, in-depth interviews were structured using a list of questions that ensured the comparability of the interviews, yet left enough flexibility for individual viewpoints of my interviewees and their different backgrounds (Flick 2009). The interviews were fully transcribed, coded and analysed along actors and interests involved in the social construction of search engines. The coding scheme, comprising categories and sub-categories, was developed with the qualitative text analysis software Atlas T.I. and followed the Grounded Theory approach (Glaser & Strauss 1968).

Empirical analysis: Algorithmic ideology

My actor- and interest-centred analysis clearly shows that engineers, website providers and users were considered the most dominant 'relevant social groups' in search engine development. One-third of the interviewees described engineers as the central driving force, the 'people who architect the code' (software developer). Others mentioned website providers, who create websites and link connections the search algorithm needs to index, rank and display results according to keywords. Moreover, users and automated user feedback in form of data traces were seen as central driving force since search results are increasingly adapted to users' interests, locations and desires. An information retrieval expert described the 'customization' of search results like this:

> Imagine you're a spy and you've been watching these people their whole life. You know everything about them, everything they've eaten, every place they've gone to, and if you imagine, if you see them sit down at a computer and they're about to do a search and if they have a query, let's say it's very vague of a query in general, but given all the context and everything you know about them you can probably still provide very good results.

In reply to my question what 'good results' means in this context the interviewee explained that the quality of search results is evaluated according to standardized measures including 'ranking evaluation methods' and 'user-driven matrixes'. This quotation clearly exemplifies the engineer-driven logic underlying the construction of search algorithms. Having grown out of the academic field of information retrieval search engines clearly incorporate what Vaidhyanathan (2011) coined 'techno-fundamentalism'.

In the last decade, however, the techno-fundamentalist ideology got more and more aligned with and overshadowed by the capitalist ideology.[5] 'Google is not just search, in fact Google is not primarily search, it's advertising, right?' (search engine scholar). Most engineers are working for privately owned, for-profit companies such as Google, the search engine centrally discussed in the interviews. Accordingly, website providers' and users' activities do not only serve refinements of the algorithm, but also the generation of profit. Website providers' content and users' data are exploited by Google to create surplus value, as argued earlier (Pasquinelli 2009; Fuchs 2011). Google thus perfectly corresponds to the 'new spirit of capitalism' and the new mode of exploitation that arose in the 'connexionist world' (Boltanski & Chiapello 2007). User data were described as 'goldmine' in this respect because it enables search engines to relate advertisements to users' interests and desires – especially when coming from multiple search tools and services provided by a single company. 'I do get Google's value isn't in its algorithms anymore, it's in its databases, its consumer data' (search engine scholar). Google is particularly successful with its business model, but other search engines – Microsoft's Bing was dominantly mentioned in the interviews – and social networking platforms have adopted similar modes of exploitation (Fuchs 2010b). I discuss below how both website providers and users comply with and stabilize search engines and their 'service-for-profile' model in their practices.

Website providers and users stabilizing capitalist spirit

Website providers aim to gain visibility in the multitude of web information and reach users to communicate their content. Users, in turn, want to conveniently find information meeting their needs. Search engines have managed to satisfy both website providers' and users' needs with their services. Especially, Google has become an 'obligatory passage point' website provider and users have to pass to reach their own goals (Mager 2009; Röhle 2009). As a consequence, providers and users of web information solidify search engines and their capitalist 'spirit' – both consciously and unconsciously.

To achieve their aim of gaining visibility, website providers have started to use techniques of SEO. Especially, commercial websites trying to market their products, services and ideas employ SEO strategies to improve their rank in search engine results, because 'a higher ranking is a lot of money sometimes' (computer scientist). They adapt and optimize their sites to be found, indexed and displayed more easily in the result lists. An SEO professional explained the importance to be visible to the 'right audience':

> It really doesn't matter if you're visible in a search engine if it's for the wrong things. The worst example is your website is number one for Britney Spears, but you're a B-to-B software company. That doesn't really help you.

This quotation shows how carefully websites are adapted to search algorithms these days. It illustrates that website providers not only provide content and links search engines use to index the web, but also deliberately please search engines by designing their sites according to search algorithms. These 'good' SEO practices of optimizing websites are stabilizing the technology – Google even suggests certain SEO practices and webmaster tools on its website.[6] Contrary, 'bad' SEO including spamming techniques and other illicit practices used to push up websites in search results threaten to destabilize the technology. Accordingly, search engines such as Google have started to respond by 'punishing' websites by excluding them from the index (Röhle 2009). My interviewees described the battle between search engines and marketers as 'war':

> So there's definitely a kind of, ah, a kind of a war going on between the search engine and the marketers, marketers are pressuring the search engines to be more crafty, more authentic in how they rank. (Information retrieval expert)

This warlike relation shows how marketing strategies alter search algorithms by forcing engineers to 'tweak' the algorithm to maintain the quality of search results – a central precondition for its own 'capitalist accumulation cycle' that requires user traffic. Website providers' strategies of gaining user, or rather customer attention, may be seen as intervening in and stabilizing the mathematics of the algorithm. Moreover, their marketing practices contribute to a commercialization of organic search results because optimized, often commercial websites tend to get a better presence in search results than smaller, nonprofit websites in certain issue areas such as health (Mager 2010).

Similarly, users' practices stabilize search engines and their exploitation scheme. 'I know Google and others always say well you can always opt out, but no one really knows that that's even an option. This and they don't even know that they're tracked' (computer scientist). This quotation hints to a typical characteristic of the new spirit of capitalism. 'Very long chains, comprising a large number of mediations that are difficult to relate to one another, are often required to level an accusation of exploitation' (Boltanski & Chiapello 2007, p. 373). Users' ignorance, partly achieved by search engines' hidden, 'spy-like' ways of operation, is an essential element in the stabilization of search algorithms and their economic logic. The default settings primarily serve the search engines' interest in collecting data rather than users' interest in protecting their privacy and thus 'inevitably entrench economic and political interests (. . .)' (Elmer 2004, p. 26). Privacy concerned users who try to opt out of the system by reconfiguring browsers, turning off cookies and using other tools of 'digital self-defence' (net activist) experience barriers too.[7] Similar to website providers who do not play by the rules, users who try to opt out of the system are disciplined by search engines:

> We're caught up in a physical exchange, yeah, (. . .) you're giving that information in exchange for the service, and you're punished if you don't say yes. Not punished in a negative way, but punished with less than other people have. (Search engine scholar)

This quotation illustrates that users are willing to enter alliances with search engines to reach their goal of conveniently finding web information they want – partly motivated by search engines' system of 'punishments and rewards' (Röhle 2009, 2010). Their practices, in turn, contribute to improvements of search algorithms, and also to the 'service-for-profile model' Google, and others, performs.

Finally, both website providers and users stabilize search engines and their business models with their own advertising and consumer practices. Besides SEO strategies, marketers also pay money to be present in sponsored search results related to specific keywords. Their advertising strategies figure as a necessary precondition for search engines' business models. Users, however, also play a central role in maintaining this dynamic according to a computer scientist: 'the raw data, I know it's a very narrow measurement, shows that people are very much interested in those kind of ads'. One may argue that more than 60 per cent of internet users do not distinguish between organic and sponsored search results, as a study suggests (Fallows 2005), and thus click on the advertisements. But one may also argue that search engines actually well correspond to the dominant cultural frame of consumerism. A graduate student in human-centred design and engineering put it like this:

> Obviously they're pushing this information at us as quickly as they can, but the reason they're pushing this information at us is because we're gobbling it up. I mean, we're consumers, and we're also producers. I think the driving force behind this information economy is our, kind of, probably, possibly a little bit unhealthy desire to just keep consuming, and communicating, and producing at such a frenzy rate.

According to Bauman (2007) our society shifted from a society of producers to a society of consumers: '"Consumerism" arrives when consumption takes over that linchpin role which was played by work in the society of producers'. (Bauman 2007, p. 28). Search engines may be seen as having perfectly incorporated this shift because advertising, an essential part of consumerism, lies at the heart of search engines and their revenue models. 'New needs need new commodities; new commodities need new needs and desires' (Bauman 2007, p. 31). Website providers and users stabilize this dynamic with their need for profit maximization and desire 'to keep consuming' (both search services and the products they advertise). An information retrieval expert hence concluded:

> Search engines are strongly advertising- and marketing-driven. And thus, if you think about it, a product of an interest group, which is extremely unproductive, at least in a materialist sense, which only sells air in fact.

All these examples show how the capitalist spirit gets embedded in search algorithms by way of social practices. Both website providers and users should not merely be seen as victims of search engines and their new modes of exploitation. Rather, they should be conceptualized as actively stabilizing the technology with their marketing, search and consumer practices – partly consciously, partly unconsciously. This implies that both actor groups would also have the power to destabilize search engines and their new exploitation modes because 'there is always the possibility of resistance that calls into question the power relationship' (Castells 2009, p. 11), as I discuss in the conclusions. Resistance, however, would be facilitated by a socio-political context, which critically examines search engines and the capitalist ideology it embodies. Currently though socio-political actors stabilize for-profit search engines rather than destabilizing them.

Culture of innovation and politics of privatization

Besides the core actor-network of engineers, website providers and users, the broader societal context – competitors, mass media, policy and legal frameworks – was described as shaping search technology. When talking about competitors, my interviewees dominantly referred to upcoming search engines such as Bing, but also social media such as Facebook and Twitter supposed to change search algorithms due to their 'real time information' (computer scientist). The relation between different internet businesses was basically described as a 'fight for data and users' (computer scientist) to gain market share mirroring the capitalist ideology of competition and profit maximization. Google's investment in the smart phone operating system Android was described as a clever move to build alliances with competitors such as mobile phone companies. It enabled Google to extend its power of default, its power of being the default search engine in users' devices and practices, to the mobile phone market.

Mass media was conceptualized as further stabilizing Google, and others, by providing the breeding ground for a techno-utopian culture of innovation. The media was seen as a central actor in solidifying contemporary consumer culture by constantly featuring new services, products and ultimately companies – together with advertising campaigns. Alternative technologies and open source developments, on the contrary, are rarely presented and discussed, as the economic journalist argued. Critical media coverage, in contrast, was seen as potentially destabilizing big players. My interviewees referred to the controversies around Google China and Google Street View that threatened Google's 'brand value that always kind of relied on its ethical nature' (search engine scholar). While Google's activities in China were globally discussed, Google Street

View was most critically discussed in European media. In Germany, where parts of my interviews were conducted, these debates culminated in a ban of Google cars in certain cities. Furthermore, Google introduced the possibility to censor one's face and property in the Street View program (assuming users are aware of the possibility). This clearly shows that the media participates in the shaping of search engines. It further shows that local media debates mirror local value systems. Especially privacy and data protection are differently conceptualized in Europe and the United States. A German politician from the liberal party said in this context:

> Well, I see that in Germany in particular, or let's say in the German speaking-European context, this distrust of uncontrollable companies, which are not subject to the German or European data protection law and make profit with our data.

The politician from the German Green party said he expects more critical debates on internet services and privacy in the future, not least due to more 'scandals'. Mass media was seen as playing a central role in this development, but also educational institutions, net activists and public campaigns were mentioned in this respect. Just recently Google's new privacy policy and terms of service,[8] allowing Google to integrate data collected from other services – including Google Mail, Google Maps, YouTube, the social networking site Google+, Google's Android mobile phones and many more – to target search results and advertisements to users' interests and desires, triggered heavy criticism on a range of German blogs and critical media, for example. The overall techno-euphoric tone and culture of innovation created by the majority of mainstream media, however, makes the media rather an ally in the stabilization of big, for-profit search engines, than a guardian of socio-cultural values.

Finally, politics was described as a central actor stabilizing search engines and their capitalist ideology. A search engine scholar clearly argued that we should not 'blame Google':

> The need for search has existed at least since the 80s and under a neoliberal moment, there is, we are to blame for not having collectively put the public pressure on that (. . .) and it could all have been quite cheaply publicly funded and it would be publicly accessible. But we didn't do this. So along comes a private firm that's doing it. So we, at a neoliberal moment, have passed it to this private corporation, which seemed a very tiny, little start-up and now is, arguably one of the most important institutions on the planet.

At a later point he added that Europe seems to 'have completely bought into this Americanized model of how it happens'. This quotation clearly shows how the politics of privatization solidifies corporate, for-profit search engines such as

Google. In an age where more and more societal areas have been passed to the free market – not least to save money and raise efficiency on parts of governments – search technology is one more area that is permeated by the capitalist ideology. The politics of privatization led to policy's loss of control over the governing of search technology and the societal implications they pose in terms of privacy and data protection. 'Public services and the state' are 'missing from the debate' (Van Couvering 2008). Particularly, the global character of the new spirit of capitalism triggers crucial problems in terms of setting legal limits, as the liberal politician admits: 'Well, that's one of the basic problems we are facing as a legislator, that ah, everything that relates to the internet is no longer tangible by national jurisdiction'.

Data protection and privacy were repeatedly mentioned in the interviews as a good example of the way global search technology affects and partly contradicts local regulations. The global scale of search engines with computer servers storing data all over the world let user data – and their commercial exploitation – widely escape national jurisdiction. Since existent regulations have become partly futile in global capitalism, new regulations would need to be developed reaching across national borders. Especially, Europe with its stricter privacy regulations is invited to take in a stronger role in this respect because we

> already saw that European data held by US companies is often protected to a greater degree and that, at some point, it becomes more expensive for companies to do double standards than to just provide the same level of protection for all their users. (Search engine scholar)

The European Commission and the internet Governance Forum,[9] an initiative by the UNO, were mentioned as primary institutions supposed to take action in terms of data protection. In Germany, the Enquete Commission on 'internet and Digital Society'[10] was formed by the German parliament to discuss how to proceed with questions related to the internet and data protection, copyright issues, international trade and net neutrality. Google's new privacy policy and terms of service will serve as a good test case since they may happen to contradict the EU's new data protection regulation according to a German net activist blog.[11] They signify a shift from search engines as single entities towards search engines as a network of services accumulating and centralizing user data. Whether the EU will react against the new settings will be seen in the upcoming months. In general, lawsuits were considered as the most effective way to create limits for search engines because 'internet businesses are all based on transgressing the law' the journalist reasoned referring to YouTube and Google Books.

Similar to challenges involved in the global fight against climate change, the road to a global internet policy was imagined to be long and rocky because political bodies are slow and often lack technical expertise. 'By the time government

decides how to regulate the technology that we're using now we'll actually have a whole different set of technologies that we are integrating' (computer scientist). Furthermore, interests of states and search companies partly overlap in terms of data collection because states also fall back on user data for purposes of law enforcement in post-9/11 surveillance societies Kurz and Rieger (2011) argued in the German context. Consequently, more hybrid forums would be needed in the future where politicians, jurists, computer scientists, net activists, privacy experts and stakeholders from civil society come together to reach a common understanding of current challenges and future developments in terms of search the jurist concluded.

Conclusions

Drawing on the tradition of the SCOT, this article showed how the 'new spirit of capitalism' (Boltanski & Chiapello 2007) gets inscribed in the fabric of search algorithms by way of social practices. I elaborated how the 'techno-fundamentalist' ideology gets aligned with the capitalist ideology and exploitation schemes of the 'connexionist world'. Furthermore, I discussed how both website providers and users stabilize the algorithmic ideology by entering alliances with search engines to reach their own goals – also achieved by search engines' clever 'system of punishments and rewards' (Röhle 2009, 2010). Finally, I exemplified that for-profit search engines and their capitalist spirit are solidified by mass media providing a techno-euphoric culture of innovation and policy pursuing a politics of privatization. This analysis provides a valuable contribution to contemporary search engine critique mainly focusing on search engines' business models and societal implications, as discussed at the beginning of this article.

My research suggests shifting the focus of attention from impacts search engines have on society towards social practices and power relations involved in the construction of search engines. Search engines should not be seen as merely overruling or 'exploiting' society, but rather as being enacted and stabilized in contemporary society and its dominant 'frame of meaning' (Carlson 1992), the new spirit of capitalism. This shift of perspective enables us to understand that search technology, as every other technology, could be otherwise. If website providers or users broke out of the core network dynamic, the power of search engines and their schemes of exploitation would fall apart. If mass media and activists initiated a more critical debate about search engines and the myriad of data they collect, store and process, big players such as Google would be destabilized. Finally, if politics and law took on a stronger role in the negotiation of search technology, limits would be set regarding the fight over user data search engines, and also social networking platforms like Facebook perform day by day. Since all these actors participate in the negotiation of search engines within the broader context of capitalist society, they all have the power to

renegotiate search engines, start off social or political interventions and pave the way towards change. 'When resistance and rejection become significantly stronger than compliance and acceptance, power relationships are transformed' (Castells 2009, p. 11).

To exert this power of resistance, however, certain steps are necessary. First, it is essential to understand that privately owned search engines benefit from our marketing strategies, consumer desires, ignorance, compliance, innovation fetish, politics of privatization and, most of all, globalized capitalism that increasingly escapes local socio-political cultures and frameworks. It is important to see that our own actions and willingness to be seduced by search engines and their convenient services help to stabilize search engines and the commodification of information (Mager 2010, forthcoming) and user data they trigger (Fuchs 2011). We have to understand that global capitalism benefits from states' inability, and partly unwillingness, to govern and regulate for-profit search engines and to finance research on alternative technologies. Bauman (1998, p. 42) argued that 'far from acting as cross-purposes and being at war with each other, the political "tribalization" and economic "globalization" are close allies and fellow conspirators'. This article gave some insights in tensions and conflicts of interests between global search technology and local debates and regulations. More research is needed on the way United States-American search engines relate to European/local laws and cultural value systems. Europe and its critical perspective or 'unique capacity to grumble' (Lovink 2009, p. 51) is especially invited to see itself as central part of the picture rather than on the edge. Whether the newly founded research institute "Alexander von Humboldt Institute for internet and Society" in Berlin,[12] sponsored by Google, is an appropriate way to pursue this undertaking or whether it may end up further stabilizing Google and its 'ethical brand value' remains to be seen.

Second, more hybrid forums are needed where heterogeneous expertise could be bundled and a common ground for future developments and challenges in the field of search engines could be found – both at a global and at a local level. Since search engines and their capitalist orientation are collectively stabilized, a collective effort involving different actors and interests is required to think about alternative ways of search engine construction. Political expertise should be bundled with legal advice, and also technical know-how lacking so far. Net activists could provide a valuable contribution to the dialogue, and also engineers, journalists, educational institutions and proponents from civil society. Vaidhyanathan (2011) imagined a 'human knowledge project' to approach the 'task of organizing the world's information and making it universally accessible in' a non-corporate way. The field of science and technology studies offers more classical ways of governing technology. Public participation events may be carried out to raise awareness about search engines and their commercial orientation. Moreover, focus group discussions with different stakeholders and decision-makers may be conducted to think about ways of

embedding and shaping global search technology in local socio-political cultures. Whatever the concrete measures for renegotiating the future of search technology may be this article showed that a switch of perspective is needed to reconsider search technology and its algorithmic ideology first.

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Notes

1 More information on Google AdWords and AdSense could be found on Google's website: http://www.google.com/intl/en/ads/ (10 March 2012).

2 Furthermore, K. Hillis, M. Petit and K. Jarrett presented parts of their analysis on knowledge and power in the contemporary 'culture of search' at the AoIR conference in Gothenburg, 2010. Their book *Google and the Culture of Search* is supposed to be published by Taylor and Francis in 2012.

3 The great detail of user profiles has become clear during the release of three months of search engine data by AOL in 2006. See, for example, *The New York Times* article 'A Face Is Exposed for AOL Searcher No. 4417749', http://select.nytimes.com/gst/abstract.html?res=F10612FC345B0C7A8CDDA10894DE404482 (10 March 2012).

4 All quotations from German interviewees presented in the empirical analysis have been translated into English by the author.

5 Internet companies' strong belief in information technology and capitalism has also been coined 'Californian Ideology'. Boltanski and Chiapello (2007), however, have shown that the fundamental shift the capitalist ideology has been undergoing reaches far beyond the Californian border.

6 Google's webmaster guidelines: http://www.google.com/support/webmasters/bin/answer.py?answer=35291 and Google Analytics' webmaster tools: https://accounts.google.com/ServiceLogin?service=web

siteoptimizer&continue=http://www.google.com/analytics/siteopt/%3Fhl%3Den&hl=en (10 March 2012).

7 The Firefox Add-on 'TrackMeNot' or the search engine 'Scroogle' are valuable exceptions because they allow users to employ the full services, while anonymizing search queries and messing up user profiles at the same time. URLs: https://addons.mozilla.org/en-US/firefox/addon/trackmenot/ and http://scroogle.org/ (10 March 2012).

8 Google's new privacy policy and terms of service, starting from 1 March 2012 onwards: http://www.google.se/intl/en/policies/ (10 March 2012).

9 Internet Governance Forum: http://www.intgovforum.org/cms/ (10 March 2012).

10 German Enquete Commission, 'Internet and Digital Society': http://www.bundestag.de/internetenquete/ (10 March 2012).

11 Article on Google's new privacy policy and terms of service on Netzpolitik.org (in German): http://netzpolitik.org/2012/google-will-user-komplett-uberwachen/ (10 March 2012).

12 Alexander von Humboldt Institute for Internet and Society: http://hiig.de/en/ (10 March 2012).

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Astrid Mager currently works as a postdoctoral researcher at the Institute of Technology Assessment (ITA), Austrian Academy of Sciences, in Vienna. She has a PhD in philosophy from the Department of Social Studies of Science, University of Vienna, where she finished her dissertation 'Mediated Knowledge' in 2010. Her current research interests include search engines at the intersection of global capitalism and local socio-political cultures, information politics on the web, digital methods, as well as new media and knowledge production in a more general sense. She has published in a variety of journals including *Policy & Internet*, *New Media & Society*, and *Science Studies*. She blogs at http://www.astridmager.net and tweets @astridmager. *Address:* Institute of Technology Assessment (ITA), Austrian Academy of Sciences, Strohgasse 45/5, A-1030 Vienna. [email: astrid.mager@oeaw.ac.at]

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Technoscientific promotion and biofuel policy: How the press and search engines stage the biofuel controversy

Jenny Eklöf
Umeå University, Sweden

Astrid Mager
Austrian Academy of Sciences, Austria

Abstract
What are the conditions for the public understanding of biofuels and how do the media shape these conditions under the influence of a new production of knowledge? This article investigates how the biofuel controversy plays out in the Swedish press and Google search engine results and analyses winners and losers in the tight attention economy of contemporary media. It describes different visibility strategies biofuel stakeholders employ in both media arenas, and identifies a form of technoscientific promotion that hybrid actors use to succeed in the day-to-day struggle for media attention. To conclude, it raises broader societal questions of the contemporary blurring of knowledge boundaries and the emergence of new information hierarchies and their biases. By understanding how contemporary media shape controversies, we can address the democratic potential of both mass media and science.

Keywords
biofuel, press, search engines, controversy, strategic communication, science policy

Introduction

As with many other science-related controversies, for example genetically modified organisms (GMOs) and chemicals, the debate on transport biofuel is characterized by

Corresponding author:
Jenny Eklöf, PhD, USSTE, Umeå Studies in Science, Technology and Environment, Department of Historical, Philosophical and Religious Studies, Umeå University, Umeå, SE-901 87, Sweden.
Email: jenny.eklof@idehist.umu.se

high political stakes, engaged publics and expert disagreement. The role of the media is often positioned at the centre of these debates, seen as an arena where public trust can be regained through democratic deliberation. Media's ability – or inability – to represent complex issues, balance interests, include multiple voices and manage uncertainties has attracted much scholarly interest (see, e.g. Allan et al., 2000). Furthermore, the ongoing commercialization of the media and resulting content biases have been critically discussed (Herman and Chomsky, 2002). How these mechanisms play out in the biofuel controversy will be investigated in this article.

In the case of biofuels, the relationships between global warming, biofuel feedstock provision and cultivation, biochemical and thermochemical industrial conversion processes, land use practices, food safety and poverty, deforestation, and biodiversity are extremely complex and lack expert consensus. Political efforts to transition from an oil-dependent to an oil-free transport sector are equally complex phenomena, as they engage multiple societal sectors and stakeholders, such as industry, forestry, agriculture, infrastructure, environment and research, further exposing political disagreement. Such societal transitions challenge existing power structures and have a bearing on everyday life. In Europe, the biofuel controversy started to escalate between 2007 and 2008 as uncertainties grew concerning the sustainability of biofuels, a concept previously taken for granted. Scientific analyses were not consistent: they either revealed that biofuels were reliable, effective and sustainable or that they were ineffective, costly, morally dubious and environmentally damaging. In fact, science itself has become a site of struggle in the context of the biofuel controversy.

In Sweden, the government started to heavily promote biofuels at the beginning of the 21st century. At that time, the Swedish government introduced a number of measures, such as tax exemptions, a pump law, green car bonuses and other subsidies. In addition, the Swedish government invested financially in so-called 'second generation' biofuels – biofuels derived from cellulose feedstock. The official political expectation, which dates back a hundred years, has been to make use of Swedish forests to promote the emergence of a new green high-tech industrial sector that would generate jobs, economic growth and scientific competitiveness (Eklöf et al., 2012). Since 2007, the consumption of ethanol, in particular, increased dramatically and became a central issue of debate (Eklöf, 2011). Although the European Union (EU) amended its first biofuel directive of 2003, the dust has still not settled on the issue, neither in Sweden nor abroad.

The central question thus is: What are the conditions for the public understanding of biofuels and how do the media shape these conditions in the Swedish context? To answer this question, we investigate how the biofuel controversy is negotiated in both old and new media – in this case, the Swedish press and Google search results. In this analysis, we focus on visibility strategies and what we call technoscientific promotion, the latter seen as a style of communication that has emerged in relation to changed conditions for knowledge production and corporate media. By drawing on analytical concepts from the field of Science and Technology Studies (STS) and critical (new) media studies, we discuss new modes of knowledge production and the role media play in staging controversies. After describing our study and mixed methods approach, we present winners and losers in the tight attention economy of the press and search results, we describe how these winners and losers try to gain visibility in both media arenas and

we identify what features of technoscientific promotion hybrid actors use in the day-to-day struggle for media attention. To conclude, we raise broader societal questions of the contemporary blurring of knowledge boundaries and the emergence of new information hierarchies and their biases in both media environments. By understanding how contemporary media shape controversies, we can address the democratic potential of both mass media and science.

New modes of knowledge production and new communication strategies

Over recent decades, there has been an increased political pressure on established knowledge institutions, such as universities, to be more open to societal needs, to demonstrate their industrial usefulness and to conform to increasingly refined evaluations. In some accounts, this transition has been understood as predominantly beneficial (Etzkowitz, 2008; Gibbons, 1994; Nowotny et al., 2001); in others, it has been described more critically (Bok, 2003; Slaughter and Leslie, 1997; Weingart and Maasen, 2007). Most accounts, however, point to an increased blurring of boundaries between industry, academia and government as a dominant feature of this new mode of knowledge production. The transition from 'mode 1' to 'mode 2' in the terminology of Gibbons (1994) involves, among other things, that knowledge production is taking place in the 'context of application'. This has taken the form of, as far as the Swedish case is concerned, raised levels of external funding of university research, resource concentration into large-scale projects and centres of excellence, research priorities that involve multiple stakeholders, increased emphasis on technology transfer and entrepreneurial activities, as well as an overall market orientation of both internal management and public relations (Benner, 2009; Engwall and Nybom, 2007; Whitley and Gläser, 2007).

These phenomena are not entirely new, however. The fact that scientific communities have always had different professional motives and interests in communicating with the 'outside' world – be it political establishments, the public or the media – calls into question its role as a neutral knowledge provider (Ekström, 2004). These motivations shed light on the way that scientific knowledge is designed or packaged to meet the requirements and interests of different audiences *before* the media frames the issue. Science communication becomes a way of promoting recent research results, competing for funding, recruiting students and securing public support for the credibility, productivity, integrity and accountability of science. This mediation process is inescapable in the communication of science, whether it is scientists or journalists who act as 'senders' (Scanlon et al., 1999). In the past two decades, we have witnessed an increased media orientation of science though (Rödder et al., 2012). This trend may be understood against a backdrop of research institutions being encouraged to become more publicly engaged with wider audiences, while at the same time adapting their activities to meet the needs of industry. This change marks a more explicit shift from the traditional idea of science communication as an obligation or service to the public, motivated on a democratic basis, to the idea of science communication as a tool for pursuing strategic goals, such as increased research funding and student enrolment. This market orientation of science communication, partly stemming from the dismantling of established

industry–academia–government boundaries, has been analysed on different levels and within different areas (Bauer & Bucchi, 2007; Cheng, 2008). According to Bauer (2008), hyperbole and sensationalism have become normal modes of operation in scientific public relation activities. Not only universities and research centres engage in strategic science communication, but professional press services are also integrated parts of high-impact scientific journals these days (Franzén, 2012). In the biofuel case, experts from many different areas have been highly visible in the media to describe and adjudicate the scientific and political implications of biofuels. These experts are often tied to different networks, which remain widely non-transparent to the public, as we will show in our analysis.

The role of the press and search engines in staging controversies

The increasing market and media orientation of science communication corresponds to an ongoing commercialization of the media itself. Traditionally, mass media was seen as a tool to inform citizens and guarantee a democratic political culture. Like controversies, interpreted as an act of 'exploring and learning about possible worlds' (Callon et al., 2009), mass media was conceptualized as a 'laboratory' where technoscientific developments can be negotiated and future scenarios tested (Oudshoorn, 2003). In contrast, scholars from critical media studies (Herman and Chomsky, 2002) argued that mass media should not merely be seen as providing arenas where controversies are negotiated, but rather as actively shaping the very conditions under which controversies play out in the public. These conditions have to do with the economic interests of media corporations as well as journalistic framing practices, such as what is considered newsworthy (Allan, 2010). Herman and Chomsky (2002) introduced the concept of the 'propaganda model' to exemplify how commercial interests and business models influence the content mass media produce, since corporate media have to satisfy not only their audiences, but also their advertising clients. Furthermore, the emergence of public relations has been described as tightly connected to the needs of capitalist democracies (Davis, 2000; Herman and Chomsky, 2002). Public relation strategies – pushing forward both industrial and governmental interests – have been criticized as constructing 'hegemonic discourses' about scientific issues, such as genetic engineering, and undermining public debate (Weaver and Motion, 2002: 337). Press releases, in particular, function as highly effective strategies to influence news coverage on science-related controversies from the outside and increase the media presence of public and private institutions. A successful press release mimics journalism in style and content, shortens the time and effort needed to produce news, and maximizes the chances to catch a journalist's attention.

Similarly, the Internet, and the search engine Google most particularly, has become a site of struggle for attention. While the Internet was described as a decentralizing democratic technology in its early days (Berners-Lee and Fischetti, 2000; Kahn and Kellner, 2004), critical studies have pointed to information hierarchies and commercial biases introduced by search algorithms undermining the 'democratic ideal of the web' (Mager, 2012b) or the web's potential to become a new or even 'better public sphere' (Gerhards

and Schäfer, 2010). According to Brin and Page (1998), the founders of Google, the PageRank algorithm would provide a mathematical way of ranking search results since it uses the number and quality of links a website gets as an indicator of the value of that website (among other factors such as clicks from users). On the contrary, Introna and Nissenbaum (2000) argued that search engines systematically privilege major, well-connected websites at the expense of smaller ones, often those providing counter-cultural viewpoints. Accordingly, website providers have started to use search engine optimization (SEO) techniques to gain a better position in search results. Furthermore, advertising-based business models such as the 'service for profile model' (Elmer, 2004) contribute to commercialization tendencies of web information. In the 'personal information economy' (Elmer, 2004; Rogers, 2009) users get services for free, while 'paying' with their data, which are turned into so-called user profiles and sold to advertising clients to better target advertising to users' desires and needs.

Search engines may hence be seen as having incorporated the capitalist ideology (Mager, 2012a) in a way that resembles the mass media 100 years ago. The commercialization of search engines triggers SEO strategies and practices of buying sponsored results, a trend that needs to be investigated in greater detail.

Against the backdrop of these theoretical considerations, we pose the following research questions:

> In the biofuel controversy, what actors are most prominent in the Swedish press and Google search results?
>
> What role do press releases, hyperlink strategies, advertising and sponsored search results play in the representation of the controversy in the two media domains?
>
> How does technoscientific promotion shape the controversy within the new mode of knowledge production?

Methods

To answer these research questions, we used a mixed methods approach consisting of press materials and search engine results, including selected press releases, hyperlink networks and advertising. The combination of press and search engine analyses enables us to gain insights in two major media arenas where scientific (and other) controversies are negotiated and staged. With this investigation we aim to show that neither 'old' nor 'new' media are objective or neutral arenas, but rather highly contested spheres where corporate and public interests meet with media logics and commercial interests. How these mechanisms work out in each media arena and what actors benefit from these dynamics in the Swedish biofuel context will be discussed in detail. Besides following their own, media-inherent logics – human editors versus automated algorithms, substantive content versus link indexes, news stories versus websites – the press and the web, search engines in particular, also mutually influence and co-construct each other. Media corporations have settled on the web and publish their stories online, while online discourses increasingly influence classical media debates, as the Arab spring has shown dramatically.

The main body of our empirical material consists of articles from the Swedish press and Google search engine results we collected and archived from April 2011 to June 2011. For the press articles, we used the database Mediearkivet (Retriever), accessed through the Umeå University library, which includes newspapers, national and local, news magazines and news service material from all major media corporations. Initially, we used the same search terms (in Swedish) for the press and Google searches, ranging from the most generic ones, such as 'biofuel' [biodrivmedel], and more specific ones such as 'ethanol', 'biogas' and 'biodiesel', to phrases or combinations of words commonly used in the controversy, such as 'biofuel and climate change' [biodrivmedel och klimatförändringar] and 'food versus fuel' [mat eller bränsle]. The rationale for selecting these words and phrases was that they would cover three important (although overlapping) areas; biofuels generally, ethanol in particular (since the Swedish biofuel controversy primarily revolved around this fuel) and green cars. The last category was additionally captured by using the term 'super green car bonus' [supermiljöbilspremie], a policy suggestion that was very topical during the studied period. The retrieved population of articles based on the search terms 'biofuel' and 'ethanol' and 'super green car bonus' were 595 in number. For the actor and press release analyses, these articles were further reduced. In the actor analysis the ethanol articles were selected from 10 newspapers most frequently publishing on the topic, which gave a total of 130 articles. For the press release analysis, 55 news articles were analysed (excluding debate articles).

For the Google search results, we queried the same keywords in Google.se.[1] We decided to focus on Google because it has become the most dominant search engine in Sweden with a market share of more than 95% (Statcounter, 2012). We saved the queries as video files with the software *ScreenFlow* (two weeks per month). We extracted the top 30 results of each keyword, including paid links, and systematically ordered them in an Excel file keeping the rank over time. Because the search produced relative stable results, we used two days per month (for each keyword) for a closer analysis. Altogether, we analysed 1440 search results, plus sponsored links and their corresponding websites.

To answer our first research question, we categorized all actors present in the press and search results, their frequency and position, and what viewpoint on the controversy they expressed – a basic content analysis. To answer the second research question, concerned with visibility strategies, we analysed press releases in relation to selected news articles, linking strategies of actors present among the first 30 Google results as well as sponsored links. To track press releases, we searched for the actors' websites, which usually collect recent press releases. To gain insights in linking strategies and how they stabilize search results (since links are still a central factor in the ordering of Google search results and hence SEO strategies), we used the network visualization software Issuecrawler, which performs different types of analyses according to the settings chosen.[2] For the purpose of our analysis, we experimented with the different software settings to grasp linking patterns from various angles and investigate how they influenced the position of certain actors in search results. Finally, we specifically analysed sponsored search results in relation to various keywords and what actors made use of Google AdWords[1], the service allowing website providers to pay for their presence in sponsored results.

To answer our third research question, on technoscientific promotion, we specifically focused on hybrid actors, which lay across our actor categorization scheme, the

industry–policy–academia nexus in particular. This helped us identify specific features of technoscientific promotion, co-configured by strategic science communication and the attention economy of old and new media.

Winners and losers in the attention economy

Having coded all actors prominently featuring in the press and search results, six basic categories emerged: Policy, Industry, Academia, Non-governmental Organization (NGO), Media, and Public. In the Swedish press, media actors themselves figured as individual journalists writing opinion pieces or chronicles and commenting on recent biofuel events. The overall balance between actors present in the press over the whole period (April–June 2011) is reflected in Figure 1.

Among industrial actors, fuel and car companies – such as Preem, SPBI (Swedish Petroleum and Biofuel Institute), Volvo and Scania – dominated. Among policy actors, the Swedish government and government agencies – such as the Swedish Energy Agency, the Swedish Transport Agency and the Swedish Transport Administration – were featured most frequently in terms of national bodies, whereas regional or municipal energy and environmental boards were prominent on lower levels. Actors within the Academia category were mostly individual or collectives of researchers affiliated with universities or other public institutions for higher education. What is most striking in this overall picture is the significant predominance of three main actor types: the industry–policy–academia nexus. In fact, as we discuss below, some actors even fell into multiple or all of these categories and thus had a 'hybrid' character.

During the period of analysis, certain issues were particularly topical, such as the anticipated consequences of the implementation of the EU fuel quality directive and the governmental announcement of a new version of the green car premium. State agencies, whether as biofuel research and development (R&D) funders or regulators, such as the Swedish Energy Agency and the Swedish Transport Agency, dominated these debates. Of course, the Swedish government, which announced a new green car premium at the

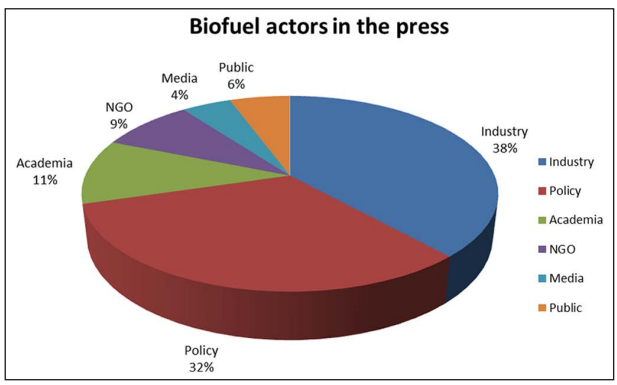

Figure 1. Biofuel actors in Swedish press articles.

time, also played a major role in these debates (Borg and Carlgren, 2011). For many commentators, these activities marked a watershed moment as the new premium did not include ethanol cars, which had been the flagship of Sweden's previous political commitments. Overall, these articles were mostly concerned with Swedish biofuel policy – either representing new policy suggestions, reactions to them or redefinitions of the scope of options available in the first place. New industrial initiatives to develop or demonstrate the usefulness of biofuels were launched, government agencies' reports were presented and expert analyses discussed.

The views on biofuels expressed in the articles escape any crude pro or con categorization. Actors can be against one particular biofuel, but support another, or they can be opposed to certain subsidies or regulatory measures, but agree on the overarching environmental or industrial policy. Generally, news pieces were more positive or neutral in their tone, reporting on new industrial developments, agency reports, fuel price fluctuations, research results, etc. Debate articles, inherently conflict laden as they were, expressed more negative views. However, both types of articles appeared to be operating within the 'sustainable biofuels' discourse, agreeing that biofuels can have both good and bad sides and that policy should be about figuring out how to support the good varieties. The public, as is often the case, was a rather absent figure: politicians, experts, industrialists and journalists refer to or speak on behalf of the public, rather than the public speaking for itself.

Contrary to initially high hopes regarding the Internet as being an inherent democratic technology, the picture of the biofuel controversy in Google search results did not differ much from the image drawn in the Swedish press. Large, well-established policy actors, industrial players and academic institutions dominated the top of Google.se. Moreover, large media corporations themselves had become omnipresent in top search results, particularly national and local newspapers, but also online press services and portals. A summary of the top 30 results of the search for 'biofuels', April–June 2011, is depicted in Figure 2.

As in the Swedish press, the industry–policy–academia nexus dominated the debate according to Google search results (besides the media also heavily promoting technoscientific actors). If sponsored links were included in the analysis, the number of industrial actors grew significantly, since biofuel companies (such as Preem or the car industry) mainly advertise with Google AdWords. However, the distribution of actors differed according to different keywords. Let us look at the top 10 results of the search for 'biofuel' and compare it to the search for the term 'food versus fuel' (which has become *the* buzzword for controversial biofuel debates in 2007–2008, in the English speaking world and beyond).

The search term 'biofuel' mainly triggered websites from the Swedish government, the Swedish Energy Agency, the Swedish Audit Office, Lund and Chalmers University, large Swedish media corporations and large companies such as the Swedish ethanol producer SEKAB (similar results were found for other generic search terms, such as biogas or biodiesel). Furthermore, Google directed us to web portals such as the website Miljö Fordon, a collaboration between the cities of Stockholm, Göteborg and Malmö promoting 'clean vehicles' in Sweden, financially supported by the EU (rank number 1). Accordingly, the issues discussed on top of Google ranged from official accounts on

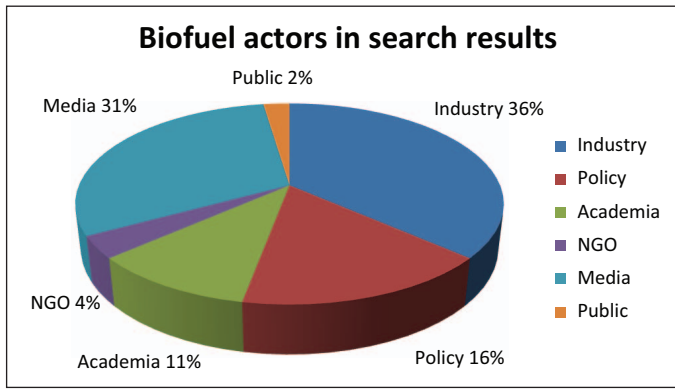

Figure 2. Biofuel actors in Google.se top 30 search results; query 'biodrivmedel'.

biofuels concerned with national and European policy strategies, academic discussions about life cycle analyses of biofuels and their energy consumption and media debates on newly published reports, one of them by the Norwegian fuel company Statoil, to an industry-informed celebration of ethanol as a sustainable alternative to fossil fuels. Sweden's lively engagement and investments in the biofuel sector as such were hardly criticized on these websites.

The very specific phrase 'food versus fuel', however, triggered more critical results. Since the media coined the term, media corporations clearly dominated the top of Google, mostly international media due to the English term, but also Swedish news services since Google.se localizes its search results according to the Internet Protocol (IP) address of the computer. Although Wikipedia was ranked number one, NGOs, such as Journey to Forever, involved in environment and rural development work in Asia and Africa, and the National Wildlife Federation, concerned with protecting wildlife and habitat, were featured among the 'top ten seats' (Introna and Nissenbaum, 2000). This result is significant, since the latter websites rarely made it to the top, no matter what search terms were chosen. Contrary to generic terms predominantly pointing users to official accounts, specific and clearly critical terms were required to reach more marginal viewpoints on social and environmental impacts of biofuels, such as rising food prices and deforestation. Another interesting aspect concerning the 'food versus fuel' results was that most articles were written in 2007 and 2008, when the food versus fuel debate peaked. This result crucially challenges the perception of the Internet as a 'fresh' medium and shows that some pieces of Internet information were quite out-dated (at least in Google search results, as the results differed in Google news services). The stability of search results was additionally confirmed by our analysis of search results over time. Except for a handful of websites having dramatically risen or fallen during our period of observation, most websites managed to hold pretty much the same rank over time.

The analysis of Swedish press materials and search engine results clearly shows that not all actors have the same voice in the negotiation of the biofuel controversy. Rather,

established policy institutions, traditional universities and industrial heavyweights are more visible than those found on the margins, NGOs and individual blogs in particular. Contrary to widespread assumptions of the web as a tool for democratizing knowledge and strengthening counter-cultural voices, representations of the biofuel controversy in search results show that the policy–industry–academia nexus succeeds in populating the top of Google search results, reifying offline power relations, such as those performed in the press.[3] Only when very specific, technical terms, such as 'food versus fuel', are used, does the user discover more marginal viewpoints. This finding confirms the media convergence thesis put forward by Seale (2005) and Nettleton et al. (2005): there is a convergence between old media – and their tendency to privilege official accounts – and new media, undermining the latter's celebrated diversity of viewpoints on controversial issues. These findings also show that alliances between policy, industry and academic actors and new modes of knowledge production have permeated both the Swedish press and Google search results. The following sections describe how these actors managed to gain presence in old and new media and what strategies they used.

Visibility strategies in the press and search engine results

The actor analysis for both the press and search engine results revealed a dominance of two major actor categories – policy and industry. These categories were followed by academia. Our analysis of press releases, link networks and advertising practices shows why these actors were more prominently featured in media materials and search results than others. One important strategy to enhance media presence in the printing press is through the use of press releases, which is a way of distributing news directly to the media in a format that conforms to media standards. Press releases can enhance an organization's brand, perform 'damage control' or otherwise strengthen influence over media output.

To assess the extent to which press releases had influenced press content on biofuels during the studied period, we took a sample of news articles and looked online for press releases that could be connected to those articles. What we found was that close to 50% could be tracked back to press releases.[4] This confirms the increasing trend of relying on external sources to save time and money. Instead of pursuing their own stories, news organizations use ready-made press releases, mostly written by public institutions or companies promoting their own agenda. Preem's press release serves as illustration of this trend. As mentioned earlier, the fuel company Preem was actively looking for media attention during our period of analysis. On 18 February 2011, Preem started launching its new fuel blend, *Evolution diesel*, in press releases and large-scale advertising. The new fuel contained 15% pine oil, produced from pulp and paper industry residues, allegedly reducing carbon dioxide emissions by 16%, compared to fossil diesel. On 31 March 2011, the Minister for Rural Affairs, Eskil Erlandsson, inaugurated the fuel (Figure 3).

The political weight of the event was underscored by the presence of the Minister who, according to the press release, saw Swedish forests as an unequalled source of welfare and industrial feedstock. The fuel was presented as unique 'world news'. When Thomas Ögren, press officer at Preem, was interviewed by the newspaper *Uppsala Nya Tidning* on 13 April, he referred to the Swedish forests as 'Sweden's

Figure 3. Michael Low (Preem) and Eskil Erlandsson, Minister for Rural Affairs, inaugurate Evolution diesel. Photo: Preem.

Klondike'[5] (Meijer, 2011). Both press releases and adverts were directed at new customers, as they clearly asserted that buying the fuel meant reducing CO_2 emissions without felling more trees (the fuel is made from forestry residues), while paying the same price as for other fuels.

What we see here is a strong emphasis on the environmental importance of these techniques and fuels for combating climate change, while at the same time providing future opportunities for economic growth and welfare. The content of the press release was adjusted to common news value criteria in the sense that it was clearly about novelties – research innovation and new unique industrial products. It also addressed one of the top political priorities in the last decade, global warming. The overall weight of this message stemmed from the joint strength of the actors presented: the Minister for Rural Affairs inaugurating Preem's Evolution Diesel fuel.

However, practices of strategically enhancing visibility were not only found in the press, but also in search results. Our analysis of the way websites are interrelated according to hyperlink connections revealed why actors from the policy, industry and academic arena were more prominent in Google than smaller websites such as those from NGOs. The link network in Figure 4 shows how websites appearing in the top 30 results of the Google search for 'biodrivmedel' were interlinked.[6]

The network shows that large institutions such as governmental bodies, universities and media corporations were heavily interconnected, as indicated by the size of the nodes, representing the number of links the websites got from the network. In particular, the Swedish Energy Agency, the Swedish government and the Swedish parliament gained a central position in link networks because they received lots of links from other policy institutions, but also from media corporations, social media sites such as Wikipedia and industrial actors such as the ethanol producer SEKAB. These connections may be seen as reflecting a common strategy, since industrial actors usually try to raise their credibility and status by pointing to official websites such as the Swedish government

website; a strategy similar to enrolling official bodies in their offline marketing strategies. Preem even linked to the environmental organization World Wildlife Fund (WWF) in attempt to show its environmental awareness. WWF, however, did not link to Preem, demonstrating an asymmetrical pattern in the politics of affiliation, which Rogers and Marres called an 'act of silencing through inaction' (Rogers and Marres, 2000). Offline relations and dynamics have thus been reified online. Established institutions from the policy–industry–academia conglomerate used their connections to build tight networks that increased user traffic and raised their position in search results, since Google also uses the number and quality of links a website gets to measure its rank (among other factors mentioned earlier). Linking strategies may hence be seen as contributing to the 'media convergence' thesis (Nettleton et al., 2005; Seale, 2005), since offline relations constitute online connections, which, in turn, result in good search engine positions.

Furthermore, investing in professional SEO and advertising campaigns strengthened large and often corporate players with large enough budgets to pursue these techniques. As with paying money to promote products in advertorials, the strategy of paying money to market products in search results has become common. In particular, biofuel companies, the car industry and some NGOs made use of Google's AdWords service,

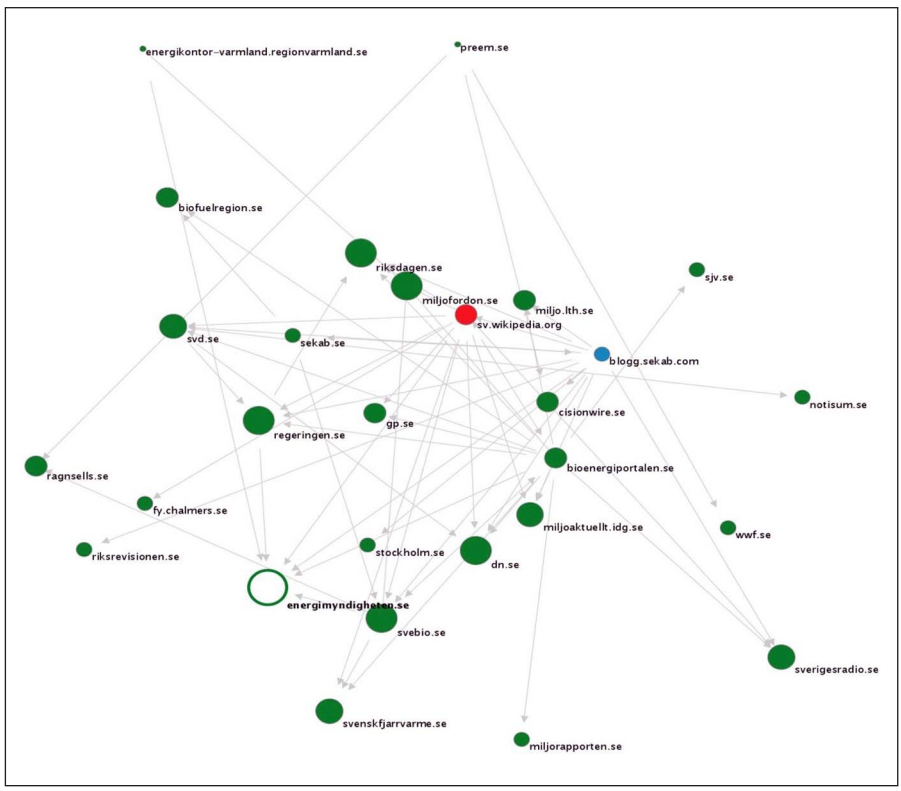

Figure 4. Hyperlink network of Google.se top 30 results; query 'biodrivmedel', created with Issuecrawler.

which allows website providers to pay money to be present on top or on the right side of the 'organic' results. Sponsored links were present in all the Google searches we conducted, but they were particularly prominent when using terms such as 'green car' [miljöbil], which triggered a myriad of car producers featuring biofuel cars and biofuel companies such as Preem and its newly launched fuel *Evolution diesel*. Given the fact that more than 50% of Internet users do not distinguish between organic and sponsored search results (Fallows, 2005), the amount of commercial information presented by Google may be considered troubling. Rather than being a neutral technical tool presenting search results in a 'mathematical' way, as Google claims, Google's 'capital accumulation cycle' (Fuchs, 2011) clearly shaped the way biofuel information was presented and hierarchized in search results. Compared to advertorials only playing a minor part in print media, sponsored search results played a major role in the way the biofuel controversy was negotiated online, especially when the search history and cookies were activated and hence used to personalize search results, which is the default setting in Google and other search engines.

The analysis of visibility strategies, whether as press releases, linking strategies or sponsored ads, revealed that both the press and search engine results were highly influenced by actors prominently figuring in the articles and search results. Their dominance is not the sole result of independent journalism or a technical/neutral way of ranking search engine results. Rather, established actors used their connections to gain presence in classic media by way of press releases and in organic search results by way of link connections. Furthermore, large and often industrial actors invested money to advertise their products in sponsored links and adverts, which additionally enhanced their visibility. This strategy explains why the policy–industry–academia nexus succeeded in outpacing smaller actors in gaining media presence. Furthermore, as we have already touched upon, policy, industry and academic actors build strategic alliances, raising their prominence even further. These alliances and their communicative strategies are the focus of the next section.

Hybrid actors and technoscientific promotion

According to our analysis of actors and visibility strategies, a tight entanglement of policy, industry and academic actors occurred where each actor drew on the strength of the other. In fact, a number of actors from these different sectors created strategic alliances, resulting in networks or platforms figuring as actors themselves in both the press and search results; we coined them 'hybrid actors' due to their marbled character. The term 'technoscientific promotion' refers to a communicative style employed by hybrid actors that emerges from the new modes of knowledge production. This style features what we call a *bundled presence*, reached by building umbrella organizations where bundles of actors act in concert, pursue common interests and jointly boost their media presence, and a *distributed presence*, achieved by each actor performing individually, but pushing forward common agendas across multiple media and contexts, as we will discuss in detail. This, in turn, produces a blurring of knowledge boundaries – between expert knowledge and policy goals, scientific knowledge production and commercialization, media content and marketing – and is largely non-transparent to the public. Two cases

exemplify hybrid actors and their communication styles arising within the new landscape of knowledge production.

The first hybrid actor, *Fossil Free Fuels* (F3), includes universities, research institutes, fuel and car companies (among them Preem) and the Swedish Energy Agency, as well as other network organizations, such as the *Bio4Energy* centre. The idea behind the collaboration, as was stated in a press release on 10 February 2011, was to secure a higher level of societal 'output' of existing and future research results. This output included building a better knowledge base for policy makers and to enhance the national capacity to stay ahead in international competition, economically and industrially. Pål Börjesson, a scientist from Lund University, stated in the press release that 'the market is almost unlimited' (Press release, 2011). This press release reflects a dominant way of framing biofuels in Swedish policy-making: science serves both politics and industry explicitly and directly and the tight connections between all three actors secure a higher level of scientific output and performance (Eklöf, 2011). The overarching conceptual frame is to advance Sweden's position globally – scientifically, industrially and environmentally – by 'driving' the development of sustainable biofuels. This specific kind of knowledge production is presented as a driving force of both political and industrial development. The communicative style of such organizations therefore comes to resemble ordinary PR and marketing, but also features science at its centre, which confirms the market orientation of much of today's science communication. The F3 platform facilitated a portrayal of all actors pulling together to encourage Swedish biofuel R&D, resulting in a 'bundled presence' of all actors involved. When the F3 centre was initiated in February 2011, many press releases were sent out simultaneously. All press releases contained the same message, but came from a diversity of actors and were distributed to different sectors. This distribution was enabled by the number and diversity of actors participating in the centre and all these actors desired good press. As a consequence, these messages had a better chance of getting more attention than they would have had without the boost of the policy–industry–academia collaboration, hence contributing to a 'distributed presence'.

This combination of bundled and distributed presence was similarly displayed in Google search results. The hybrid actor *Biofuel Region*, an initiative based in northern Sweden, was particularly successful in this regard and therefore serves as a good example. As with the F3 network, the *Biofuel Region* is supported by universities, companies and state, regional and local policy bodies and is designed to increase both the production and consumption of biofuels and to disseminate knowledge about biofuels. The goal of the organization is to 'mobilize, engage and activate' the geographical region in this direction. According to the *Biofuel Region* website, biofuel companies were at the centre of the organization that, along with input from society, universities and nature (trees as raw material) produce biofuels, bioenergy and other bio-products. The bundled presence was also apparent in the links provided on the website. As with joint press releases, the *Biofuel Region* website presented technoscientific actors from different sectors and their primary objective – promoting biofuels. In analogy to simultaneously spreading multiple press releases, hybrid actors gained presence on multiple websites at once, to reach distributed presence. Besides being present on umbrella websites such as the *Biofuel Region* or the *Biorefinery of the Future*, each actor had its own website linked to both the

umbrella websites they were part of and the actors they collaborated with to raise their link connectivity and position in search results. Furthermore, actor conglomerates increased their distributed presence by using social media sites such as Facebook, blogs, and other Web 2.0 services, but also Google AdWords. As a result, the *Biofuel Region*'s website had significant presence in Google search results. The website appeared multiple times among the top 10 of the biofuel query, since its own website, its Facebook page and its members featured the *Biofuel Region* 'brand' (and the different actors involved).

These technoscientific promotion strategies can be seen as a central reason why actors from the policy–industry–academia nexus managed to take on a dominant role in the negotiation of the Swedish biofuel controversy in both the press and search results. The bundled and distributed media presence that followed from such collaborations resulted in a stronger position than they would have had if they were only speaking for themselves. Technoscientific promotion thus figures as a communicational institutionalization of the new modes of knowledge production. At the same time, it additionally contributes to the ongoing blurring of boundaries between policy, industry and academia. The amalgamation of expert knowledge and policy goals, of science and commercial interests and, last but not least, between media content and marketing observed in the Swedish press and Google results, serve as evidence of this trend. Our analysis exemplified how these developments were co-produced by changing research landscapes and the commercialization of old and new media. Clearly, both the new modes of knowledge production and the implications of corporate media, that we discussed at the beginning of the article, should not only be seen as abstract phenomena, but rather as very concretely shaping how controversies play out in media arenas and how they are communicated to the public. As a result, already existing power relations are perpetuated and the democratic potential of the media and its role in helping citizens to 'explore and learn about possible worlds' (Callon et al., 2009) is jeopardized.

Conclusions

Our analysis has shown that not all types of actors have the same voice in negotiating the biofuel controversy in old and new media. On the contrary, the policy–industry–academia nexus better succeeds in gaining media presence than smaller institutions, such as NGOs. This is a result of the increasing market orientation of science communication and the ongoing commercialization of the media. Sophisticated visibility strategies such as planned press releases, linking strategies and professional SEO, as well as buying adverts and sponsored links are in place to enhance actors' presence in biofuel debates, both online and offline. Moreover, techniques of technoscientific promotion are used by networks and platforms made up of political, industrial and academic actors – the hybrid actors. These actors secure an advantage for themselves by building strategic alliances, as this also influences media presence through a 'bundled presence' that features all stakeholders, for example in a single press release or on a common website, and a 'distributed presence' by spreading bits and pieces of their identity through multiple press releases, news management and online formats. Accordingly, and in addition to their already increased prominence, they hit newspaper headlines and figure in the top of Google results. Press releases as a means to influence media content and SEO strategies

as tools to boost one's position in search results – in combination with paid adverts and sponsored links – play into the hands of corporate media, which increasingly rely on external news sources, automated algorithms and advertising-based business models. Our analysis shows how new modes of knowledge production and corporate media mutually contribute to information hierarchies and biases, partly overlapping with traditional power relations due to tendencies of 'media convergence'. These new modes might undermine the democratic potential of both science and the media. Accordingly, biofuels are promoted in both media domains – not in terms of a single specific fuel, but rather under the header of 'sustainable biofuels'.

The other side of the coin, however, is an increase of blurred knowledge boundaries and a lack of transparency in the public sphere. Technoscientific promotion and enhanced visibility strategies are largely non-transparent for regular media users. Neither the use of press releases nor enhanced SEO techniques are comprehensible to media consumers. Even paid content often remains unacknowledged by readers, since both advertorials and sponsored search results mimic original media content disguising underlying business models and market revenues. By understanding underlying power relations, visibility strategies and technoscientific promotion, new ways of communicating controversial issues to the public may be found. This understanding is essential in an age of global risks and media monopolies widely figuring as black boxes. Opaque algorithms and non-transparent flows of communication between journalists and organized interests should be unpacked and critically debated. This article may be seen as a step in this direction, but further efforts are needed to develop more democratic and transparent research and media landscapes.

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Notes

1. We searched carefully using different computers and changing browser settings (with and without search histories, cookies, etc.) to prevent excessively biased results due to user data stored in browsers and being used to personalize organic and paid results.
2. The Issuecrawler is from the Govcom.org Foundation, Amsterdam, http://govcom.org/. It performs a co-link analysis to map densely interlinked communities of websites, which means it performs two steps of 'exclusion'. Consequently, not all interlinked websites are visualized, but only those websites that get a link from at least two of the original starting points (chosen by the researcher). The interrelations between these 'survivors' are displayed as a network map showing websites as nodes and hyperlinks as links between them. In addition, other settings could be chosen, such as the inter-actor analysis, which analyses how the starting points are interrelated. For more information on the Issuecrawler, see also Rogers (2006, 2009).

3. Wikipedia may be seen as an exception to the rule, since its unique amounts of text and links almost always place it at the top of Google.
4. 25 articles of 55 could be linked to press releases or press invitations.
5. Klondike is the historically famed gold rush region in Canada.
6. Issuecrawler, setting: inter-actor.

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Defining Algorithmic Ideology: Using Ideology Critique to Scrutinize Corporate Search Engines

Astrid Mager

Institute of Technology Assessment, Austrian Academy of Sciences, Vienna, Austria, astrid.mager@oeaw.ac.at, http://www.astridmager.net

Abstract: This article conceptualizes "algorithmic ideology" as a valuable tool to understand and critique corporate search engines in the context of wider socio-political developments. Drawing on critical theory it shows how capitalist value-systems manifest in search technology, how they spread through algorithmic logics and how they are stabilized in society. Following philosophers like Althusser, Marx and Gramsci it elaborates how content providers and users contribute to Google's capital accumulation cycle and exploitation schemes that come along with it. In line with contemporary mass media and neoliberal politics they appear to be fostering capitalism and its "commodity fetishism" (Marx). It further reveals that the capitalist hegemony has to be constantly negotiated and renewed. This dynamic notion of ideology opens up the view for moments of struggle and counter-actions. "Organic intellectuals" (Gramsci) can play a central role in challenging powerful actors like Google and their algorithmic ideology. To pave the way towards more democratic information technology, however, requires more than single organic intellectuals. Additional obstacles need to be conquered, as I finally discuss.

Keywords: Search Engine, Algorithm, Critical Theory, Ideology, Capitalism, Social Practices, Net Politics, Social Movements

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1. Introduction

Corporate Internet technologies like Google, Facebook and co. have been described as mirroring the "Californian ideology". Google, in particular, has been interpreted as a paradigmatic example of a company deeply rooted in the economic culture of Silicon Valley with a strong belief in the democratic potential of information technology and the free market. "This new faith has emerged from a bizarre fusion of the cultural bohemianism of San Francisco with the hi-tech industries of Silicon Valley. Promoted in magazines, books, TV programmes, websites, newsgroups and Net conferences, the Californian Ideology promiscuously combines the free-wheeling spirit of the hippies and the entrepreneurial zeal of the yuppies" (Barbrook and Cameron 1996, 44). The Californian ideology encompasses ideals of both the political left and right. It reflects the disciplines of market economics and the freedoms of hippie artisanship. According to Barbrook and Cameron (1996) the Californian ideology is held by IT entrepreneurs and clearly linked to techno-determinism and American neoliberalism. It has become a buzzword for the business culture Google and other IT companies perform. It, however, fails to provide a thorough concept of ideology enabling us to analyze and criticize search engines in the context of wider socio-political developments and capitalist modes of production. Drawing on Marxian thinking critical Internet scholars (Pasquinelli 2009, Fuchs 2011a, 2011b) have scrutinized the political economy of search engines and new modes of exploitation that have been introduced along with search engines, social media, and other online services. In my own work, I have argued that search engines should not be seen as external to society, but rather as negotiated and shaped in society. They show us the face of capitalism because they were born and raised in a capitalist society. They embody an "algorithmic ideology" (Mager 2012a).

In this paper I aim to thoroughly define the notion "algorithmic ideology" by drawing on concepts from the tradition of critical theory, ideology critique first and foremost. I begin with discussing fundamental critique new media scholars have formulated regarding

search engines and their biases, business models, and political economy. Drawing on thinkers like Althusser, Marx and Gramsci I further elaborate how individual users relate to "transnational informational capitalism" (Fuchs 2011a) as a whole, how they contribute to Google's capital accumulation cycle, and how the capitalist ideology endures and spreads through search engines. I further argue that the capitalist hegemony needs to be constantly renewed, which means that Google has to motivate users to comply with its practices, and that users may opt out of Google's capital accumulation cycle any time. What role "organic intellectuals" (Gramsci 2012) can play in challenging actors like Google and their algorithmic ideology in an age of "post-democracy" (Crouch 2004) will be finally discussed.

2. Search Engine Critique

Compared to utopian digital futures inherent in the Californian ideology, critical Internet and new media scholars have pictured more dystopian visions of online spaces increasingly occupied, organized and exploited by corporate players like Google. At the turn of the century Introna and Nissenbaum (2000) started questioning the mathematical purity of search algorithms like the PageRank. While Brin and Page (1998, see also Mayer 2009), the inventors of the PageRank, argued their algorithm would mathematically measure a website's value by using the number and quality of links a website gets from other websites, similarly to references in the academic context, Introna and Nissenbaum (2000) pointed to the political dimension of search engines. Systematically preferring big, well-connected websites at the expense of smaller ones, search engines would construct a content bias and run counter to the democratic potential of the web according to the authors. Their claim was empirically confirmed by a number of studies in the past years. In the medical context, for example, well-established medical institutions and commercial health portals clearly outpace smaller websites such as self-help groups and NGOs (Seale 2005, Nettleton et al. 2005, Mager 2012b). Consequently, orthodox medical viewpoints are much more dominantly presented on the top of search engines than experiential medical knowledge and alternative accounts. Besides such snowball effects, popular algorithms like the PageRank trigger search engine optimization (SEO) strategies further contributing to information biases and the commodification of search results (Mager 2012b, Eklöf and Mager 2013).

Moreover, business models based on user-targeted advertising have come under attack in the past years. Elmer (2004) coins the core business model of the information economy the "service-for-profile" model, where users get services for free in exchange for personal data. Search engines, but also social networking platforms and other online services, turn these vast amounts of data into "user profiles" mirroring users' desires and needs. These individual or group profiles help search engines to localize and personalize search results, but also – more importantly – to personalize sponsored links, presented on the right side or on top of the "organic" search results in the case of Google, for example. In 2000, Google presented an automated advertising system called AdWords that targeted advertisements based on users' search terms. Imitating a technology originally invented by the search engine GoTo Google allowed advertisers to bid on how much they would like to pay to appear on top of sponsored search results in relation to individually chosen search terms. Later it began to syndicate cost-per-click advertisements to partner websites through its AdSense program, which allowed advertisers to relate their advertisements to a website's content[1]. This clever business model makes use of the "traffic commodity" (Van Couvering 2008) and has created gigantic annual revenues. Rather than taking over classical business models based on audiences (such as portals that collapsed during the dot-com crash), Google followed a new business model based on the 'traffic commodity', the flow of visitors from one website to the other (Van Couvering 2008).

[1] More information on Google AdWords and AdSense can be found on Google's website: http://www.google.com/intl/en/ads/ (accessed February 6, 2014).

Google hence succeeded in aligning its technology with a business model that perfectly fits the network structure of the web.

At the same time, criticism concerning privacy violations, online surveillance and the exploitation of user data and practices has emerged. Having analyzed the political economy of Google from a Marxian perspective, Matteo Pasquinelli (2009) argues that Google's PageRank algorithm exploits the collective intelligence of the web since Google uses links from other websites to measure a websites' value. These links may be seen as a concretion of intelligence that is used by Google to create surplus value. Website providers' creativity is turned into profit without being compensated by Google. Christian Fuchs further conceptualizes user data and practices as integral part of Google's capital accumulation cycle. The simple acts of using Google search, locating places with Google maps, communicating with Gmail, browsing manuscripts with Google books, watching YouTube videos, or sharing images with Picasa and Google+, to mention but a few of the vast repertoire of Google services, leave a myriad of data traces Google collects, archives and turns into user profiles. The author hence concludes that "these are all applications that can give great benefits to humans. But at the level of the relations of production, Google is a profit-oriented, advertising-financed moneymaking machine that turns users and their data into a commodity. And the result is large-scale surveillance and the immanent undermining of liberal democracy's intrinsic privacy value" (Fuchs 2011b).

In a Marxist tradition the user may hence be seen as both the consumer constantly exposed to personalized ads and the commodity that is sold to advertising clients. These analyses of the political economy of Google are valuable contributions to the understanding of the commercial dimension of search engines and new modes of exploitation that come along with it. They show that capitalist modes of production are both continued and transformed in contemporary information economies. Fuchs (2011a) speaks of "transnational informational capitalism" to capture both the continuity and discontinuity of capitalism in the information age: "Transnational informational capitalism is the result of the dialectic of continuity and discontinuity that shapes capitalist development. Surplus value, exchange value, capital, commodities and competition are basic aspects of capitalism; how such forms are exactly produced, objectified, accumulated, and circulated is contingent and historical. They manifest themselves differently in different capitalist modes of development. In the informational mode of development surplus value production and capital accumulation manifest themselves increasingly in symbolic, "immaterial", informational commodities and cognitive, communicative, and co-operative labour. The accumulation of capital, power, and definition capacities on a transnational scale is strongly mediated by new media" (Fuchs 2011a, 128).

Other notions capturing tight entanglements between global information technology and capitalist structures are "the new spirit of capitalism" (Boltanski and Chiapello 2007), "immaterial labor" (Hardt and Negri 2000, 2004), or "cognitive capitalism" (Vercellone 2007), to cite but a few of the growing number of terms focusing on the political economy of new media (see also Fuchs 2011c). However, all these contributions cannot explain why search engines have become powerful actors in the first place and how they – and their algorithmic ideology – are stabilized in contemporary society. To better understand these dynamics the focus of analysis needs to be broadened and the variety of actors involved in the solidification of search technology should be taken into account. Since Internet companies do not operate in a societal vacuum, but rather incorporate and mirror societal values we need to go beyond the political economy of search engines and include ideological frameworks, material practices and socio-political factors in the analysis, as I show in the following pages.

3. Ideology in Practice

Ideology is a complex matter. It oscillates between epistemological ideas about true or false consciousness rooted in Marxist theory and sociological thinking concerned with the way ideas function in social practices. The classical Marxist concept of ideology relates to

questions of dominant social power and the way signs, meanings and values help to reproduce power structures and, ultimately, class society (capitalism in particular, Herzogenrath-Amelung 2013). Sociological interpretations, in contrast, describe ideology as action-oriented sets of belief that sustain social life resembling neutral world views more than radical concepts of critique (for an in-depth discussion of ideology theories see Eagleton 1991). To define algorithmic ideology I focus on ideology concepts that perceive ideology as co-produced by social values and material practices. Rather than thinking of ideology as either a set of disembodied ideas or as a matter of social practices, I show that algorithmic ideology is both at the same time. It enables us to formulate search engine critique entrenched in empirical contexts, to raise empirical ideology critique. "The task of empirical ideology critique is to critically analyse ideologies in and about the media" (Fuchs 2011a, 327). In the following, I tease out ideology concepts that serve this purpose.

The first concept is Louis Althusser's notion of ideology as a matter of lived relations. "Ideology for Althusser is a particular organization of signifying practices which goes to constitute human beings as social subjects, and which produces the lived relations by which such subjects are connected to the dominant relations of production in a society" (Eagleton 1991, 18). In Althusser's belief ideology represents the way individuals relate to society as a whole. It is a matter of lived relations, but it also involves a range of beliefs and assumptions. Accordingly, it provides a concept of ideology that helps us to close the gap between ideology as a value system imposed by the ruling class and ideology as a concept emerging from social practices. It offers a bridge between the ideological superstructure and the economic base to speak in the words of Karl Marx. In fact, Marx himself introduced the notion of "commodity fetishism" in his later work to pay reference to interrelations between values and material cultures. In his first volume of *Capital* (Marx 1867) he argues that in capitalist society social relations are governed by interactions of the commodities they produce. "By virtue of this 'commodity fetishism', real human relations appear, mystifyingly, as relations between things; and this has several consequences of an ideological kind" (Eagleton 1991, 85). One of these consequences, according to Eagleton (1991, 85), is that ideology is no longer a question of (true or false) consciousness, but that it is anchored in reality, "in the day-to-day economic operations of the capitalist system". Accordingly, ideology is not just a matter of thinking about a situation, but it is rather inscribed in the situation itself. "It is no good my reminding myself that I am opposed to racism as I sit on a park bench marked 'Whites Only'; by the act of sitting on it, I have supported and perpetuated racist ideology. The ideology, so to speak, is in the bench, not in my head" (Eagleton 1991, 40). Consequently, ideology can no longer be conceptualized as solely springing from a dominant class, but rather as being enacted, stabilized, and manifested in society.

Philosophers like Theodor Adorno or Herbert Marcuse interpret the capitalist ideology as a monolithic concept reaching from commodity fetishism and speech habits to political bureaucracy and technological thought. This perception of capitalist ideology takes capitalism at face value and makes critique futile since all corners of society are pervaded by capitalism (Eagleton 1991). Antonio Gramsci, in contrast, offers a more dynamic concept of ideology involving struggle. Gramsci's work on "hegemony" interprets dominant value systems not as static and generally accepted, but rather as constantly negotiated in society. It shows that effort and strategies are needed to spread hegemonic values in society and that hegemonized groups need to participate in this process. In his prison notebooks Gramsci (2012) enriches the notion of ideology by introducing a dynamic feature and explaining that hegemonic values have to be permanently renewed, recreated and defended. Hegemony implicates struggle and negotiation and thus "lends this otherwise somewhat abstract term a material body and political cutting edge" (Eagleton 1991, 115). "To win hegemony, in Gramsci's view, is to establish moral, political and intellectual leadership in social life by diffusing one's own 'world view' throughout the fabric of society as a whole, thus equating one's own interests with the interests of society at large" (Eagleton 1991, 116). A central moment, according to Gramsci (2012, 181), is "that in which one

becomes aware that one's own corporate interests, in their present and future development, transcend the corporate limits of the purely economic class, and can and must become the interest of other subordinate groups too". Consent is reached by way of creating win-win situations that make individuals play by the rules of capitalism. In turn, hegemonized groups actively contribute to power relations and solidify hegemonic value systems. "Hegemony presupposes an active and practical involvement of the hegemonized group, quite unlike the static, totalizing and passive subordination implied by the dominant ideology concept" (Gramsci, in Forgacs 1988, 424). In the following, I show how these concepts help us to define "algorithmic ideology".

4. Algorithmic ideology

Althusser's notion of ideology as a matter of lived relations enables us to conceptualize how individual users relate to "transnational informational capitalism" (Fuchs 2011a) as a whole and how the capitalist ideology spreads through search algorithms. Google uses websites and links provided by content creators to index the web and rank its search results. It further employs user data to improve its algorithm and, more importantly, to adapt sponsored links to users' preferences and needs. In Marx's terms Google uses both content providers' and users' practices to create surplus value (Pasquinelli 2009, Fuchs 2011a, 2011b). Algorithmic logics, code, external content, link structures, user data, clicking behavior, user-targeted advertising, financial transactions all act together and take effect in a single Google search. Capitalist modes of production are enmeshed with technical features and individual practices. The ideological superstructure and the economic base meet with and feed each other in every singly Google query. Similarly to sustaining racist ideology by sitting on a park bench marked "Whites Only", conducting a Google search may hence be seen as sustaining capitalist ideology; whether consciously or not. The ideology is in the search engine and acts through algorithmic logics and computational systems. Search engines like Google may hence be seen as perpetuating the capitalist ideology through their supposedly neutral search algorithms (Mager 2012a). Undoubtedly, the role of content providers and users is central in this economic process. But how are providers and users steeped into Google's capital accumulation cycle and why do they play by the rules?

In critical internet research producers and users of web content are often described as exploited by corporate internet companies and turned into a "prosumer commodity" (Fuchs 2011b), as argued earlier. The whole debate about digital or cognitive labor conceptualizes users primarily as victims of Internet companies and their perfidious practices. "Prosumers", however, are not forced to use services by Google, Facebook and others, but rather do so of their own free will. The Internet is both a factory and a playground after all (Scholz 2013). Content providers and users are not simply exploited by Google (and others). Quite on the contrary, they clearly benefit from search services Google provides. Website providers aim to gain visibility in the multitude of web information and reach users to communicate their content. Users, in turn, want to conveniently find information and filter them along their needs. Search engines have managed to satisfy both content providers' and users' needs with their services. Especially, Google has become an "obligatory passage point" providers and users have to pass to reach their own goals (Mager 2009, Röhle 2009). Also, services like Google AdWords and Google AdSense would not work if people would not advertise with or click on Google ads. This dynamic perfectly exemplifies Gramsci's central moment in winning hegemony over hegemonized groups, the moment "in which one becomes aware that one's own corporate interests […] become the interests of other subordinate groups" (Gramsci 2012, 181). It is the moment where "prosumers" start playing by the rules of transnational informational capitalism because Google (and other IT companies) serve their own purposes; a supposedly win-win situation is established. Prosumers are "steeped into" the ruling ideology to speak with Althusser: "All the agents of production, exploitation and repression, not to speak of the 'professionals of ideology' (Marx), must in one way or another be 'steeped' in this ideology in order to per-

form their tasks 'conscientiously' – the tasks of the exploited (the proletarians), of the exploiters (the capitalists), of the exploiters' auxiliaries (the managers), or of the high priests of the ruling ideology (its 'functionaries'), etc" (Althusser 1971).

Besides benefits that help to involve prosumers into Google's capital accumulation system the broader context of consumerism plays into the hands of Silicon Valley firms and their business practices. Contemporary mass media heavily contributes to the consumerist culture by constantly featuring new online services, products, and, ultimately, IT companies. They clearly buy into and stabilize the global informational capitalism and its advertising-based modes of production. According to Bauman (2001) contemporary consumerism is not only characterized by an elevated volume of consumption, but also by the emancipation of consumption from its past instrumentality that used to draw its limits. Consumption now justifies itself only by its own "pleasurability"; consumption is its own purpose, an end in itself. "[C]onsumers should not ever be allowed to 'awake' from their 'dreams'" (Bauman 2001, 13). This quote clearly explains how Marx's (1867) commodity fetishism is anchored in reality. It, however, evokes a concept of capitalist ideology as totally pervading society, as a monolithic concept resembling the one described by Adorno and Marcuse. It takes capitalism at face value and makes critique and efforts towards change difficult.

Turning to Gramsci's notion of hegemony, in contrast, enables us to identify moments of struggle that open up the view for counter-activity and alternative futures. Röhle (2009) described Google's strategy of convincing website providers and users to play by the rules as a clever system of "punishments and rewards". Website providers who follow the rules get rewarded with a good "seat" in Google's search results, while those who transgress the rules by using illicit SEO practices get punished with a lower search engine position (or even an exclusion from the index). Similarly, users who try to opt out of Google's data collecting practices by changing default privacy settings, reconfiguring their web browsers, or turning off cookies are punished with less convenient services than cooperating users get. This shows how Google makes both website providers and users play by the rules. It further shows that Google's hegemony is not fixed or stabilized, but that it is constantly negotiated and made. "As a concept, then, hegemony is inseparable from overtones of struggle" (Eagleton 1991, 115). This struggle has the potential to challenge powerful actors like Google and their algorithmic ideology. If content providers and users broke out of the network dynamic, the power of Google and its whole business model would fall apart. If the media would feature more critical stories about Google's data collecting practices, privacy violations and possible collaborations with secret services dissatisfaction and protest would significantly grow in the public domain; as we have seen in the past months. If politics and law took on a stronger role in the regulation of search technology, limits would be set regarding the collection and use of personal data, but also business practices and advertising schemes. In an age of neoliberal policy, however, governments have widely failed to tame corporate players like Google. Quite on the contrary, the politics of privatization has pushed search on the free market in the first place. This shows that new types of actors, "organic intellectuals" in the words of Gramsci (2012), are needed to challenge corporate players like Google and its ideology.

5. Post-Democracy, Counter-Struggles and the Organic Intellectual

The state is increasingly described as "weak" (Bauman 1998) or as an "appendix of the market" (Neckel 2008) in contemporary capitalist structures. In fact, politics itself is changing under the dictate of neoliberalism. Slavoy Žižek (1998) described the current political state as "post-political", while Colin Crouch (2004) framed it as "post-democratic". In a post-democratic society democratic institutions are still formally intact, while political processes are regressing because power is increasingly transferred to economic lobbyists. "Behind this spectacle of the electoral game, politics is really shaped in private by interaction between elected governments and elites that overwhelmingly represent business interests" (Crouch 2004, 4). The negotiation process of the Anti-Counterfeiting Trade

Agreement (ACTA)[2] serves as a paradigmatic example of Crouch's (2004) concept of post-democracy. The multinational treaty, supposed to prevent online piracy and copyright infringement, was composed behind closed doors, hidden from the public and crucial institutions including the World Trade Organization (WTO) and the European Parliament. Instead, large intellectual property-based organizations such as the Motion Picture Association of America (MPAA) were active in the negotiations and hence industry-informed interests and the capitalist ideology dominated (a practice that finally resulted in massive protests and the EU's rejection of ACTA in 2012). Another example would be the EU data protection law that is currently negotiated. The binding law will be of central importance not only for European IT companies, but also for US-American players like Google. Consequently, there was heavy lobbying from Silicon Valley companies; more lobbying and industry amendments than ever before in the history of EU legislation. But Edward Snowden and his NSA revelations played a crucial role too. In June 2013 Snowden, a former employee of the CIA and NSA, revealed practices of mass surveillance that American and British intelligence agencies conducted. He further accused tech companies like Google, Facebook, Apple, and others of collaborating with the US National Security Agency (NSA), which created heated media debates. Out of a sudden the issue of large-scale online surveillance and privacy violations hit the headlines all over the world. In fact left-wing media, the Guardian in particular, played a central role in leaking information on NSA scandals and amounts of data commercial players contributed. Snowden's revelations demonstrate entanglements between corporate surveillance and state control. Rather than being victims of the market, governments appear to clearly benefit from commercial players and their data collecting practices in post-9/11 societies. However, counter-struggles are seen on various levels too. The NSA scandal made the European Parliament decide to fend off all amendments from IT companies (for now at least). The accelerated pressure Snowden reached together with critical media clearly created a change in public opinion that could no longer be neglected by policy makers[3]. Whether this will finally result in a data protection law strong enough to set limits for companies like Google remains to be seen in the future.

In Gramsci's terms Snowden may be interpreted as an "organic intellectual". The task of organic intellectuals is to provide subordinate groups with a homogeneous self-consciousness in the cultural, political and economic fields. Rather than offering "truth" from above, the organic intellectual is supposed to give shape and cohesion to practical understanding deriving from hegemonized groups themselves. "The category of organic intellectual thus spans not only ideologues and philosophers but political activists, industrial technicians, political economists, legal specialists and so on" (Eagleton 1991, 119). Contrary to philosophers withdrawn from social life, figures like Snowden positioned at the center of power have the knowledge to challenge hegemonic actors and their ideological superstructure. They have the expertise and technical know-how to open up opaque networks of information flows, algorithmic logics and collaborations between governmental bodies and commercial players. The Australian journalist Julian Assange was one of the first organic intellectuals of this sort. He created the online platform WikiLeaks publishing secret information concerned with power abuse, corruption and vested interest. Drawing on top-secret information provided by Whistleblowers of various kinds WikiLeaks succeeded in revealing scandals on an unprecedented scale and pushing it right into the public domain with the help of selected mass media[4]. This shows that individuals possessing classified information and technical skills to spread it into society can weaken hegemonic actors, practices and ideologies. Subordinate groups can gain enough power to destabilize hegemonic structures under certain circumstances. It further underlines that political

[2] http://en.wikipedia.org/wiki/Anti-Counterfeiting_Trade_Agreement (accessed February 6, 2014)
[3] http://www.theguardian.com/world/2013/oct/17/eu-rules-data-us-edward-snowden (accessed February 6, 2014).
[4] The most popular leaks include US-Army-related incidences such as the Baghdad airstrike video or standard operations at the Guantánamo Bay detection camp, but also 9/11 messages or Sarah Palin's email communication (Lindgren and Lundström 2011).

activities have migrated from institutional politics to "sub-politics" (Beck 1997). In an age of post-democracy socio-political movements like the ecological movement or feminism played a central role in putting issues like environmental protection and gender equality on the formal political agenda, as Ulrich Beck (1992, 1997) argued. The remaining question thus is whether net political issues will find their way into formal politics in the future or whether alternative measures are needed to challenge powerful players like Google and their algorithmic ideology. In the concluding section I will debate this question by pointing out that certain barriers still need to be overcome on the road towards a more sustainable information society.

6. Conclusions

In this article I used concepts from ideology critique to show how Google performs, renews and fosters the capitalist ideology. I argued that capitalist modes of production are deeply woven into Google's algorithm and computational mechanisms; that the algorithm is ideological. Moreover, I showed how content providers and users relate to "transnational informational capitalism" (Fuchs 2011a) as a whole in the terms of Althusser. Turning to Gramsci's notion of hegemony I outlined how content providers and users contribute to and stabilize the algorithmic ideology. Rather than conceptualizing them as passive victims of Google, I described them as active participants in Google's capital accumulation cycle with the ability to destabilize its dynamics. How "organic intellectuals" (Gramsci 2012) like Julian Assange or Edward Snowden can help to tame corporate search engines and their ideological superstructure was further discussed. To sustainably challenge hegemonic actors like Google and pave the way towards "value-sensitive innovation" (Allhutter and Hofmann 2010), however, requires more than single individuals. Additional obstacles need to be met, as I finally discuss:

The first obstacle is the vulnerability of organic intellectuals and the inconsistency of their political agendas. Felix Stalder (2010) argued that organic intellectuals, or "superempowered" actors as he coins them, are well suited to trigger large-scale events relatively quickly and cheaply, but that broader social movements would be needed to sustain counter-struggles in the long-term. "Many of the issues that are typical of small groups organised by a charismatic leader seem to affect WikiLeaks as well, such as authoritarianism, lack of internal procedure, dangers of burnout and internal and external attacks on the credibility of that single person (if not worse)" (Stalder 2010). Social movements like "Occupy Wall Street"[5] challenging global finance or the hacktivist collective "Anonymous"[6] advocating for issues such as freedom of information, independence of the internet, and a new copyright law may be seen as newly emerging phenomena of this sort. On a European level initiatives like the Chaos Computer Club[7], which scrutinizes privacy violations Google and others commit, or "Europe vs. Facebook"[8], which fights for the compliance of US-based companies with European data protection law, have been created. They may all be seen as locations where counter-struggles form and hegemonic actors are challenged. Rather than following a coherent political agenda, however, they all have very different political goals and visions. While "Occupy Wall Street" is rooted in a radical critique of capitalist society, Anonymous or WikiLeaks stress liberal freedoms without challenging capitalist ideology in and of itself. Gabriella Coleman (2011) argued that Anonymous and WikiLeaks share certain ideological sympathies, such as the freedom of information, but perform very diverse politics: "This diversity of politics results, in part, because geeks and hackers labor on different objects, initiate different types of projects, and are located in many different parts of the world. They are also quite sectarian, engaging in fierce debates as to what constitutes legitimate forms of access, openness, transparency, hacking, privacy, and dissent. As with most political domains, they are bedeviled by ideo-

[5] http://occupywallst.org/ (accessed February 6, 2014)
[6] http://anonnews.org/ (accessed February 6, 2014)
[7] http://www.ccc.de/en/ (accessed February 6, 2014)
[8] http://europe-v-facebook.org/EN/en.html (accessed February 6, 2014)

logical or organizational contradictions" (Colemen 2011, 514). The heterogeneity of political visions amongst disparate organic intellectuals and social movements makes it difficult to formulate a net political voice that can make itself heard in formal politics. Contrary to the ecological or feminist movement, which both had a pretty clear political vision, net politics still lacks an overarching goal and vision of alternative digital futures.

The second obstacle is the translation of "sub-political activities" (Beck 1997) into institutional politics. Even if net political initiatives try to enter formal politics and manage to explain that actors like Google cause fundamental socio-political implications that reach far beyond the digital realm, e.g. compromising human rights like data protection, struggles are waiting for them. In Germany, for example, the Enquete Commission "Internet and Digital Society"[9] has been installed by the German parliament. In this commission members of the parliament, but also 17 experts including computer scientists, Internet researchers, media experts, and net activists such as those from the Chaos Computer Club, worked together on net political issues including privacy aspects, security and media literacy. Such forums may help net political issues to enter decision-making processes, but may also dissolve net political ambitions in party politics and processes of economic value creation. The risk is that concessions are made to net activists to keep them in the network of practices stabilizing the power of hegemonic actors, but that the essence, the "nucleus of economic activity" is not touched: "Undoubtedly the fact of hegemony presupposes that account be taken of the interests and the tendencies of the groups over which hegemony is to be exercised, and that a certain compromise equilibrium should be formed – in other words, that the leading group should make sacrifices of an economic-corporate kind. But there is no doubt that such sacrifices and such a compromise cannot touch the essential; for though hegemony is ethico-political, it must also be economic, must necessarily be based on the decisive function exercised by the leading group in the decisive nucleus of economic activity" (Gramsci 2012, 161). This would imply that counter-activities run the risk of getting integrated into hegemonic power relations and, ultimately, end up fostering the dominant algorithmic ideology. Just like the artistic critique helped the "new spirit of capitalism" to endure (Boltanski and Chiapello 2007)[10], net activists may end up improving corporate internet technologies by provoking privacy-sensitive features that, in turn, raise customer satisfaction further contributing to the brand value of Google and other US companies.

Finally, the third obstacle is that even alternative search technologies enter alliances with corporate players. This means that users, who try to escape for-profit search engines often end up with big players too because the web index, the algorithm and/ or the search results are borrowed from commercial search engines. DuckDuckGo, for example, clearly tries to oppose the dominant algorithmic ideology by providing a search tool that protects privacy rather than sharing personal data with third parties. When looking at its back-end though it becomes obvious, that DuckDuckGo is highly dependent on commercial search engines and their data collecting practices. DuckDuckGo has its own crawler, but only a very small search engine index. Consequently, it displays results from other search engines; non-commercial ones, but also commercial ones including Bing, Yahoo! and Yandex. So even if it does not sell user data itself, it makes use of corporate players and their business models. In addition, it actively contributes to Yahoo's capital accumulation cycle by advertising with Bing ads. Other search engines like Ixquick, MetaGer or Ecosia are similarly dependent on big search engines and their practices (Mager forthcoming). One reason is that building a comprehensive web index has become a very expensive endeavor. Except from peer-to-peer technologies like YaCy, for example, which try to build a

[9] http://www.bundestag.de/internetenquete/ (accessed February 6, 2014)

[10] The new capitalist spirit has managed to incorporate what Boltanski and Chiapello (2007) coined, the 'artistic critique' raised by the generation of 1968 and the emerging left. The critique of industrial capitalism as hierarchical, dehumanizing and restricting the individual's freedom, authenticity, autonomy, mobility and creativity. The integration of values like self-management and flexibility in the workplace helped the new spirit of capitalism to endure. The artistic critique may hence be seen as indirectly serving capitalism, which turns critique itself into a fundamental crisis, as Boltanski and Chiapello concluded.

de-central web index running on users' own computers, search engines would need funding to be able to establish an encompassing non-corporate web index. Dirk Lewandowski (forthcoming) suggested providing public funding for creating a public index of the web that would enable programmers to build various search engines on top of it and, as a result, to achieve greater diversity on the search engine market. Contrary to funding one single search engine, funding an open web index would enable the creation of multiple different search tools challenging the dominant algorithmic ideology and offering alternative styles of search. Lewandowski (forthcoming) concluded with arguing that the task of building and maintaining a search engine index may be seen as part of government's role to provide public infrastructure: "The state finances highways used by everyone, ensures that the electrical grid is available to all, and generates and disseminates geo data. Making web data available is no different from these other public services". How such an undertaking may be practically organized, who may contribute money, what institution may be appropriate to run and maintain such an index, what additional barriers may occur on the way towards a public index are all questions that need to be further discussed.

What this article has shown though is that single actors or isolated activities will not be enough to defy big players and their ideological superstructure. Since the capitalist ideology is inscribed in code and manifests in computational logics, since it is stabilized in a complex actor-network and fuelled by neoliberal politics and contemporary consumer culture a collective effort is needed to challenge corporate search technology. Actors from the technological, the political and the socio-cultural realm all have to simultaneously nibble at quasi-monopolistic actors and their ideological Gestalt to revive the search engine market, provide technological choice, protect users, and reconsider advertising and consumer practices. Multiple actors are needed that follow their own ways of irritating Google and working towards alternative styles of search. Programming independent technology, developing public information infrastructures, refining law and regulations, supporting organic intellectuals, changing user practices and routines, questioning marketing strategies and consumer desires are all great first steps towards destabilizing powerful actors like Google. Challenging the dominant algorithmic ideology in the long-term, however, requires more than that. A fundamental debate about where to draw boundaries between the state and the market, how to set limits for corporate players, and how to sustain social justice is needed. A serious discussion about the relation between hegemonic power networks and hegemonized groups is essential. Since technology is not external to society, but rather a central part of it, society needs to change in order to change technology. Alternative socio-political visions need to be developed to conquer capitalist structures and create more democratic information technology, possibly at odds with "frictionless capitalism" (Schröter 2012).

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About the Author

Astrid Mager

Dr. Phil, is a postdoctoral researcher at the Institute of Technology Assessement (ITA), Austrian Academy of Sciences, and a lecturer at the Department of Science and Technology Studies, University of Vienna. At present, she is leader of the project “Glocal Search. Search technology at the intersection of global capitalism and local socio-political cultures” (funded by the Jubiläumsfonds of the Oesterreichische Nationalbank (OeNB), project number 14702*).* Her theoretical background is in Science and Technology Studies (STS) and her primary research interests include Internet and society, search engine politics, knowledge production, privacy, digital methods, and critical theory. Recent publications: “Technoscientific promotion and biofuel policy. How the press and search engines stage the biofuel controversy”, in *Media, Culture & Society,* 2013 (together with Jenny Eklöf), “Algorithmic ideology. How capitalist society shapes search engines”, in *Information, Communication & Society*, 2012, “Search engines matter: From educating users towards engaging with online health information practices, *Policy & Internet*, 2012. *Visit* http://www.astridmager.net*, email:* astrid.mager@oeaw.ac.at.

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Search engine imaginary: Visions and values in the co-production of search technology and Europe

Astrid Mager
Institute of Technology Assessment (ITA), Austrian Academy of Sciences (ÖAW), Wien, Austria

Abstract
This article discusses the co-production of search technology and a European identity in the context of the EU data protection reform. The negotiations of the EU data protection legislation ran from 2012 until 2015 and resulted in a unified data protection legislation directly binding for all European member states. I employ a discourse analysis to examine EU policy documents and Austrian media materials related to the reform process. Using the concept 'sociotechnical imaginary', I show how a European imaginary of search engines is forming in the EU policy domain, how a European identity is constructed in the envisioned politics of control, and how national specificities contribute to the making and unmaking of a European identity. I discuss the roles that national technopolitical identities play in shaping both search technology and Europe, taking as an example Austria, a small country with a long history in data protection and a tradition of restrained technology politics.

Keywords
Austrian media, co-production, European identity, European policy, Google, privacy, search engine, sociotechnical imaginary

Introduction

Information and communication technologies (ICTs) are described as transcending and transforming national borders, political regimes and power relations. They are envisioned as creating a global 'network society' (Castells, 2000) that has hubs and links

Correspondence:
Astrid Mager, Institute of Technology Assessment (ITA), Austrian Academy of Sciences (ÖAW), Strohgasse 45/5, 1030 Wien, Austria.
Email: astrid.mager@oeaw.ac.at

rather than cities and peripheries, 'democratic egalitarianism' (Gillespie, 2006) rather than hierarchical structures and 'technological zones' (Barry, 2001, 2006) rather than political territories. The technological reordering of topology and space goes hand in hand with processes of reordering social and political life, as captured by the term 'co-production' (Jasanoff, 2004, 2005; Latour, 1992; Marcus, 1995). The notion co-production tries to avoid both social and technoscientific determinism. It recognizes 'that the production of order in nature and society has to be discussed in an idiom that does not, even accidentally and without intent, give primacy to either' (Jasanoff, 2004: 20). Within the framework of co-production, Jasanoff (2005) focuses on power and culture to draw attention to deep entanglements of technoscientific and political arrangements. This is a valuable perspective for my analysis, as we will see later.

Barry (2001: 2) coins the term 'technological society' to refer to one that 'takes technical change to be the model for political intervention'. In a technological society, technological zones are established in conjunction with multinational corporations, financial institutions and NGOs, rather than the territorial spaces of nation states. At the same time, technological zones are not isolated from national institutions, transnational political bodies and geographical borders (Barry, 2006: 250). This creates tensions between technological zones and classical political territories. How these tensions play out in the European context will be discussed through a focus on ICTs, and on search engines in particular.

Search engines are central to the navigation of the Internet.[1] As first points of access to the Web, search engines have become the most used services by Internet users (Hoboken, 2009; Rieder, 2009). Universal search engines may be seen as central driving forces in establishing a technological zone reaching beyond national borders. Growing out of a very specific culture of innovation and benefitting from liberal data protection legislation, multinational companies like Google managed to create not only state-of-the-art search algorithms, but also new business models. With the spread of their technology, this particular Silicon Valley culture traveled around the globe. Popular search engines may hence be interpreted as expanding both geographically and ideologically, as I discuss in the next section. While the proliferation of corporate search engines and the technological zone in which they operate has expanded smoothly, they now seem increasingly at odds with political entities on the ground. In the European Union, several judgments have been passed against multinational IT companies, most importantly against Google.

But what is guiding European search engine policy? What visions and values are enacted in the European policy arena? Can we even talk about a European vision or is Europe too much of a 'multiply imagined community' (Jasanoff, 2005) to speak univocally? These are the questions I will discuss. More specifically, I will analyze, by taking negotiations of the EU data protection reform as a case study, how search technology and a European identity are co-produced. The negotiations of the EU data protection legislation ran from 2012 until 2015 and resulted in a unified data protection legislation directly binding for all European member states. Given its long negotiation process, the legislative effort serves as an excellent case to examine how technology and political order co-emerge. Using the concept 'sociotechnical imaginary' (Jasanoff and Kim, 2009), I will analyze how search engines are imagined in Europe and how Europe is imagined in

the context of search engine policy. In addition, I will discuss how the European imaginary is translated into national contexts and how national specificities contribute to the making and unmaking of a European identity. To get an understanding of the role that national histories and identities play in the perception and shaping of search technology and Europe, I take Austria as an example. Austria has a long history of data protection and a tradition of restrained technology policy rooted in a very specific 'repertoire of sociotechnical resistance' (Felt, 2015), as I discuss below.

In this article I start with a section on search engine governance and mechanisms of 'private ordering' (Katzenbach, 2013) that pose challenges for European policy and legislation. I go on to discuss the concept of a 'sociotechnical imaginary' (Jasanoff and Kim, 2009) as a lens for my analysis. In the following section, I describe the compilation of empirical materials, EU policy documents and Austrian media, and the discourse analysis employed. The empirical analysis is elaborated in three sections, each juxtaposing European policy and Austrian media discourses, examining: 1) how the European imaginary of search technology forms and how fundamental rights are conceptualized as core European values, 2) how a certain politics of control is envisioned and how the European identity is constructed in this context, and 3) how fragile the European identity is when it is confronted with national specificities deeply rooted in different historical, cultural, and economic traditions. In the conclusions, I discuss theoretical and political implications of this analysis.

Search engine governance and private ordering

Search engines are central drivers of the establishment of a technological zone reaching beyond national borders. Many search engines and associated enterprises grew out of Silicon Valley, proliferating both geographically and ideologically. Geographically, they expanded by building headquarters, server farms and transnational company constructions to reduce their tax burden. Ideologically, they spread through their wide range of services, carrying specific norms, values and ideas that came to inhabit many cultures and practices (Mager, 2012). A new business model, the 'service-for-profile' model based on personalized advertising, co-evolved with the development of search engines (Elmer, 2004; Van Couvering, 2008). Users receive services for free, while 'paying' with their data. The myriad of digital traces that users leave on their journey through the web are turned into user profiles, which are sold to advertising clients. Google was particularly successful in introducing and fostering this business model, and other companies followed. Google cleverly managed to combine its innovative search algorithm with a new model of harvesting personal data and making it economically productive. This made the company the 'undisputed market leader' (Rieder, 2009: 133), especially in Europe, where it has a market share of more than 90% (Jacobsen, 2016). Media critics talk about 'informational capitalism' (Fuchs, 2010) or 'cognitive capitalism' (Pasquinelli, 2009) to describe Google's economic culture. In earlier works, I have introduced the term 'algorithmic ideology' (Mager, 2012, 2014) to show that the capitalist spirit not only spreads through technical features and economic transactions, but also through social practices. The technological zone in which the search engine operates is thus held together by material, technical, economic, social and ideological means.

As a consequence, Google's search services and business model should not be seen as separate, but rather as tightly intertwined. This is the reason for the growing tension between the technological zone globally operating IT companies establish and the political territory demarcated by national borders, traditional policy and legislation. Rieder and Sire (2014) argue that Google's combination of search and advertising activities, its 'tangled position', is the reason for crucial conflicts of interest and biases policy and regulation need to address. Copyright infringements and freedom of expression are further matters of policy concern and legal reasoning (Hoboken, 2009). Practices of tracking and user profiling are increasingly discussed in terms of surveillance and 'social sorting' (Lyon, 2002):

> Rather than treating everyone the same, social sorting allows matching people with groups to whom particular procedures, enabling, disabling or modifying behavior, are assigned. With search engines, we encounter this as personalization. (Stalder and Mayer, 2009: 108)

In addition to its core search engine, Google has introduced a large number of services that require a user account (Webmail, Analytics, Google Scholar, YouTube, etc.) and allow the company to collect and combine very different types of data. These services enable Google to govern technology by introducing not only software features and default settings, but also terms of service and user contracts, maneuvering in legally grey zones. Scholars concerned with Internet governance describe these new forms of governing information technology as technical and private modes of ordering (DeNardis, 2009; Katzenbach, 2013; Ziewitz and Pentzold, 2014). Katzenbach (2013) defines mechanisms of 'private ordering' that companies such as Google perform as follows:

> Mechanisms of private law such as contracts, licenses, and end user agreements (EUA) are complementing, enforcing or even undermining the traditional mechanisms of public law in some areas, especially concerning copyright but also in other legal areas like privacy and consumer rights. (Katzenbach, 2013: 402)

As a consequence, the European court of justice (ECJ) has passed a number of judgments against the company in the past years, the most prominent of which has become known as the 'right to be forgotten case' (EC, 2014). In 2014, the ECJ forced Google to delete illegal or inappropriate information about a person from the Google index (at least from its European databases) if the person concerned requests it. This controversial judgment has been described as remarkable, since it successfully applied European data protection legislation to a US technology company. One year later, Google was faced with antitrust actions, when the European Commission accused the company of cheating competitors by preferring its own shopping service in its search results (Neslen, 2015). Besides these legal activities, the European Union announced a comprehensive data protection reform supposed to make Google and other multinational IT companies respect domestic rules and regulations. Given the long and tough negotiation process that led to it, this data protection reform serves as a rich case for studying how search engines are imagined in the European policy arena and how a European identity is enacted in these discourses.

The sociotechnical imaginary and the co-production of technology and Europe

The concept sociotechnical imaginary was developed in the context of research on the co-production of technoscientific developments and society (Jasanoff, 2004, 2005; Latour, 1992; Marcus, 1995). Jasanoff and Kim (2009: 120) define sociotechnical imaginaries as 'collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects'. They compare imaginaries to discourses, metaphors and cultural meanings out of which actors build their policy preferences (p. 123), drawing on a growing recognition that the capacity to imagine future is a crucial constitutive element in social and political life. Sociotechnical imaginaries hence not only include tightly bound belief systems, ideologies in a narrow sense, but also policy imaginations containing implicit understandings of what is good or desirable in the social world. In comparison to policy agendas, however, they are characterized as less explicit, less goal-directed and less politically accountable. Through the lens of the sociotechnical imaginary we can see how search engines are imagined in the European policy context, but also how the 'European technological zone' (Barry, 2001) is enacted and filled with meaning in this particular context.

Barry (2001) argues that the European technological zone is not only made up of classical political institutions and the actions of political parties, interests, networks and lobbies, but also of the political agency of scientific and technical materials. Thus 'technical controversies are *forms* of political controversy' (Barry, 2001: 9, italics in original). There is no doubt that classical political actors and bureaucratic processes are a central component of the harmonization of the European Union: 'Brussels is above all, for its critics, a bureaucracy' (Barry, 2001: 65). Barry argues, however, that if we want to understand the cultural policy of the European Union we should not be looking at culture in a classical sense, but also examining the material culture, the politics of regulation and technology according to the author. Following this line of thought, in this article I analyze negotiations over the EU data protection reform as a highly political issue drawing together political institutions, technical standards, modes of private ordering, lobby interests, social norms and civil society. My crucial question is how a European identity is imagined in this technopolitical controversy. According to Jasanoff and Kim (2009: 124) political territories like states or nations should not be seen as fixed or immutable either, but rather as 'reimagined, or re-performed, in the projection, production, implementation, and uptake of sociotechnical imaginaries'. This particularly applies to the political construct of Europe, as Jasanoff (2005: 10) argues in the context of biotechnology:

> Europe in particular is a multiply imagined community in the minds of the many actors who are struggling to institutionalize their particular versions of Europe, and how far national specificities should become submerged in a single European nationhood – economically, politically, ethically – remains far from settled.

Along these lines, in this article I analyze how a European identity is imagined and enacted in the context of search engine policy and how national specificities contribute

to the making and unmaking of Europe. I use the notion of sociotechnical imaginary to help understand how 'Europe itself is *in practice* being allowed to unfold' (Waterton, 2002: 198; italics in original). To trace how the European imaginary is translated into national contexts, I analyze Austrian media discourses related to the EU data protection reform. Each European country has its own technopolitical history that plays into the perception and construction of technoscientific developments.

A number of scholars describe Austria as following a restrained technology policy (Felt, 2015; Felt et al., 2008; Müller and Witjes, 2014; Torgersen, 2002). Torgersen (2002) argues that Austrians should not be seen as technology-averse in general, but rather as abhorring certain large-scale technological systems that carry menacing images, most importantly nuclear power and agricultural biotechnology. Felt (2015) coins Austria's restrained technology policy as 'keeping (certain) technologies out'. Austria's strong opposition to nuclear power plants and its rejection of genetically modified food crops serve as important frames of reference when nanotechnology is discussed in Austria. One central component of the Austrian 'repertoire of sociotechnical resistance' (Felt, 2015: 6) is the picturing of Austria fighting against mighty economic actors. This imaginary was originally shaped in the context of genetically modified foods that are represented as profiting big, industrial players and threatening local culture (Felt, 2015; Torgersen, 2002). Felt (2015: 121) concludes that resisting a technological innovation also means resisting a certain mode of politics: 'Imposed from outside rather than developed from within, driven by lobbies rather than by the ideal of the public good, imposed from above rather than developed from below, artificial rather than natural.'

Study and methods

In 2009, the European Union announced the ambitious goal of developing a unified data protection legislation directly binding for all 28 European member states: the General Data Protection Regulation. This regulation is meant to replace and update the current Data Protection Directive from 1995[2] and to force multinational companies to respect European rules and regulations. In January 2012, the European Commission presented the first draft of the regulation. After two years of heavy negotiations, on 12 March, 2014 the European Parliament adopted a common position. The Council of Ministers, where national interests of the member states are at play, only reached a common position on 15 June 2015. After that, the three-way discussions between the European Commission, the European Parliament and the Council of Ministers, required for passing the law, started. On 15 December 2015 the three parties reached an agreement, which, in a newspaper article citing the data protection activist Max Schrems, was interpreted as a 'diplomatic text, complicated and full of exceptions'.[3] At the time of writing (April 2016), the actual legal text has been produced, and it has to be formally approved again by the European Parliament and the Council of Ministers. Following two years of transitional arrangements the law will come into force (probably in 2018).

Throughout the negotiation process, Austria, which has a long tradition in data protection, has taken a strong position. In Europe, Austria was the first country to lay down data protection as a fundamental right, in its Constitution in 1978 (Souhrada-Kirchmayer, 2010). Since then, Austria has been one of the countries with the strongest data

protection laws in the European Union. To keep up its strict law, Austria tried to fight for strong data protection standards during the negotiation process of the EU data protection reform. Below I discuss how Austria's 'technopolitical identity' (Felt, 2015; Müller and Witjes, 2014,) plays into the shaping of the European search engine imaginary and how national specificities contribute to and prevent the construction of the European identity.

To address these issues, I conducted a discourse analysis of European policy documents and Austrian press materials dealing with the EU data protection reform. Policy documents and media articles follow different logics and play on different registers. Felt et al. (2009: 28) describe the differences as follows: As a result of complex negotiation procedures between member states, European policy documents use 'a limited set of discursive elements, which are rhetorically highly coded and symbolic'. They hence articulate their imaginations on a macro-level. The media, in contrast, taps 'into the broad pool of cultural imagination and local experiences' (Felt et al., 2009: 28) and provides more nuanced imaginaries, agendas and cultural frames. Loeber et al. (2011: 151) refer to the constitutive character of media, 'which play a major role in co-producing images or story-lines engaging nature in the social order'. As for policy imaginations, the media should not be seen as passively representing reality, but rather as actively participating in the shaping of social and political order.

Since the negotiation of the EU data protection law took much longer than expected, the reform process was not finished when I collected empirical materials. This, however, did not turn out as a problem for the study, because I focus on European visions and values and their articulation in the Austrian context, rather than on technical or legal details. The shaping of the European imaginary, discourse coalitions and lines of conflict, as well as identity constructions and deconstructions, all appeared to be relatively stable throughout the reform process.

The analysis focuses on a period running from January 2010 to May 2014. In 2010, the European Commission formulated its first policy document explicitly dealing with the EU data protection reform. At the same time, a controversy over Google Street View made newspaper headlines all over Europe.[4] When Google tried to launch its Street View service on the European market, a number of individuals, civil society groups and formal policy makers started to take action. As an endpoint of the analysis, I chose the elections of the European Parliament in May 2014, because the negotiations came to a preliminary halt when the European parliament had to pause and reconstitute itself. In the Austrian media, the fact that the data protection reform had not been finished before the elections was clearly framed as a defeat. The polling day thus served as a good final point for both the policy and media analyses.

In the policy analysis, I included all policy documents dealing with the General Data Protection Regulation (Communications of the European Commission, the first draft of the data protection reform by the Commission, the position by the European Parliament, and documents from the Council of Ministers).[5] In addition, policy documents defining the overall course of the EU, such as the Lisbon Agenda (EC, 2000) and Europe 2020 (EC, 2010c), as well as digital counterparts such as the Digital Agenda for Europe (EC, 2010b) were chosen as context materials. Twelve comprehensive documents were analyzed altogether. In the media analysis, three quality papers (the daily newspapers *Der*

Standard and *Die Presse* and the weekly newspaper *Falter*) and three tabloids (the daily newspapers *Kronen Zeitung* and *Österreich* and the weekly magazine *News*) were included, chosen for their high circulation. In addition, I included *Futurezone*, an Austrian online portal focusing on digital issues. The newspaper articles were selected through searches using the DeFacto database provided by the Austria Press Agency (APA).[6] The focus on Google resulted from the fact that Google has a quasi-monopoly on the Austrian search engine market and is discussed as a dominant actor in the media. While policy documents speak of ICTs in general and envision search engines as part of broader sociotechnical developments, the media not only differentiates among search engines, social media and software packages, but also refers to them by name. Altogether 690 articles were analyzed.

The discourse analysis of EU policy and Austrian media materials was conducted as part of a larger research project that included qualitative interviews with stakeholders involved in the EU data protection reform.[7] The research in the current article uses discourse analysis as developed in the work of Hajer and colleagues (Hajer, 1993, 1995; Loeber et al., 2011). Hajer (1995: 44) defines a discourse as 'a specific ensemble of ideas, concepts, and categorisations that are produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities'. A discourse may hence be seen as co-producing social and political order. Hajer's (1995) concept of discourse serves as a valuable tool to analyze how the European search engine imaginary is crafted in policy discourses and media representations, how it is filled with meaning, and how the European identity is constructed and deconstructed in both discursive arenas.[8]

The European search engine imaginary

My discourse analysis shows a shift from a techno-euphoric discourse towards a fundamental rights discourse over the past years. The techno-euphoric discourse staged search engines mainly as drivers for social innovation and economic growth. The fundamental rights discourse shaped search engines primarily as a threat to privacy. Given the different logics that policy documents and media reports follow, these storylines were differently articulated and filled with meaning in the different arenas. In the policy arena, the techno-euphoric discourse was initially crafted in the influential Lisbon Agenda (EC, 2000: 12):

> The uptake of digital technologies is likely to be the main driver of substantial growth in the EU over the next decade. The challenge for Europe is to create the conditions in which this potential can be realised – to use the productivity gains achieved to make the economy more dynamic and create jobs. This pattern can already be seen in the US but is not yet visible in the EU.

This storyline was continued in all follow-up documents of the Lisbon Agenda. In policy documents explicitly dealing with Europe's digital future, notions such as the 'digital single market' or the 'free flow of personal data' were staged as central components of the strategy to embrace ICTs to stimulate growth and create jobs (e.g. EC, 2010b). These stable phrases recurred in almost all policy documents, reflecting the observation that

policy documents use 'a limited set of discursive elements, which are rhetorically highly coded and symbolic' (Felt et al., 2009: 28). The broader imaginary of European technology politics as a 'technological race with the United States' (Jasanoff, 2005: 77) is another common rhetoric enacted in EU policy. It implies that European policy employs a standardized repertoire of imaginaries traveling from certain technological contexts to others. It further shows that European policy constructs the European identity in relation to 'the other', most importantly the US. This particular form of identity construction is crucial in the fundamental rights discourse too, as we will see.

The techno-euphoric interpretation of ICTs boosting economic and social progress can also be found in the Austrian media arena. Google was described as a highly creative and innovative company developing exciting features and services. In addition, economic facts and figures were compared to rank Internet companies amongst the top players in the world economy.

The Street View controversy in 2010 initiated more critical debates and the fundamental rights discourse started to take shape. The arrival of Google's Street View cars – collecting images and other information – on European soil was staged as an event that provided the ground on which the fundamental rights discourse grew. Strong images and metaphors were important: An Austrian farmer attacking a Google vehicle with a pickaxe, for example, became an iconic event picked up by both quality papers and tabloids – the latter generally reporting on personal stories more than on political facts.[9] The illegal scraping of open WiFi data by Google's vehicles further contributed to the swelling of this discourse. Google was characterized as invading European countries and citizens' privacy. Especially quality papers nurtured the image of Google 'ignoring privacy, data protection legislation and cultural norms'.[10] Tapping 'into the broad pool of cultural imagination' (Felt et al., 2009: 28) metaphors like 'data octopus'[11] were used to illustrate Google's thirst for data: 'This octopus is evil. Its sheer size allows the beast to evade any control.'[12] This is the first time that companies like Google were described as being 'out of control', an image further crafted in the context of the NSA affair, as described below. Google was a preferred target for this rhetoric, but Facebook and some other companies were similarly pictured in the Austrian press. In the aftermath of the Street View controversy, a European voice started to form in the media, calling for coordinated actions against Google on the basis of common data protection standards. Several events fuelled this European imaginary, most importantly the Europe-vs-Facebook case. The attempt of the Viennese student Max Schrems to sue Facebook for privacy violations, running a gauntlet from the Irish data protection authority to the Irish court and from the European court of justice to the Austrian court, demonstrated a European dimension of data protection issues (see Schrems, 2014).

While the Street View controversy made newspaper headlines, the European Commission presented its first policy paper explicitly dealing with the EU data protection reform. Its primary goal was described as follows: 'Data processing is globalised and calls for the development of universal principles for the protection of individuals with regard to processing of personal data' (EC, 2010a: 16). In this context, the economic rationale of the digital single market was increasingly overshadowed by the fundamental rights discourse staging citizens' rights and freedoms as core European values. The right to privacy, the right to be forgotten, the right to informational self-determination and,

most importantly, the fundamental right to data protection were conceptualized as central components of the European vision:

> Data protection is a fundamental right in Europe, enshrined in Article 8 of the Charter of Fundamental Rights of the European Union, as well as in Article 16(1) of the Treaty on the Functioning of the European Union (TFEU), and needs to be protected accordingly. (EC, 2012: 2)

Here, both digital technologies and a European identity are imagined in the context of the data protection reform. Through the lens of the 'sociotechnical imaginary' (Jasanoff and Kim, 2009) we can see that the European Union constructs itself as a guardian of citizens' personal data and as a 'driving force in promoting high data protection standards worldwide' (EC, 2010a: 5). Especially with respect to multinational IT companies, the impetus of empowerment is deeply embedded in the imaginary constructing the EU as defending its values against other countries and customs. This indicates that the search engine imaginary is shaped by and co-evolving with European values, not separable from European politics and society.

In the Austrian media, we can see that the NSA affair contributed significantly to the stabilization of the fundamental rights discourse. It figured as a 'key incident' that is 'essential to understand the discursive dynamics' of the debate (Hajer, 2016).[13] Snowden's revelations of close co-operations between Internet companies and secret services helped to solidify a view of multinational IT companies intruding into and violating fundamental rights of European citizens. In the context of the NSA affair, the Austrian media no longer merely spoke about fundamental rights being at threat, but also about human dignity and democracy at large. Metaphors such as 'Big Brother' were mobilized to picture the threat posed by companies like Google. These metaphors strengthened the empowerment rhetoric embedded in the fundamental rights discourse in the media. In this context, the EU data protection reform was conceptualized as a necessary tool to defend core European visions and values against multinational IT companies and their practices of 'social sorting' (Lyon, 2002) and surveillance. Quoting an opinion piece by Viviane Reding, then Vice-President of the European Commission, and Beatrix Karl, then Minister of Justice in Austria, the online portal *Futurezone* wrote:

> A consistent EU General Data Protection Regulation has to put an end to the contemporary fragmentation in data protection. 'We cannot credibly defend ourselves against Google, Facebook or the NSA on the basis of the Austrian, Hungarian or German data protection law', as it is said in the opinion piece.[14]

This quote underlines that policy and media discourses should not be seen as separate, but rather as mutually shaping one another. But what is at stake here? What kind of policy is imagined and how is the European identity constructed in this imagination?

Politics of control

The starting point of the reform process was defined by the rapid expansion of the 'technological zone' (Barry, 2001, 2006) that companies like Google create and its growing tension with the political territory on the European ground:

> **Rapid technological developments and globalisation have profoundly changed the world around us, and brought new challenges for the protection of personal data.** Today technology allows individuals to share information about their behaviour and preferences easily and make it publicly and globally available on an unprecedented scale. … At the same time, **ways of collecting personal data have become increasingly elaborated and less easily detectable**. For example, the use of sophisticated tools allows economic operators to better target individuals thanks to monitoring of their behaviour. (EC, 2010a: 2, bold in original)

In particular, practices of user profiling were discussed, since technical complexity and a proliferation of actors involved in the provision of user-targeted advertising were seen as making it difficult to know if personal data are being collected, by whom, and for what purpose (EC, 2012: 24). Personal data processed by multinational IT companies and their opaque services were described as being out of control. The EU data protection reform was characterized as a political means to put limits to modes of 'private ordering' (Katzenbach, 2013) that increasingly escape European rules and regulations. Putting Europe back in control was the goal, at multiple possible levels: the level of users, Data Protection Authorities, or European policy at large.

First, users were envisioned as regaining control over personal data being stored and processed on servers around the world. According to a Eurobarometer survey, 72% of Internet users in Europe 'feel they are not in control of their data' (EC, 2012: 4). The European Commission suggested that multinational IT companies should minimize the amount of personal data that they collect and process, provide default settings that ensure that personal data is not made public, and delete an individual's personal data if that person requests it and if there is no other legitimate reason to retain it (EC, 2012). In this context, transparency was shaped as a central condition for enabling individuals to exercise control over their own data:

> It is therefore essential that individuals are **well and clearly informed, in a transparent way**, by data controllers about how and by whom their data are collected and processed, for what reasons, for how long and what their rights are if they want to access, rectify or delete their data. (EC, 2010a: 6, bold in original)

Especially the explicit consent to data transfer, however, was a major issue of controversy and lobbying, since it points to the heart of the 'service-for-profile' (Elmer, 2004) business model. In relation to user control, the terms 'privacy by design' or 'data protection by design' were used a few times to motivate 'data controllers' to make sure that data protection safeguards are taken into account at the planning stage of the technology (EC, 2012); however, this storyline appeared to be a marginal one.

Second, Data Protection Authorities (DPAs) were envisioned as better controlling multinational companies and as ensuring that European citizens can exercise their rights. They were pictured as 'guardians of fundamental rights and freedoms with respect to the protection of personal data' (EC, 2010a: 17). They were expected to play a key role in establishing consistent law enforcement across the EU, putting an end to a fragmented legal environment creating uncertainty and uneven protection for individuals. In addition, high penalties were discussed as a means to control multinational IT companies. Whether DPAs could be equipped with enough resources in terms of money, manpower

and technical know-how to play their roles successfully and how they could manage to better co-operate remained matters for discussion, since DPAs are national bodies and thus a matter of national policy. In addition, the level of sanctions was a subject of controversy, as media debates will show.

Third, on a more abstract level, Europe was envisioned as regaining control over business models, data flows, algorithmic logics and financial transactions that had transgressed geographical borders and escaped domestic regulation: 'No matter how complex the situation or how sophisticated the technology, clarity must exist on the applicable rules and standards that national authorities have to enforce and that businesses and technology developers must comply with' (EC, 2010a: 18). In the first draft of the data protection reform, the European Commission used actual cases to illustrate how the new data protection legislation would help citizens, DPAs and the EU to exercise their power. Even though the names of the companies were not mentioned in the text, the examples are easily related to actual cases, such as the Europe-vs-Facebook initiative, the hack of Sony's PlayStation network, the Google Street View controversy, and Cloud services. The choice of cases shows that the EU data protection legislation addressed not only European companies, but also and more importantly multinational IT corporations providing services from a distance:

> Individuals' rights must continue to be ensured when personal data is transferred from the EU to third countries, and whenever individuals in Member States are targeted and their data is used or analysed by third country service providers. This means that EU data protection standards have to be applied regardless of the geographical location of a company or its processing facility. (EC, 2012: 10)

In this 'politics of control', Europe is imagined as regaining control over a globally operating IT industry that is described as having invaded European territory. Rather than imagining its own IT policy, the EU counts on controlling and containing big players and their commercial practices.

This form of identity construction appeared in the Austrian media, too. In line with its long history of data protection (Souhrada-Kirchmayer, 2010) and its tradition of 'keeping (certain) technologies out' (Felt, 2015), the media portrayed Austria as earnestly working towards strong data protection standards to contain big, universal search engines. Conceptualizing Google as invading the country and expanding its business practice on local ground, the imaginary of 'small Austria against mighty economic actors' was reenacted in the Austrian media (Felt, 2015; Torgersen, 2002). Google and other big players were challenged in this perception, and so was a certain mode of politics: 'imposed from outside' and 'driven by lobbies rather than by the ideal of the public good' (Felt, 2015: 121). Accordingly, the European politics of control was presented as broadly consistent with Austrian interests. In fact, a number of very different actors pushed the politics of control in the Austrian media, leading to interesting 'discourse coalitions' (Hajer, 1993). Even a spokesperson from Google nurtured the impetus of control, claiming: 'The easiest way to establish and maintain trust are services that provide users themselves with control over their data – that is better than we have control over their data, or third parties like government authorities.'[15]

The discourse of control was shared and co-shaped by antagonists, which makes it particularly strong (Hajer, 2016). With the uptake of the control discourse from the European arena, the construction of the European identity in opposition to 'the other' was reappearing in the Austrian media. One reason for the smooth translation of the European imaginary into Austrian media debates is that European and Austrian policy makers made a joint appearance in the media. In an opinion piece, then EC Vice-President Reding, and Minister Karl characterized Europe's identity as follows:

> The former CIA and NSA director Michael Hayden just recently spoke of the Internet as the 'Wild West'. This is exactly not our vision in Europe. We are a legal community. In Europe not the law of the strongest counts, but the strength of the law. The Internet must not be a legal vacuum; the constitutional state must not capitulate to the Internet. This is exactly why we work on credible solutions to data protection both on the national and the European level.[16]

Giving European (and national) policy makers a voice additionally helped to solidify the European identity in Austrian media debates. Contrary to policy documents formulating rather abstract visions, the media tapped into historical and cultural values to depict its version of Europe. The 'Wild West' figured as a recurring metaphor in Austrian media; it described the cultural values and the 'totally different understanding'[17] of data protection in the US. The Austrian parliamentarian Eva Lichtenberger put the issue in historical terms, drawing attention to 'broad skepticism on the transfer of personal data in the eastern parts of Europe due to their historical experience'.[18] The European identity is deeply rooted in awareness of recent historical events such as Communism and National Socialism, and an Austrian writer articulated this explicitly in an opinion piece: 'To put it in provocative terms: If Hitler had had data à la NSA, no Jew, no Sinti and Roma, no regime critic would have survived.'[19]

Through such articulations, Austrian media debates contributed to the imagination of Europe as a coherent entity, contrasting European and US visions and values. This European identity was further hardened in the light of lobbying attempts by multinational IT companies. How national specificities contributed to the unmaking of a European identity will be further discussed in the next section.

The making and unmaking of Europe

While the European imaginary of search engines and the envisioned politics of control appeared to be strong in abstract terms, their translation into legal text presented a different picture in policy and media discourses. Conflicts of interest and opposing storylines characterized the tough negotiation process. Policy documents hinted at conflicts in the large number of amendments and modifications in the various drafts of the reform. The duration of the negotiation process also suggested the opposing interests, and the complex discussions in the Council of Ministers showed especially harsh lines of conflict. Even though the Council of Ministers is a rather non-transparent board, preliminary documents and working papers leaked to the public showed the diversity of voices and viewpoints.[20] In addition, policy makers speaking in the media were able to publicly communicate divergent views on controversial issues.

In contrast to policy documents, the media openly spoke about conflicts, frictions and fractures. When talking about the actual reform process, the quality newspaper *Die Presse* described the complex negotiations as 'warfare on three fronts':

> The reasons for the long fights about the proposal suggested by the European Commission lie in the complexity of the matter – the draft accepted by the committee on internal affairs comprises 4000 points – but also in the situation of the battle, because a warfare on three fronts has flared up between the Commission, EU members and Internet corporations. The associated interests in a nutshell: Brussels wants Europe-wide, harmonized regulations on the one hand and more rights for consumers on the other hand, the member states do not want to soften their national laws, respectively want to remain an attractive location for online giants – and the companies themselves desire, at best, no binding regulations at all.[21]

Martial metaphors like 'war', 'fight' or 'battle' were repeatedly used to describe the lines of conflict, by both quality newspapers and tabloids.[22] In line with the identity construction described earlier, the first line of conflict was drawn between the EU and the US. Right after the first announcement of the EU data protection reform by the Commission, lobby efforts of unprecedented scale unleashed in Brussels. Silicon Valley companies invested heavily in lobbying strategies, resulting in more amendments than ever before in the history of EU legislation – almost 4000 (Albrecht, 2014). In the Austrian media, these lobbying measures were described as watering down data protection standards. After the NSA affair, even economic sanctions were discussed: 'If the US government "tramples our values all over", negotiations about a European-American free trade area, which should start soon, do not make any sense', as a member of the Austrian Social Democratic Party put it.[23] The Snowden revelations changed not only the tone of negotiation, but also the actual text adopted by the European Parliament. The most significant change, as discussed in the media, was a raise of the level of sanctions in cases of legal breaches to 5% of a company's annual revenue.[24] Compared with the current situation, this is a relatively high penalty, interpreted by Austrian journalists as significantly hurting multinational companies such as Google. In this storyline, the European identity was constructed in opposition to 'the other' again. It was shaped as coherent political entity fighting against the lobby armada sent by the US IT industry and backed by the US government. The martial metaphors used in the media solidified the European identity, actively participating in the shaping of the European sociotechnical imaginary of search engines.

At the same time, however, national discourses also contributed to the unmaking of a European identity. In the context of the data protection reform, some European member states were seen as opposing common data protection standards as a whole. While the Austrian media described the position by the European Parliament as consistently privacy-friendly, the proceedings in the Council of Ministers were characterized as full of conflicts. The basic line of conflict was drawn between countries friendly to privacy working towards strong data protection legislation and other countries trying to weaken data protection standards. In this discourse, Austria, Germany and Poland were portrayed as especially friendly to privacy, while Great Britain and Ireland were seen as benefitting economically from the presence of multinational corporations and being in alliance with companies like Google or Facebook: both of these latter countries have relatively lax

data protection regulations and are hence popular locations for Internet companies.[25] Ireland was often characterized as giving Silicon Valley companies a European home, by providing them with liberal data protection standards and tax benefits. These countries were seen as helping multinational IT companies to expand their technological zone across European borders. They were further described as contributing to the spread of the 'algorithmic ideology' (Mager, 2012, 2014) that ICTs carry in their technical Gestalt. Citing Gerhart Baum, former minister of the interior in Germany, the quality newspaper *Die Presse* pictured the ideological invasion in dark colors:

> The digital revolution is more profound than the industrial revolution of the 19th century. The problem is as big as the problem of climate change or the spread of nuclear weapons. There are dangers of financial markets, and there are dangers of information markets, these big, automated data collections that change everything: the personality, the society and democracy. We are in a radically new situation with which we have to deal seriously. The principle of human dignity is at stake. Privacy is part of human dignity and is endangered. And if we do not manage to tame the information markets we will experience what we experienced with the financial markets – only worse because we distance ourselves from a conception of mankind characterized by human dignity.[26]

Not only were unleashed data flows and business practices to be 'tamed', but so were to be their ideological underpinnings. Climate change and nuclear weapons were mobilized as strong frames of reference to exemplify the deep impact ICTs are supposed to have on social and political orders. In the context of Austria's technopolitical identity, especially its green image and its rejection of nuclear technology, passages such as the above would have clearly indicated a risk to local values and cultures. That passage taps into Austria's rich 'repertoire of sociotechnical resistance' (Felt, 2015) and evokes 'menacing images' (Torgersen, 2002) from other technological contexts to continue and solidify Austria's tradition of restrained technology policy. From the Austrian media perspective, European countries facilitating the geographical and ideological proliferation of multinational IT companies were described as 'blocking'[27] the reform process and opposing the politics of control. The online portal *Futurezone* got to the heart of the conflict line:

> 'Under no circumstances should the reform lead to setbacks regarding citizens' fundamental rights. Austria can thus not agree to the planned declaration by the EU Council of Ministers, but agrees with parts of it', said Karl (then Austrian minister of Justice). More specifications are needed. The representative of Great Britain also does not want to accept the paper by the Irish EU Presidency, for very different reasons though. Chris Grayling, Minister of Justice, warns that the data protection reform planned by the EU would have gigantic impacts on European corporations. If those were burdened too heavily, competitiveness would suffer and Europe would be threatened with a loss of jobs. 'We should not make legislation for Microsoft and Google, but for our medium-sized industry', said Grayling.[28]

This underlines that not only were different cultural perceptions of privacy and data protection at play here, but so were different economic cultures. Britain, in particular, was described as an economically liberal country that does not want to burden its economy with strict data protection standards, which were seen as causing high costs and competitive disadvantages for European companies. Countries like Germany, principally in favor

of strong data protection standards, were also discussed as following economic interests in the Council of Ministers and hence as being divided between a fundamental-rights friendly position and economic interests.[29] Moreover, not only the NSA, but also European secret services were discussed as operating large-scale citizen surveillance. Quoting the British *Guardian*, the newspaper *Der Standard*[30] described the UK's Government Communications Headquarters as 'worse than the NSA', since according to Edward Snowden its program 'Tempora' directly taps into the network of big fiber optic cables.

All of this shows the complexity of actors and interests contributing to the unmaking of a European identity. Rather than being divided between pro-privacy and contra-privacy countries, Europe was pictured as multi-faceted, with multiple conflicts of interest running between and within its single countries. Fundamentally different visions and values rooted in different historical experiences, socio-political traditions, economic cultures and ideological foundations all participate in the co-production of search technology and Europe.

Fundamental rights were still mobilized to reinforce a coherent European position, but as the elections of the European Parliament approached the situation got increasingly hopeless. The longer the negotiation process took, the harsher the criticism of the slow process became in the Austrian media. In the course of the long-winding process, the rhetoric of empowerment turned into a rhetoric of disillusion. After Reding announced that further negotiations of the data protection reform were postponed until after the elections of the European Parliament, the Austrian press reported critical accounts and frustrated voices, such as that of the German Green Jan Philipp Albrecht, the rapporteur of the EU data protection reform: 'I think this is a setback for the European election campaign.'[31] When Peter Fleischer, data protection officer from Google, described the EU effort as 'dead', Albrecht found even stronger words: 'The EU would reach an agreement, if Google did not torpedo each regulation and spend hundreds of billion dollars for lobbyists in Washington DC and Brussels.'[32] Other voices, however, blamed inner-European conflicts: 'After more than two years of negotiation, the EU member states still fight over central points of the reform.'[33] Users' explicit consent to data transfer, the level of sanctions of 5% and coordinated law enforcement across the EU – all central components of the politics of control, as argued earlier – were still under negotiation. This shows how national discourses contributed to the unmaking of Europe. It indicates that not only multinational IT corporations and their practice of expansion, but also tensions on the European ground were viewed in media debates as obstructing the reform. In the rhetoric of conflict, the European identity was shattered and fragile. Through the eye of the media, we can see that the European voice crafted in policy visions turns into a concert of different voices and viewpoints when it comes to its translation into the legal text. While the European technological zone may be functioning on a bureaucratic level, it is filled with conflicting views when it comes to political practice; this is the 'institutionalization' of the discourse in Hajer's (1995) terms. Tough negotiations of the EU data protection legislation depict Europe as a 'multiply imagined community' (Jasanoff, 2005) in the minds of European policy makers, national politicians, legislators, data protection advocates, industry lobbyists, journalists and ideologues, all of whom try to institutionalize their particular versions of Europe. In the field of search engine policy it is still far from

settled 'how far national specificities should become submerged in a single European nationhood – economically, politically, ethically', as Jasanoff (2005: 10) puts it.

Conclusions

I have shown how a European imaginary of search engines is forming in the EU policy domain. It conceptualizes fundamental rights as core European values, which need to be defended against multinational IT companies providing their services from a distance. European policy is mainly concerned with containing IT giants like Google and their business practices of 'social sorting' (Lyon, 2002), and follows a politics of control. In this imagined politics of control, the European identity is constructed in contrast to 'the other', most importantly the US technology-policy nexus.

My analysis further shows that the European search engine imaginary and the envisioned politics of control are reenacted and solidified in the Austrian media, since they well-correspond to Austria's long history in data protection and its tradition of restrained technology policy rooted in a rich 'repertoire of sociotechnical resistance' (Felt, 2015). The European search engine imaginary is not only crafted in the EU policy arena, but also in national media debates, where strong images and metaphors are used to solidify a European identity. In this context, the Austrian technopolitical identity contributes to the making of a European identity.

Meanwhile, other national particularities contribute to the unmaking of a European identity, when it comes to the translation of the European vision into the actual text in the EU data protection legislation, or the 'institutionalization' of the discourse (Hajer, 1995). Europe is in this context no longer shaped as a coherent whole, but rather as a 'multiply imagined community' (Jasanoff, 2005). The dominant line of conflict has been drawn between privacy-friendly countries and economically liberal countries fond of weak data protection standards. Other lines of conflict were depicted, such as that between data protection advocates and industry lobbyists, and that between the European Commission and national policy makers. Not only technical and legal details, but also historical experiences, technopolitical identities, perceptions of privacy, sociopolitical traditions, economic cultures, the proximity and distance to multinational IT companies and their 'algorithmic ideology' are all at stake when EU data protection standards are negotiated. They all participate in the co-production of search technology and a European identity. But what are the theoretical and political implications of this analysis?

The case shows that sociotechnical imaginaries should not be seen as monolithic or stabilized, but rather as multi-faceted and dynamic. The European search engine imaginary appears to be coherent in the European policy arena, contested when confronted with lobbying attempts, and multiple given the heterogeneity of national interests and agendas at stake. Contrasting policy and media discourses enables us to see that not only technology, but also Europe is differently crafted, made and unmade in different locations: in policy negotiations and media debates, in Brussels and in nation states, in lobby-battles and activist circles, in formal policy structures and modes of private ordering and in social practices and technical features.

My comparative approach, however, still directs us to dominant visions and values involved in the co-production of search technology and a European identity, while it

obstructs the view on more marginal voices and viewpoints: Methods do not passively report on a given reality, but rather actively help to produce reality (Law, 2004; Mol, 1998, 2002). If methods are seen as constitutive elements in the research process, however, they may also be seen as political. Methods make 'certain (political) arrangements more probable, stronger, more real, whilst eroding others and making them less real' (Law, 2004: 149).

So what are the 'ontological politics' (Mol, 1998) of this analysis? Examining dominant visions and values may be seen as reproducing power relations and hegemonies enacted in the policy and media domain. The focus on Google – resulting from its omnipresence in both discursive arenas – drove my attention to the politics of control concerned with big players. In the context of search engine law, Hoboken (2009) argues that the dominant position that Google holds in European legal debates may further contribute to its quasi-monopolist position in Europe. He thus concludes: 'Clearly, there is room and need for more than one general search engine, so European search engine law and policy should look beyond the dominant position of Google' (Hoboken, 2009: 92). Putting Google at the center of the analysis further contributes to the dominant politics of control envisioned in European search engine policy. It obstructs the view of alternative imaginaries of search engines, that may be found at the edges of the material.

Notions like privacy by design and the development of privacy-friendly technology are marginal to discussions in the policy and media arena, but are more prominent in discussions in activist circles and the European start-up scene.[34] In these latter discourses, strong data protection standards are seen not only as means for controlling big players, but also as means for promoting the European IT industry. This 'politics of innovation' focuses on domestic start-ups rather than multinational corporations. Especially after the NSA affair, data protection can be turned into a competitive advantage. In this context, Europe can be imagined as embracing data protection, and thus providing a niche in which alternative technology can grow. Companies can build privacy-friendly features into technology and host personal data on European soil, to mention two strategies discussed for reaching this goal. Europe can expand its own technological zone, rather than focusing on the containment of Silicon Valley companies and their modes of proliferation. And countries like Austria can build their own 'alternative innovation space' (Felt, 2015) within the European one. Bringing such sociotechnical imaginaries to the fore may help to strengthen alternative digital futures and algorithmic ideologies such as those embodied in privacy-friendly search engines.

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Notes

1. In this article, the term 'search engine' not only refers to a tool for simple web searches, but also includes search services that require a user account, as well as the business model that enables these services since they appear to be tightly intertwined. In parallel, the term 'Google' not only refers to Google search, but to the whole assemblage of services that Google provides, including maps, Email, social network, Analytics, YouTube, the business model that Google employs, and even the company Google, Inc. (Alphabet, Inc.). These merge in practice, as will be discussed below.
2. Until now, data protection has been regulated through the OECD Privacy Guidelines and the EU Data Protection Directive 95/46/EC.
3. *Futurezone* 16-12-2015: EU-Datenschutz: Einigung auf neue Bestimmungen: http://futurezone.at/netzpolitik/eu-datenschutz-einigung-auf-neue-bestimmungen/169.809.845 (accessed April 2016).
4. Google Street View offers panoramic views from different positions along many streets in the world. It was launched in the US in 2007 and in 2008 it was introduced in Europe. Since then, Google Street View has been a subject of controversy, a target of privacy concerns and an issue of legal fights that made Google alter its service several times. In Austria, Google was temporarily banned in 2011. For further information go to: https://en.wikipedia.org/wiki/Google_Street_View and https://en.wikipedia.org/wiki/Google_Street_View_in_Europe (both accessed April 2016).
5. Since the article focuses on the regulation of search engines, the directive on the protection of personal data in the area of police and justice was not included in the analysis (even though also being part of the EU data protection reform package).
6. I combined explicit search terms such as 'Google + General Data Protection Regulation', 'Google + Data Protection Reform', 'Google + Data Protection Legislation' with more general search terms such as 'Google + Data Protection', 'Google + Privacy', 'Google + NSA', and 'Google + Snowden' to contextualize discourses explicitly dealing with the data protection reform http://www.apa-defacto.at/Site/Medienrecherche.de.html (accessed April 2016).
7. There were eighteen qualitative interviews with European and Austrian stakeholders involved in search engine governance, including with formal policy makers, legal and technical experts, data protection advocates, net activists, as well as representatives from consumer protection and civil society were conducted. More information on the project 'Glocal Search: Search technology at the intersection of global capitalism and local social-political cultures' (2012–2015, supported by the Jubilee Fund of the Austrian National Bank) can be found here: www.oenb.at/jublfonds/jublfonds/projectsearch?id=5398&action=detailview&origin=resultlist>https://www.oenb.at/jublfonds/jublfonds/projectsearch?id=5398&action=detailview&origin=resultlist (accessed August 2016).
8. My analysis started with identifying broad thematic storylines, discourse-coalitions and discursive shifts to understand how the European search engine imaginary forms in the policy and media arena. I followed with a value-oriented analysis to identify how the European imaginary is filled with meaning, what metaphors are employed, and how the European identity is shaped in the context of search engine policy was conducted. For the analysis of thematic storylines I used a rough coding scheme consisting of codes like 'Street View' or

'NSA affair' in the media and 'growth and jobs' or 'citizens' rights' in policy papers. For the value-oriented analysis I developed a more complex coding scheme, employing the software MAXQDA (http://www.maxqda.com/). In this analysis, analytical codes such as 'European values' or 'Austrian culture' in the media and 'economic discourse' or 'social union' capture visions, values and meanings. In addition, the codes 'EU versus US' and 'intra-European conflicts' turned out to be relevant to grasp discourses of making and unmaking Europe in the Austrian context. In this process, top-down codes resulting from the research questions were combined with bottom-up codes emerging from the empirical material, enabling me to trace the forming and falling apart of the search engine imaginary in EU policy discourses and Austrian media debates.

9. Apart from the different staging of search engines – personal stories vs political facts – quality newspapers and tabloids crafted similar storylines and worked with similar metaphors, which is the reason for the rather coherent presentation of the media discourse in this article. While tabloids tended to cover the EU data protection reform only in a few lines, quality newspapers provided much longer reports, opinion pieces and interviews on the reform process. This is why more quotes from quality newspapers are presented in this article than from tabloids.
10. *Der Standard* 21-04-2010: Datenschützer klopfen Google auf die Finger
11. *News* 06-05-2010: So gefährlich sind Facebook und Co
12. *Die Presse* 21-08-2010: Steht mehr auf dem Spiel als das deutsche Vorstadtidyll?
13. http://www.maartenhajer.nl/?page_id=14 (accessed April 2016).
14. *Futurezone* 25-09-2013: Ruf nach rascher Umsetzung von EU-Datenschutzreform
15. *Der Standard* 06-08-2010: Google: Dann wären wir der Zensor aller Inhalte.
16. *Der Standard* 24-09-2013: Das Internet ist nicht der Wilde Westen
17. *Die Presse* 21-02-2013: 'Dreiste' Intervention der US-Lobby in Brüssel
18. *Die Presse* 21-02-2013: 'Dreiste' Intervention der US-Lobby in Brüssel
19. *Die Presse* 07-08-2013: Der Weg zur Unfreiheit: Hitler und die Datensammler
20. The initiative LobbyPlag gathered all these leaked papers to show which countries work for or against strong data protection standards: http://lobbyplag.eu/governments (accessed April 2016).
21. *Die Presse* 22-10-2013: EU-Parlament nimmt Facebook an die Kandare
22. *Die Presse* 22-10-2013: EU-Parlament nimmt Facebook an die Kandare, *Kronen Zeitung* 29-01-2013: Kampf für besseren Datenschutz, *Falter* Nr. 28, 10-07-2013: 1.000.000.000.000 Daten.
23. *Die Presse* 11-06-2013: Datenaffäre schädigt Beziehungen zwischen EU und USA
24. In the final agreement (15 December 2015) the amount was lowered to 4% again, which underlines again that the EU data protection reform can be interpreted as a tradeoff between divergent visions and values: http://futurezone.at/netzpolitik/eu-datenschutz-einigung-auf-neue-bestimmungen/169.809.845 (accessed April 2016).
25. *Die Presse* 22-10-2013: EU Parlament nimmt Facebook an die Kandare
26. *Die Presse* 20-07-2013: 'Wir müssen die Datenmärkte bändigen'
27. *Falter* Nr. 51-52, 18-12-2013: Was wurde eigentlich aus…
28. *Futurezone* 06-06-2013: EU-Datenschutz: Österreich will nicht zustimmen
29. Later in the reform process, documents from the Council of Ministers were leaked to the public that showed that Germany brought in more amendments against strong data protection standards than it did for a strict EU data protection legislation: *Futurezone* 10-03-2015: Lobbyplag zeigt, welche Länder EU-Datenschutz verhindern: http://futurezone.at/netzpolitik/lobbyplag-zeigt-welche-laender-eu-datenschutz-verhindern/118.616.178 (accessed April 2016).

30. *Der Standard* 23-07-2013: 'Goldenes Zeitalter' der Online-Spionage
31. *Die Presse* 23-01-2014: EU-Datenschutz rückt in weite Ferne
32. *Futurezone* 14-01-2014: Google: 'Europäische Datenschutzreform ist tot'
33. *Die Presse* 23-01-2014: EU-Datenschutzreform rückt in weite Ferne
34. A good overview of European civil and human rights organizations concerned with rights and freedoms in the digital environment may be found on the website of the 'European Digital Rights Initiative' (EDRi): https://edri.org/about/ (accessed April 2016).

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Author biography

Astrid Mager is a postdoctoral researcher at the Institute of Technology Assessment, Austrian Academy of Sciences, and a lecturer at the Department of Science and Technology Studies, University of Vienna. She is currently working on her habilitation project, 'Algorithmic imaginaries: Visions and values in the shaping of search engines' (funded by the Austrian Science Fund (FWF), grant V511). Her research interests include Internet and society, politics of ICTs, algorithmic cultures and digital methods. See: http://www.astridmager.net/ and @astridmager

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Internet governance as joint effort: (Re)ordering search engines at the intersection of global and local cultures

Astrid Mager
Austrian Academy of Sciences (ÖAW), Austria

Abstract

In this article, I investigate Internet governance in practice by focusing on search engines, Google in particular. Building on science and technology studies–grounded Internet governance research, I ask how different stakeholders interpret governing by algorithms, the governing of algorithms, and the limits of various governing modes when considering local specificities. To answer these questions, I conducted 18 qualitative interviews with key experts involved in search engine governance from four distinct societal domains: policy, law, civil society, and the IT sector (from Austria and/or the European level). In this analysis, I show that perceptions of search engine governance are shaped not only in specific cultural contexts but also within particular social groups and their situated knowledges. I further elaborate how joint efforts are imagined as a means to challenge powerful search engines and their governing abilities cutting through different societal arenas and areas of expertise. Finally, I discuss implications of this analysis regarding the complex relationship between global technology and local cultures.

Keywords

Austria, European Union, governing by algorithms, governing of algorithms, Internet governance, qualitative interviews, science and technology studies, search engine, Google, situated knowledges

Corresponding author:
Astrid Mager, Institute of Technology Assessment (ITA), Austrian Academy of Sciences (ÖAW), Apostelgasse 23, 1030 Vienna, Austria.
Email: astrid.mager@oeaw.ac.at

Introduction

Internet technology companies have grown into powerful actors who intervene in world politics in various ways. Just recently, after Donald Trump announced a ban on visitors from seven predominantly Muslim countries (January 2017), a coalition of large and small technology companies—including Google, Apple, Facebook, Twitter, and Microsoft—filed a legal brief against Trump's travel ban. Sam Altman from the startup funder Y Combinator commented in the *New York Times*, "Silicon Valley is stepping up."[1] Around the same time, rumors started to spread that Facebook's CEO Mark Zuckerberg is himself considering running for the US presidency.[2] Not to speak of endless discussions in academic circles on how search engines may have helped Donald Trump to become president in the first place[3] or how social media may have influenced the United Kingdom's "Brexit" vote.[4] All this implies that private technology companies are increasingly maneuvering on political terrain. In fact, political leaders from different countries have started to negotiate with Silicon Valley companies on their own. Their overlying goal is to benefit from the vast amount of data these big players are sitting on, usually under the pretext of terror prevention strategies. This indicates that the influence of transnational technology companies reaches far beyond the geographical borders of the United States. Rather, it intersects with national policy strategies and local socio-political cultures.

While IT companies are increasingly operating on classical political territories, at the same time, they are introducing new forms of politics on technological grounds. Instead of explicit rules and regulations, technological forms of politics are shaped by protocols and sociotechnical arrangements. DeNardis (2009) speaks of "protocol politics" as a way of characterizing this kind of governance that is co-produced by technological and political means. Rather than elected, flesh-and-blood politicians, an assemblage of social choices and technical entities including code, software, and technical infrastructure define the rules of this game. Accordingly, the field of Internet governance (IG) has grown significantly in recent years. While IG scholars traditionally investigate how international organizations and multistakeholder arrangements govern Internet technology (e.g. Levinson and Marzouki, 2015, 2016), scholars in the field of science and technology studies (STS) have started to focus on protocols and practices. They have shown how algorithms, lines of code, bits and pieces of software, and hardware components contribute to IG (Gillespie, 2014; Musiani, 2013a, 2013b; Ziewitz, 2016; Ziewitz and Pentzold, 2014). Moreover, they have investigated how corporate interests are inscribed in technical components and act through their technical Gestalt (DeNardis, 2009, 2014; Katzenbach, 2013; Mager, 2012a). They conclude that IG takes place not only in global institutions but also through day-to-day interactions with technology, in "mundane activities" (Hofmann et al., 2017: 1415).

Drawing on this body of work, in this article I investigate IG in practice by specifically focusing on search engines. Musiani (2013b) and Saurwein et al. (2015) distinguish between two types of governance in regard to search engines and ranking systems: "governance *by* algorithms" and the "governance *of* algorithms." The first type relates to the governing power of algorithms themselves or the "power through the algorithm" (Beer, 2009). The second type captures classical forms of governance, "the governance of

algorithms, the extent to which political regulation can affect the functioning of the instructions and procedures subtending technology" (Musiani, 2013b). These two types of algorithmic governance conceptually guide my analysis in the context of search engines. These are the central research questions: What challenges do different types of actors identify regarding governing *by* algorithms? What solutions do they suggest in terms of the governing *of* algorithms? Where do they see limits of the various governing modes, considering local specifics? To answer these questions, I have conducted 18 qualitative interviews with key actors involved in search engine governance stemming from four distinct societal domains: policy, law, civil society, and the IT sector. All actors work in the area of Austrian and/or European search engine policy. Austria is a country with a long tradition in data protection and a rather restrained technology policy (Felt, 2015), as further described below. Google[5] is at the center of discussions in this study since it holds a quasi-monopoly position in Europe of more than 90% (Jacobsen, 2016) and poses crucial questions in terms of IG.

In the following pages, I discuss how IG research and STS have co-emerged in recent years. Within the context of STS-grounded IG research, I then elaborate on global search engine governance and its relation to local specificities, in terms of both "geographical arrangements" (Law, 2008: 1) and "situated knowledges" (Haraway, 1988). After a description of the empirical study and methods used, I present the analysis in three sections, focusing on different perceptions of (1) governing *by* algorithms, (2) the governing *of* algorithms, and (3) limits of governing modes rooted in local cultures. To conclude, I discuss the implications of this analysis in regard to the complex relationship between global technology and local cultures.

IG research meets STS

The term IG has been constructed and deconstructed multiple times in recent years. Van Eeten and Mueller (2012) argue that the field labeling itself as IG research only captures a narrow field of study, primarily focusing on transnational institutions like the "Internet Governance Forum" (IGF) or the "Internet Corporation for Assigned Names and Numbers" (ICANN). The authors thus conclude that "There is a remarkable absence of governance in what is commonly called Internet governance" (Van Eeten and Mueller, 2012: 728). To broaden this narrow concept of IG, STS scholars have suggested investigating IG in practice. Rather than providing yet another IG definition, they propose to investigate how IG figures in Internet architecture, sociotechnical practices, and private modes of ordering (DeNardis, 2009, 2014; Musiani, 2015; Ziewitz, 2016; Ziewitz and Pentzold, 2014).

DeNardis (2009, 2014) has analyzed technical infrastructures as arrangements of power and politics; negotiations over Internet architecture as conflicts of norms, values, and rights; and IG as increasingly privatized endeavor enacted by corporations and nongovernmental bodies. Katzenbach (2013) argues that technological devices and Internet services should not be seen as external triggers for regulation but as parts of the heterogeneous networks that constitute the social, just like norms or power. He uses the notion of "private ordering" to capture how mechanisms of private law, including contracts, licenses, and end-user agreements, increasingly complement, and even undermine,

traditional mechanisms of public law, especially concerning copyright and privacy issues (Katzenbach, 2013: 402). Compared to governance, the notion of "ordering" focuses on practices and procedures rather than formalized institutions and regulations, which makes it a useful tool for STS-oriented IG research. Ziewitz and Pentzold (2014) refer to Law's (1994) concept of ordering to analyze how IG is enacted and performed in different contexts. They aim to multiply the notion of IG by showing that different versions of reality relate to different "modes of ordering" (Ziewitz and Pentzold, 2014: 2008). To illustrate their argument, the authors discuss five versions of the "Twitter Joke Trial," an Internet-related conflict in Great Britain.[6] In this analysis, they show how different readings of the "Twitter Joke Trial" invoke different solutions to the problem. Reading the Twitter message of blowing up a British airport as a joke, a terror threat or a case of user surveillance leads to very different proposals for policy actions, such as intervening in Twitter's self-governance, closing a regulatory gap, or developing security-conscious social media use. These examples illustrate the interdependence of different versions of reality and visions of governance, an aspect I will explore further in my analysis.

Hofmann et al. (2017) suggest grounding IG in mundane practices of coordination. They explain that "grounding governance in coordination means studying ordering processes from the bottom-up rather than proceeding from regulatory structures" (Hofmann et al., 2017: 8). The authors then argue that mundane activities of coordination become reflexive when ordinary interactions break down and become problematic. Drawing on Boltanski and Thévenot (2006), they call such moments "critical moments." In critical moments, actors begin to redefine the situation in question since routines are challenged, contested, and displaced through acts of articulation and justification. The authors conclude that "'critical moments' open temporary windows to the precarious conditions underpinning social coordination, which, more often than not, may be in need of adaption" (Hofmann et al., 2017: 14). In view of my empirical material, Edward Snowden's intelligence leaks of the massive surveillance performed by secret services and Internet companies may be interpreted as such a critical moment. An Austrian activist from my interview sample referred to Snowden's revelations by dubbing it "the Chernobyl of data protection." Having conducted my study one year after the Snowden disclosures, the dust has started to settle and different social actors have had some time to reflect on mundane practices of coordination and modes of adaption. To lay the ground for the empirical analysis, I will now discuss the particularities of global search engine governance and its relation to local cultures.

Global search engine governance and local specificities

Critical Internet researchers have pointed to various modes of governing performed by globally operating search engines. First, search engines are discussed in terms of their central role in ordering web information. Introna and Nissenbaum (2000) were among the first scholars having pointed to the political qualities of search engine algorithms. According to them, these are rooted in mechanisms of determining systematic inclusions and exclusions and factors leading to systematic prominence for some sites and systematic invisibility for others (Introna and Nissenbaum, 2000: 171). The authors consider the influences that come into play in these ways of ordering political because they strongly

shape what people find and select. Their arguments are empirically confirmed by studies having shown how people search for, select, and engage with online information (Goel et al., 2010; Mager, 2009, 2012b; Seale, 2005). Introna and Nissenbaum hence conclude that search engines' ways of functioning, especially corporate ones that are largely black-boxed, run counter the ideology of the Web as a public good. In a similar vein, Beer (2009) argues that unlike hegemonic power operating from the outside, power is now working from the inside. Following Lash's (2007) notion of post-hegemonic power, Beer (2009: 999) elaborates that there is a complex "underweave of power at play in the digital mundane." Following these arguments, political qualities and biases can be found in all search engines and ranking mechanisms, as White and Horvitz (2009) have shown in the medical context, for example. Since Google constitutes such a powerful source of access in wide parts of the world, however, the ""inherently political" qualities" (Musiani, 2013a: 5) of Google are particularly discussed. In reference to Wu (2010), Musiani (2013b: 4) argues that Google, "as the 'master switch' of the internet (Wu, 2010: 279–280), centralises and organises the circulation of information in the network of networks, and for every search interrogation and request, arbitrates on what's important and relevant."

Second, corporate search engines have been described as governing by shaping users' behavior. Badouard et al. (2016: 3ff) elaborate how Google governs by "directing" users' behavior. Drawing on Foucault's (1982) notion of governmentality and discussing Google's Webmaster Tools, the authors explain how Google directs publishers' actions by installing an incentive-oriented governmentality regime. They argue that Google encourages website publishers "to produce their content in a certain way by giving advice on the best way to make and publish content, if they want to be visible on the leading search engine" (Badouard et al., 2016: 4). Moreover, they argue that designing a website, content management system, or social network (e.g. Google+) can be interpreted as an act of making users adopt a certain behavior, while developing a mobile operating system (e.g. Google's Android) can be seen as an act of framing what can and cannot be done with a mobile phone. The authors thus argue that this new means of exerting power is about influencing other people's behaviors (Badouard et al., 2016: 2). More fundamentally, Cohen (2012) argues that networked information technologies reconfigure the self as such:

> The social and cultural patterns that mediate the activities of self-constitution are being reconfigured by the pervasive adoption of technical protocols and services that manage the activities of content delivery, search, and social interaction. (Cohen, 2012: 130)

This reconfiguration of the self happens within a larger techno-political climate that Cohen (2014) labels the "surveillance–innovation complex." In this paradigm, user surveillance is seen as a necessary prerequisite for innovation, while privacy is framed as "antiprogressive, overly costly, and inimical to the welfare of the body politic" (Cohen, 2013: 1904). The author concludes that corporate information technologies, and the neoliberal rhetoric surrounding them, redefine the very nature of the self, surveillance, and privacy, which triggers crucial regulatory effects, an aspect that will be discussed in my analysis.

Finally, private modes of ordering performed by corporate search engines like Google have also been discussed (DeNardis, 2009, 2014; Katzenbach, 2013). Belli and Venturini (2016) argue that contractual agreements like terms of service can be directly implemented through technical means like algorithms, online platforms, or Internet traffic management techniques. These agreements

> may be considered as a kind of private law-making system, because the substantive provisions set in the agreements—which may apply transnationally—regulate the relationships between the parties with a binding force that may be analogue to or even stronger than the one exercised by law. (Shapiro, 1993, quoted in Belli and Venturini, 2016: 2)

Given the great number and variety of Google services, its power to govern by private ordering has been discussed, particularly in regard to commodification, privacy, and surveillance (Fuchs, 2011). In reference to Hardt and Negri (2000), Google is described as having established a "technological empire" (Pasquinelli, 2009: 158). Miller (2004: 81) argues that the rules of this "imperial machine" are written not only in the political arena but also in scientific and engineering laboratories. Mager (2017) exemplifies how global IT companies expand "technological zones" (Barry, 2006), transgressing national boundaries and challenging cultural specificities and political territories on the ground. In the "surveillance–innovation complex," users are primarily constructed as consumers and regulation is mainly directed at forms of private lawmaking and industry self-regulation, which are understood as fostering innovation (Cohen, 2014: 8). This poses crucial challenges for European data protection regulators attempting "to maintain a generally precautionary stance towards personal data protection" (Cohen, 2016: 394) that is supposed to protect citizens and their rights. This indicates that notions like privacy and data protection are culturally shaped and hence tied to particular localities and their economic and socio-political characteristics (Cohen, 2013; Mager, 2017). But how can "the local" be grasped analytically in relation to global technology?

STS has a long tradition of showing how local specificities shape the development and governance of global technology. Martello and Jasanoff (2004) explicitly address the importance of the local in the context of global environmental governance. They argue that local knowledge and identities are of growing importance in global governance and challenge "the simplifying and universalizing forces of global science, technology, and capital" (Martello and Jasanoff, 2004: 4). Both the local and the global should not be seen as fixed or rigid entities, but rather as being constantly made and remade in processes and practices. They are "constituted through the beliefs, actions, and normative commitments of relevant social actors" (Martello and Jasanoff, 2004: 16). These actions and beliefs are at the heart of my study. In the analysis, however, the local refers not only to the cultural specificities of Austria but also to individual practices and perspectives. Martello and Jasanoff (2004: 17) suggest that the local may also be found in how users understand a technological system, for example. This interpretation of the local relates to Haraway's (1988) concept of "situated knowledges." Following a constructionist argument, Haraway (1988) argues that all forms or knowledge claims, including scientific ones, are socially constructed and made. "I am arguing for politics and epistemologies of location, positioning, and situating, where partiality and not universality is the condition of being heard to make rational knowledge claims" (Haraway, 1988: 589).

Study and methods

To investigate how search engine governance figures in local practices, I focus on the Austrian context. Austria is a country with a long tradition of data protection. It was one of the first countries in Europe to lay down data protection as a fundamental right in its Constitution in 1978 (Souhrada-Kirchmayer, 2010). Its strong attitude toward data protection may be seen in several occasions. In 2010, Austria opposed Google's Street View service on the basis of privacy violations (along with Germany and the Czech Republic).[7] After Google's illegal scraping of open WiFi data, Austria's data protection commission banned Street View in May 2010. One year later, the ban was lifted, but Google was required to provide Austrians with the option to blur out their homes. Consequently, Google dropped the mapping for most of the country. In Hofmann et al.'s (2017) terms Austria may thus be seen as having had its "critical moment" long before Edward Snowden pushed corporate surveillance into the spotlight in June 2013. Its moment culminated in an event where a farmer attacked a Google vehicle with a pickaxe, an incident widely covered in the Austrian mass media (Mager, 2017). Austria's strong data protection–friendly stance may also be seen in negotiations regarding the European Union (EU) data protection reform that started in 2012. Austrian representatives took an active role in fighting for strong data protection standards in both the European Parliament and the Council of Ministers. It is interesting to note that the rhetoric of small Austria against large corporations can be traced back to narratives related to other technologies, most importantly agricultural biotechnology (Felt, 2015; Torgersen, 2002). The question remains, however, whether this restrained technology policy is ubiquitous within the cultural context of Austria or whether different perceptions of technology, and related modes of governance, may be identified when taking different situated perspectives into account.

To answer this question, I conducted 18 qualitative interviews with key actors involved in search engine governance from the realms of policy, law, civil society, and the IT sector: (1) five policy-makers: two Austrian members of the European Parliament (MEPs), one employee of the European commission (EC), one member of the Austrian parliament, and one representative from the Austrian consumer protection agency[8]; (2) four legal experts: one legislator having contributed to the EU data protection reform, one representative from the Austrian data protection authority, and two lawyers specialized in data protection; (3) six representatives from civil society: three individual activists (all of them working on the Austrian and the European level) and three members of organized groups (one from a European advocacy group defending rights and freedoms online headquartered in Brussels, one from an Austrian non-governmental organization (NGO) concerned with EU law enforcement, and one from an Austrian advocacy group for fundamental rights); and 4) three IT professionals: one computer scientist and two stakeholders from the IT industry (one from an organization lobbying for the Austrian Internet economy and one from Google Switzerland representing Austria). All interviewees may be considered key actors in their respective fields according to the high positions in their institutions and the high recognition of their expertise in media and policy circles. In total, 16 interviews were conducted face-to-face, two via Skype.

Given the interviewees' important positions in the respective issue areas, the interview method chosen was the expert interview, more specifically, the theory-generating

expert interview because it corresponds well to my research purpose of understanding local interpretations of global search engine governance. Bogner and Menz (2009) ground this interview method in the sociology of knowledge, which understands social reality as being constructed by acts of interpretation. "In theory-generating expert interviews, we consult experts because their action orientations, knowledge and assessments decisively structure, or help to structure, the conditions of action of other actors, thereby showing that expert knowledge has a socially relevant dimension" (Bogner and Menz, 2009: 54). The authors further argue that an expert should be perceived as having technical, process and interpretative knowledge referring to a specific field of action.

In line with the methodology of expert interviews, my interviewees were chosen following the technique of theoretical sampling, which enables the researcher to select interviewees one after another and develop a theory that is grounded in data. Following this Grounded Theory approach (Glaser and Strauss, 1968), I started by conducting interviews with well-known experts in the respective fields and then moved on to actors recommended in the first round of interviews.[9] All interviews were conducted between July 2014 and October 2014, one year after the Snowden revelations. To be able to cross-analyze the interviews, a rough interview guideline was used. The first cluster of questions focused on perceived challenges regarding general search engines, Google in particular. The second set of questions focused on suggested solutions to the problems. In this context, the EU data protection reform was mentioned regularly since it was in full swing during the time the interviews were conducted.[10] In addition, the "right to be forgotten" judgment of the European Court of Justice (ECJ) was discussed since it was a recent case at the time. In 2014, the ECJ forced Google to delete illegal or inappropriate information about a person from the Google index if the person concerned requests it.[11] Finally, questions about the governing ability of nation states and local entities were posed to gain further insights into the specific cultural context of Austria. Local aspects, however, were discussed throughout the interviews since not only "geographical arrangements" (Law, 2008: 1) but also "situated knowledges" (Haraway, 1988) were of interest to me.

Empirical analysis: IG as joint effort

The empirical analysis is presented in three parts following the conceptual questions introduced before. They will focus on (1) perceived challenges having to do with governing *by* algorithms, (2) suggested governing modes *of* algorithms, and (3) the limits of different forms of governance rooted in local specificities.

Governing by algorithms

Revisiting search engines' different modes of governing *by* algorithms (Musiani, 2013b; Saurwein et al., 2015), private modes of ordering were prominently mentioned in the interviews, especially techniques of user profiling. How Google's "power through the algorithm" (Beer, 2009) was interpreted depended on the respective viewpoints however.

Representatives from the *policy realm* framed the issue in terms of democracy. In addition to critically discussing techniques of user profiling and commodification,

they expressed an overall concern with Google's dominant role in society, which they saw as threatening democracy at large. An Austrian MEP sketched the picture in rough patterns:

> I think Google is going to be an exterritorial agency shaping future developments without any democratic legitimacy, without any accountability to citizens. Google is a driver not only for technological and economic developments, but also a driver for societal developments triggering new forms of human behavior. There will be new forms of life someday. And all this happens without any societal consensus. This is what bothers me.[12]

This quote illustrates the deep impact the company is expected to have on society. The Austrian politician spoke about Google's central task of providing access to knowledge, which she described as a "question of power." Talking about the non-transparent character of Google's search algorithm, terms of service, and business model, the consumer advocate said that Google has the "power to autonomously determine things regardless of anything and anyone." All these quotes indicate that stakeholders from the policy realm described Google's governing abilities in terms of power politics. Having become the "master switch" (Musiani, 2013b; Wu, 2010a) of the Internet, Google was interpreted as being in charge of "basic infrastructure" (MEP) without having any political legitimacy. Instead of seeing Google as "directing" (Badouard et al., 2016: 3ff) specific user behavior, they portrayed Google as autonomously defining socio-political developments and transforming society as a whole, which resembles Cohen's (2012) work on reconfigurations of the self due to networked technologies.

While policy-makers interpreted Google as having escaped political decision-making processes, *legal experts* portrayed Google as a "rule-maker" rather than a "rule-taker" (Marsden, 2011: 99). One example given for ignoring European rules and regulations was Google's strategy of writing non-transparent terms of service perceived as invalid according to the European consumer protection law. Another example mentioned in the interviews was Google's technique of user profiling, which was interpreted as being conducted "without any legal basis" (legislator). A lawyer specialized in data protection added that Google would transform the legal concept of personal data itself: "It is a misunderstanding that one thinks that data is only relevant for data protection if it contains name and address. These companies don't care about that." Drawing an analogy to state surveillance, the legislator involved in the EU data protection reform said,

> […] if I count these profiles as personal data, which is not entirely clear, Google would create a comprehensive collection of characteristics, which can be attributed to a person, without precedent in the whole of history. State administration has a lot of data, but is not allowed to merge them. The state is not allowed to build a profile containing all activities related to a single citizen. This is not allowed and now the interesting question arises: What does it mean if a private company does it for the first time in history?

In this quote, Google is seen as subtly taking over tasks and responsibilities that had resided with public institutions in former times. Moreover, Google was interpreted as "making" (Marsden, 2011: 99) law by technically introducing rules and regulations. Having heard a data protection officer from Google speaking at a conference, a lawyer

remembered him saying, "You know, there is a global data protection standard: ours. […] Why would I need to contribute to an initiative, if I already created the data protection standard in fact?" The interviewee's story indicates that the company was perceived as setting standards on its own rather than contributing to institutional standard-setting procedures.

Civil society actors were concerned about Google's governing abilities in more practical terms. The issue of "indirect personal data" (member of the European advocacy group), for example, was explained in this way: "This is no legal problem, this is a problem of proof" (member of law enforcement NGO). The activist went on with a wink: "because they say: prove to me that we can calculate who you are on the basis of data that is on our server, which we don't give you." The controversy around this new type of personal data is a good example of the interviewees' perception of Silicon Valley companies intervening in traditional governance processes while, at the same time, introducing new forms of governance on technological grounds. Their volatile character was seen as helping them to transgress geographical borders and political territories. The activist from the enforcement NGO coined the notion "virtual multinational companies" to pin down their distinct character compared to powerful firms of the past like Shell:

> And there is the additional problem that these companies are virtual, which means that they can change their state of business any time, at least on paper, because everything is in the cloud. There is no physical location anymore. And that makes them more flexible than the old multinational companies because they had to put their oil platforms somewhere, their refineries, and their petrol stations to sell their oil and so forth. There was some local relation at least, where something could have been done. And now the point has come where governments look pretty stupid.

Terms like "imperialistic," "monopolistic," or "authoritarian, paternalistic zombie company" (all individual activists) further suggested that activists tended to support the argument of Google having created its own "technological empire" (Pasquinelli, 2009: 158), leaving behind traditional forms of governance linked to public institutions and political territories.

Finally, stakeholders from the *IT sector* shaped Google's algorithmic modes of governing as techno-political issues. While the computer scientist was mainly concerned about the concentration of Internet services and their non-transparent algorithms due to their corporate nature, the lobbyist from the Austrian IT economy identified "the problem" as being on the side of policy rather than industry: "Politics is facing the internet totally incompetently." Sharing this perception, the Google employee picked up the "right to be forgotten" case to illustrate the incompetence of policy and legislation from the company's viewpoint:

> This is an attack on the freedom of expression. This was our position in a nutshell. It is tricky if you start intervening in search results because it is always a balancing act between the right to privacy, the right to be forgotten, and the right to access to knowledge and, yes, freedom of expression. But then the ECJ decided otherwise, against us. We were not happy about it, but within two weeks, I think, the company managed to create the online form, organize the processes, hire lawyers. It is no automated process. There are lawyers deciding on each case.

> We were turned into assistant judges, which we do not like. We have argued against that, but we are aware of the responsibility now.

The notion "assistant judge" indicates that Google perceived itself as having been pushed into societal tasks without necessarily wanting them. Later in the interview, the Google employee added that European legislation would be mainly directed against companies like Google, which are used as "scapegoats" since there is no way to bring a case against the US government itself. The geopolitics that plays into the matter is discussed below.

All these examples show that Google was interpreted as a powerful actor privately fulfilling tasks and responsibilities of public concern. Moreover, it was described as introducing new forms of governance on technological grounds, transgressing geographical boundaries and political terrains. Whether these developments were interpreted as a threat to democracy, as an act of rule-making, as a practical dilemma, or as a techno-political problem depended on the respective viewpoints. If and how these different versions of reality were coupled with different perceptions of the "governing *of* algorithms" (Musiani, 2013b; Saurwein et al., 2015) is discussed in the next section.

Governing of *algorithms*

Corresponding to their perceived loss of control, *policy-makers* expressed the need for "regaining political sovereignty" (MEP) over sociotechnical developments. The consumer advocate said, "the European commission has to get active. Who else would have enough power of negotiation to challenge these internet companies?" Later in the interview, she mentioned law enforcement as another necessary condition for regaining control: "you can watch some time how things are not resolved […] but for the sake of the rules of law it would be important to build up expertise on how to enforce law despite all hindrances." The Austrian politician suggested a more fundamental solution to the problem. Drawing an analogy to feminist politics, the interviewee explained that net politics should be understood not only as a matter of privacy or Google Street View projects but as a matter of fundamental rights, in the way that feminist politics is not only about female suffrage. One step toward reformulating net politics, she suggested, would be (re) conceptualizing the parliament as the "highest democratic realm of negotiation." Saying the parliament is currently "a house for guiding through lobby interests," she concluded, "and there it gets lost, the importance of reformulating human rights in net politics." This narrative closely relates to the search engine imaginary shaped in European policy discourses that conceptualize fundamental rights as core European values (Mager, 2017).

Legal experts perceived regulation and law enforcement as the most appropriate tools to force transnational technology companies to "take" (Marsden, 2011: 99) European law. Having been asked who he thinks would be responsible for solving problems posed by corporate search engines, the legislator answered straight away: "In my view, it's the responsibility of the regulators of course, that is governments in combination with parliaments and legislation. It is the task of the state, who else should do it?" A lawyer labeled the EU data protection reform as a great sign of "progress" in this respect. Corresponding to the expressed concerns regarding user profiling, he added, "The positive aspect of the new EU regulation

is that the so-called user profiling is supposed to be highly protected. Profiling will only be permitted if the person explicitly approves." Lawsuits, courts, and high sanctions were further mentioned as necessary requirements for making IT companies play by the rules. The "right to be forgotten" case, which was strongly criticized by the Google employee, was perceived as "groundbreaking" (lawyer) because the ECJ clarified that Google has to obey European law. Accordingly, both the representative of the Austrian data protection authority and the employee of the EC considered courts to be central actors forcing companies like Google to obey European law. Referring to the long negotiations for the EU data protection reform, the EC employee concluded, "If politics sleeps, then the court steps in."

Civil society actors mentioned data protection agencies as important actors in the practical enforcement of European law. To be able to successfully sanction Silicon Valley companies, however, they would need to be better equipped with "technical expertise" (member of the European advocacy group). Talking about how Google is "manipulating" (individual activist) user behavior, civil society actors also mentioned digital literacy as a central driver of change. Having been asked how society can handle the challenges Google poses, the activist from the fundamental rights advocacy group said straight away, "I think the very first step is raising critical awareness. Everything else, including data protection initiatives and lawsuits, has to be carried out as well, but the very first step is education and digital literacy." Besides educational institutions, civil society was seen as responsible for raising awareness in the population. In addition, a service agency was imagined to be able to practically help citizens fighting for their rights since "what we need is creating facts by citizens. This is what is totally lacking" (activist from the law enforcement NGO). Giving justice to the technical complexity of the matter, a technical solution was finally envisioned as a way out of the dilemma: "Privacy by design, […] privacy by default, privacy-enhanced technologies and so forth. This is where the journey should go, where research should be directed" (activist from the rights advocacy group). Especially in the aftermath of the US National Security Agency (NSA) affair, "post-Snowden products" (individual activist) were seen as having a great potential for success. In this narrative, culturally shaped notions of privacy coupled with strong European data protection standards were interpreted as a business advantage for the local IT industry, a viewpoint challenged by the IT professionals, as we will see below.

According to the perceived techno-political problem, *IT professionals* proposed technologically (re)defining the rules of the game. The computer scientist proposed open standards as a way of allowing users to integrate accounts, contacts, and data from different platforms and services. In this narrative, hackers were seen as responsible drivers for reshaping technology: "Many technologies may be seen as wild horses and it's the hackers who tame them for our purposes" (computer scientist). The Google employee picked up the discourse of open standards, too, claiming that the company would allow users to export data from various accounts and integrate it in new services. However, contrary to the computer scientist who imagined "better ways of managing the commons," the Google collaborator envisioned a market solution. Referring to the American saying of the competition being "only one click away," he said,

> If we lose user trust, then we're right out of it, this is our strongest regulator after all. You don't even have to speak of self-regulation, this is our business case. If we lose the confidence of our users then we're gone from one day to the next, to overstate a bit.

Corresponding to the perception of policy-makers being incompetent, a market solution was framed as being the most appropriate mode of governing in the eyes of the Google employee. In contrast, classical modes of governance were seen as running the risk of endangering innovation and IT economies. In this rationale, the role of policy-making was reduced to providing broad "crash barriers" instead of "detailed regulations" (Google employee). These quotes can be seen as reproducing, and reinforcing, the rhetoric of privacy regulation as hindering innovation, which is part of the wider context of the neoliberal "surveillance–innovation complex" (Cohen, 2014).

Coupled with different versions of Google's governing abilities, different visions regarding the governing *of* algorithms were imagined, ranging from regaining political sovereignty over sociotechnical developments, forcing IT companies to take European law, empowering users and encoding public values in technology, to autonomous modes of (re)engineering society by technological and economic means. Since corporate surveillance was largely interpreted as a threat to privacy—a widespread interpretation, but by far not the only one (Lyon, 2002)—regulation and law enforcement were still strongly counted on. Actor groups, having pointed to the increasingly mundane character of surveillance, additionally imagined modes of governance located in user practices, business models, and technology itself. Where the limits of these different governing modes lie is finally discussed by focusing on "geographical arrangements" (Law, 2008: 1) and "situated knowledges" (Haraway, 1988).

Local perspectives

Since representatives from all social groups articulated their preferred "modes of ordering" (Ziewitz and Pentzold, 2014), the question remains as to why things have not yet been resolved. Looking at the geopolitical dimension of search engine governance from local perspectives enables us to better understand the complexity of the matter.

When talking about specific ways of regaining political sovereignty over global search technology, *policy-makers* framed cultural differences as complicating these processes. Talking about the EU data protection reform, for example, my interviewees identified different perceptions of privacy, each of which is deeply rooted in different historical events, as major obstacles to common data protection standards:

> The way of looking at privacy issues is fundamentally different in the US. US-Americans did not have traumatic experiences with a derailed state. Fascism, surveillance states, the former East Germany and so forth. The experience of what a derailed state can do with a data set does not exist in the US. This is the reason why debates about data protection standards are heated and shaped by misunderstandings on either side of the Atlantic. (MEP)

Cultural differences, however, were identified not only "on either side of the Atlantic" but also within the boundaries of the EU. From the Austrian perspective, countries like Great Britain, which was still part of the EU during the negotiation process, and Ireland were characterized as "blocking" (MEP) the reform process, while countries like Germany and Austria were described as privacy-friendly, supporting strong data protection standards. Finally, discrepancies within Austrian net politics were mentioned as yet another reason for the lack of a "consolidated position" (consumer advocate). To overcome

cultural discrepancies and strengthen local voices in global search engine governance, a joint effort was called for, both within and beyond the policy arena. The European policy community was invited to put aside "particular interests" (consumer advocate) and to develop "a strong data protection standard acknowledging our historical experiences in Europe" (MEP). The other EP member reached beyond the policy realm and encouraged civil society actors to share their technical know-how and expertise to help make policy-makers less vulnerable to industry lobbying. These narratives already hint at a strategy shared by all four actor groups: the strategy of drawing other actors into the picture once the limits of their own governing abilities were reached.

Legal experts referred to "massive lobbying" (lawyer), by both the IT industry and governments, as having prolonged the EU data protection reform. According to the EC employee, this shows that there is a law to be made "that decides how Europe will position itself towards mass processing of personal data and information." This quote indicates the geopolitical dimension of the issue at stake. The reform process was framed not only as an act of lawmaking but also as a way of "positioning" Europe in relation to data processing and the information economy more generally. As a lawyer put it bluntly,

> Well, this means that I have read in the newspaper once that Angela Merkel received a message from the US Department of Justice saying that if she consents to the draft of the data protection reform, German companies will have to pay for it. What should Angela Merkel do? She can answer by saying "I don't care" and she will have to take criticism from the German industry or she can answer by saying "I do care" and will have to give in somewhere. […] And because the US economy is important and powerful, of course, the threat of punishing the German economy has to be taken seriously. This is a purely political question.

This quote refers to the "privatization of internet governance" (DeNardis, 2010), not only in terms of algorithmic power but also in regard to lobbying initiatives undermining European law. The technical complexity of Internet technology and its global reach were described as further complicating attempts to force transnational technology companies to take European law. Reasoning about Google's non-transparent terms of service and ways of sanctioning by national data protection agencies, the legislator said that locally banning Google would not make any sense since users would learn how to technically circumvent the decision. Moreover, they would not understand the reason and "such a decision would possibly be described as weird by the media" (legislator). Toward the end of the interview, the legislator thus concluded that regulators and governments cannot solve the issue on their own. Acknowledging the limits of classical forms of governance, he called for a joint effort, too:

> You don't have to expect much from governments. Rather, the empowerment of the people is significant. In how far they develop critical awareness and stand up for their rights. Or, also, in how far they pressure governments to fight for their rights. Without this pressure there won't be long-term effects. That governments will perfectly protect citizens out of love for fundamental rights is a pure fiction (laughing). This won't happen, since other actors will be too strong.

Again, a joint governance mode that would cut through different areas of society was imagined as being able to meet challenges posed by globally operating search engines

like Google and their technical configurations. Since Internet technologies were perceived as governing by technical means, it was not only public institutions but also ordinary citizens and their "mundane activities" (Hofmann et al., 2017: 1415) that were seen as central drivers for making a difference in IG. After the "participatory turn" (Cohen, 2014), users were imagined as not only participating in corporate surveillance schemes but also in the shaping and governing of mundane networked technologies they use day by day.

Similar arguments were made by *civil society*. "Private enforcement" (activist from the law enforcement NGO) was mentioned as being a crucial part of IG in practice. The lack of financial resources, however, was described as severely limiting civil society initiatives. Speaking about ways of building up digital literacy in the wider society, an activist said, "Actually, this is a societal duty we take on at our own expense." Comparing civil society activism and industry lobbying, another individual activist added, "this is a fight with unequal weapons." Again, a joint effort was envisioned as a strategy to strengthen local initiatives. Public support of civil society and collaborations between data protection agencies and citizens were particularly mentioned in this respect. Practical problems arising due to the volatile character of Google were described as being harder to solve. Having gone through multiple lawsuits against Silicon Valley companies, the activist from the enforcement NGO characterized Internet services as slippery objects that are hard to pin down. Talking about practically "opening the server" of these companies, he explained the matter as such: "Imagine you are the data protection agency that has to go through a million, billion terabytes of data: Where do you start? Do you just take out a hard drive and look at it?" Referring to Facebook as a comparative case, he added that even their own engineers would not entirely understand how things work since they would only program a tiny bit of the whole: "So what do you debate with someone who does not know what is actually running on the machines? (*laughing*)" Due to practical problems involved in suing private technology companies, privacy-by-design attempts were considered to be more realistic ways of creating technology devoted to local visions and values.

Representatives from the *IT sector* portrayed local specificities, funding structures, and geopolitical ways of thinking as obstacles that prevent the local IT industry from flourishing. Compared to Silicon Valley companies, the "garage myth" is lacking in Austria, as is the "market religion," as the computer scientist put it: "we throw it on the market wall and see what sticks. This is a much stronger, a more essential part of the Silicon Valley approach towards such things compared to our own culture." Moreover, he identified a funding gap between basic and applied research as being responsible for the lack of research on non-commercial technologies serving the public good, like open source projects. Finally, the Google employee raised broader geopolitical concerns. Differentiating between two fundamentally different ways of conceptualizing the Internet—as an opportunity or as a threat—the interviewee suggested a joint effort of a very different sort:

> I personally hope that in Europe—and I don't only speak of politicians, but also of citizens, entrepreneurs, activists, whatever stakeholders—the focus on opportunities will outweigh the risk debates. […] If the whole focus is directed at risks, the digital train may pass Europe by, I think.

Contrary to the other interviewees imagining ways of integrating local values into global governance processes, the Google employee basically suggested leaving locality behind and jumping on the global train of technology development. Speaking about historic events, he argued that Austrians still seem to have the "Stasi history" on their minds rather than thinking about all the opportunities of creating innovation with data. In his opinion, such fears need to be considered, yet rejecting all opportunities because of them would hurt the economy. Accordingly, he concluded,

> If one totally opposes data-driven innovation because of a bizarre mix of anti-Americanism, anti-big business, a general uncertainty […] due to the NSA affair […] and if one says "data are bad per se" would be more than reckless because all the possibilities of new technologies are evident.

Narratives about local specificities, in terms of both cultural values and situated experiences, have enabled us to see that the rhetoric of both privacy as anti-innovation—originating from the US "surveillance–innovation complex" (Cohen, 2014)—and privacy as worthy to protect—often considered a genuinely European approach (Mager, 2017)—can be found on European ground. These opposing viewpoints explain why data protection is such a heated issue in EU legislation. The focus on local perspectives has further opened up a view on the limits of the various governance modes and counter-strategies that may be found in the collective rather than the individual. Joint efforts that go beyond distinct societal arenas and areas of expertise were imagined to challenge globally operating technologies like Google and their governing abilities.

Conclusion

In this article, I have discussed IG in practice. Having investigated the narratives of four distinct actor groups—policy-makers, legal experts, civil society, and IT professionals—I have analyzed how different perceptions of Google's "governing *by* algorithms" were coupled with different suggestions regarding the "governing *of* algorithms" (Musiani, 2013b; Saurwein et al., 2015). Having specifically teased out local perspectives, both regarding the cultural context of Austria and in terms of "situated knowledges" (Haraway, 1988), I have further analyzed where the limits of the various governing modes lie and how to overcome them through joint efforts. This analysis strengthens the argument that IG is "a proxy for resolving broader global tensions, arising both offline and online" (DeNardis and Musiani, 2016: 18). It further shows that the sociotechnical imaginaries of search engines are shaped not only in specific cultural contexts (Mager, 2017) but also within particular "communities of practice" (Wenger, 1998) and their respective experiences and expertise.

From the perspective of policy-makers, Google's governing power was interpreted as a threat to democracy calling for counter-strategies to regain political sovereignty. From legal perspectives, algorithmic forms of governing were seen as an act of lawmaking calling for techniques to force transnational IT companies to take European law. Civil society groups portrayed Google's governing abilities as posing practical problems that should be solved by empowering users and encoding public values in technology.

Stakeholders from the IT sector interpreted algorithmic modes of ordering as a techno-political issue to be met with largely autonomous modes of technologically and economically (re)engineering society. Focusing specifically on local perspectives ultimately enabled us to grasp the limits of the various governing modes that are deeply rooted not only in cultural specificities but also in practical dilemmas resulting from the global reach of the technology, its complex configurations, and its volatile character. Having acknowledged the limits of their own governing abilities, representatives from all actor groups called for joint efforts, which cut through different societal arenas, geographical arrangements, and areas of expertise. Saurwein et al. (2015) similarly suggest "*multi-dimensional solutions* and combinations of governance measures that mutually enable and complement each other" (p. 44; italics in original). Inviting practically all stakeholders to let go of culturally shaped values—and their legal enforcement—for the sake of global innovation may be considered the most radical proposition in this respect.

This analysis adds to STS-grounded IG research by arguing that shifts toward technological forms of governing that are located in corporate Internet services and "mundane activities" (Hofmann et al., 2017: 1415) call for joint modes of ordering, drawing together entities from different technological backgrounds, societal fields, and areas of knowledge. To fully exploit their respective potentials, institutional forms of governance may be coupled with technical interventions, governmental modes of ordering complemented with civic engagement, European efforts combined with national initiatives, civil society activism supported by public institutions, private modes of ordering contained by policy frameworks, and technical developments enriched with cultural values. Each of the social groups involved may acknowledge opportunities and limits of their own governance capabilities and reach out to other actors in the heterogeneous network of IG, both human and non-human. Joint efforts of this sort can contribute to redistributions of power that challenge central actors like Google and create more diverse search engine landscapes and related services. If civil society actors were strengthened, for example, they would be able to better apply their expertise to regulation, education, and technology development. They would be able to build a stronger lobby for human rights in institutional forms of governance, to empower users by building up digital literacy, and to promote technology developments devoted to local values and the common good. As a consequence, it may be possible to challenge contemporary "power plays in global internet governance" (Carr, 2014) and attain a more equal distribution of tasks, responsibilities, and resources.

This reordering of power structures may also result in a redistribution of global and local forces. If local stakeholders succeed in making their voices heard in global IG, global actors would be increasingly faced with cultural, political, and technological barriers. They would have to accept different concepts of privacy that are deeply rooted in historic events, socio-political frameworks, and cultural fabrics, and they would be required to broaden their own, rather than narrow, perceptions of privacy as only a matter of anti-innovation. They would have to realize that innovation can take multiple shapes and that value-sensitive design can help to make technology more sustainable in different cultural, economic, and political contexts. In sum, they would have to learn how to listen to situated experiences and expertise rather than ignoring locality in order to contribute to more socially robust information technology in the long run. To reach this goal,

all types of actors are invited to express their situated knowledges and to collectively think about ways of unlocking the potential of local know-how. Rather than buying into global technology that comes with particular socio-political visions and values, local actors are encouraged to envision, build, and govern technology that respects cultural diversity and social needs. If technologies like search engines may be considered basic infrastructure, then processes of technology development and governance should be opened up and democratized. Only when actors from multiple corners of the world get the chance to participate in IG might it be possible to find joint modes of ordering that go beyond mere regulation and which better correspond to the richness of digital cultures that surround, and co-configure, us.

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Notes

1. Available at: https://www.nytimes.com/2017/02/06/business/trump-travel-ban-apple-google-facebook.html (accessed December 2017).
2. Available at: https://www.theguardian.com/commentisfree/2017/jan/23/mark-zuckerberg-us-president-facebook-ceo-politics (accessed December 2017).
3. Available at: http://www.sciencemag.org/news/2016/10/could-google-influence-presidential-election (accessed December 2017).
4. Available at: http://www.ox.ac.uk/news-and-events/oxford-and-brexit/brexit-analysis/views-from-oxford (accessed December 2017).
5. In this article, the term "Google" not only refers to Google search but to the whole variety of services that Google provides, including maps, Email, social network, Analytics, YouTube, and so on, as well as the business model that Google employs, and even the company Google (Alphabet Inc.), as they appear to be tightly intertwined in practice (Rieder and Sire, 2014).
6. Available at: https://en.wikipedia.org/wiki/Twitter_Joke_Trial (accessed December 2017).
7. Available at: https://en.wikipedia.org/wiki/Google_Street_View_in_Europe (accessed December 2017).
8. In Austria, consumer protection is organized in the Austrian Chamber of Labor, which is part of the "social partnership" and thus anchored in the political system.
9. Since I have done research on search engine politics before and am thus familiar with the

net political scene, it was relatively easy to identify key experts and get field access. Many years of expertise in privacy research of my home institution, the Institute of Technology Assessment in Vienna, additionally helped me with this endeavor. The only problem was time constraints, especially concerning actors operating on the European level.

10. Available at: http://ec.europa.eu/justice/data-protection/index_en.htm (accessed December 2017).
11. Available at: http://ec.europa.eu/justice/data-protection/files/factsheets/factsheet_data_protection_en.pdf (accessed December 2017).
12. All interviews were conducted in German and translated by the author.

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Author biography

Astrid Mager is a senior postdoctoral researcher at the Institute of Technology Assessment (ITA), Austrian Academy of Sciences (ÖAW). In addition, she teaches at the Department of Science and Technology Studies, University of Vienna, on a regular basis.

René König and Miriam Rasch (eds), Society of the Query Reader: Reflections on Web Search, Amsterdam: Institute of Network Cultures, 2014. ISBN: 978-90-818575-8-1.

Is Small Really Beautiful? Big Search and Its Alternatives

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Google is big in many ways. The company offers a myriad of services and products ranging from basic keyword search to futuristic glass technology. It possesses the most comprehensive index of the web and the most extensive database of user data, and its ranking algorithm is state of the art. Google figures as search engine number one, at least in the Western world, and is also the leader in online advertising. Just recently, it has been accused of collaborating with the U.S. National Security Agency (NSA), exemplifying its powerful role in collecting and profiling personal data.[1] In debates on big data, the conventional argument is that big data needs big methods to be mined and made productive for users. In light of big data, Google may be seen as *the* biggest method applied when trying to bring order to the web, to find answers to questions, to sift through the sea of information.

It is thus not surprising that Google is a flourishing company, and its algorithm incorporates and strengthens the capitalist ideology. Rather than blaming Google for doing evil, however, I suggest thinking of Google as being shaped by society. Google shows us the face of capitalism because it was born and raised in a capitalist society. 'Technology is society made durable', as Bruno Latour put it.[2] Accordingly, Google is not the only actor to blame. Quite on the contrary, actors such as policy makers, jurists, journalists, search engine optimizers, website providers, and, last but not least, users are part of the game too. If users would turn away from Google, the whole business model, including its sophisticated algorithm and database of personal data, would fall apart. But where can people turn to? Are there true alternatives to Google and their algorithmic ideology?

The goal of this article is to examine and discuss critically a selection of so-called alternative search engines and their ideological underpinnings. If Google embodies the capitalist ideology, what ideology do alternative search engines incorporate? What values do privacy-concerned search tools such as DuckDuckGo carry? What is green about green search engines? Can peer-to-peer search engines such as YaCy be inter-

1. For more information on accused collaborations between the NSA and IT companies leaked by Edward Snowden see, for example: Glenn Greenwald and Ewen MacAskill, 'NSA Prism Program Taps into User Data of Apple, Google and Others', *The Guardian*, 6 June 2013, http://www.theguardian.com/world/2013/jun/06/us-tech-giants-nsa-data.
2. Bruno Latour, 'Technology Is Society Made Durable', in John Law (ed.) *A Sociology of Monsters: Essays on Power, Technology and Domination*, New York and London: Routledge, 1991, pp. 103-131.

preted as communist search engines? Could search be seen as a scientific endeavor as Wolfram|Alpha suggests?

Big Search and Its Algorithmic Ideology

In my previous work,[3] I argue that algorithms, like all other technologies, should not be understood as merely technical, mathematical, or 'objective' tools, even though Google and its competitors try to establish them as exactly that. Rather, they should be seen as socially constructed entities mirroring and solidifying socio-political norms and values. Drawing on interviews with search engine experts,[4] I show how ideologies become inscribed in search algorithms by way of social practices. Following Luc Boltanski and Ève Chiapello,[5] I interpret ideology not only as a moralizing discourse, but as a set of shared beliefs, which are inscribed in institutions, embedded in actual practices, and hence anchored in reality. Along this line of thought, I show how ideology becomes manifested in search technology, Google in particular.

Google's success is built on flat hierarchies, a flexible work force, and a global scale, which are central characteristics of 'the new spirit of capitalism'.[6] Furthermore, Google corresponds well to new modes of exploitation that rose with this capitalist spirit. '*A form of exploitation that develops in a connexionist world* – that is to say, a world where the realization of profit occurs through organizing economic operations in networks.'[7] Scholars such as Matteo Pasquinelli and Christian Fuchs explain how Google extracts value from networks. Pasquinelli argues that Google's PageRank algorithm exploits the collective intelligence of the web since Google uses links from other websites to measure a websites' value. These links may be seen as a concretion of intelligence that is used by Google to create surplus value.[8] Fuchs further hints at the importance of including users' activities to understand Google's capital accumulation cycle. Google not only exploits website providers' content, but also users' practices and data. Fuchs thus concludes that 'Google is the ultimate economic surveillance machine and the ultimate user-exploitation machine'.[9] My colleague Jenny Eklöf and I additionally show that the capitalist spirit Google carries contributes to a commercialization of search results and has thus wider implications on the way we approach information and make sense of the world we live in.[10]

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3. Astrid Mager, 'Algorithmic Ideology: How Capitalist Society Shapes Search Engines', *Information, Communication & Society* 15.5 (2012a): 1-19.
4. Between October 2010 and February 2011 I conducted 17 expert interviews, both personally and via Skype. My interview partners included computer scientists, programmers, software developers, and people working in information retrieval (mainly from big, universal search engines). Furthermore, I talked to one search engine optimization expert, one economic journalist, one net activist, one jurist, and two policy-makers concerned with search technology, as well as multiple search engine scholars from the social sciences (all from the U.S. and Germany, one from Ireland). This research was supported by HUMlab, Umeå University (Sweden), where I worked as a post-doctoral fellow from 2010-2012.
5. Luc Boltanski and Ève Chiapello, *The New Spirit of Capitalism*, London: Verso, 2007.
6. Boltanski and Chiapello, *The New Spirit of Capitalism*.
7. Boltanski and Chiapello, *The New Spirit of Capitalism*, p. 355 (italics in original).
8. Matteo Pasquinelli, 'Google's PageRank algorithm: A Diagram of Cognitive Capitalism and the Rentier of the Common Intellect', in Konrad Becker and Felix Stalder (eds) *Deep Search: The Politics of Search Engines Beyond Google*, Innsbruck: Studienverlag, 2009, pp. 152-162.
9. Christian Fuchs, 'A Contribution to the Critique of the Political Economy of Google', *Fast Capitalism* 8.1 (2011), http://www.uta.edu/huma/agger/fastcapitalism/8_1/fuchs8_1.html.
10. Jenny Eklöf and Astrid Mager, 'Technoscientific Promotion and Biofuel Policy: How the Press and Search Engines Stage the Biofuel Controversy', *Media, Culture & Society 35.4 (2013):* 454-471.

But criticizing Google and its business model is not enough. It is essential to understand power relations and social practices involved in the construction and solidification of search algorithms. Website providers and users are not simply exploited by Google (and others); their desire for attention and information, but also for consumer goods, is perfectly served by companies such as Google. Accordingly, users and providers actively stabilize the technology by using it to reach their own goals of gaining visibility and finding answers to their questions. Also, services such as Google AdWords and Google AdSense would not work if people would not advertise with or click on Google ads. Furthermore, broader socio-political frameworks strengthen corporate actors like Google. The politics of privatization of the last decades put search on the free market. Despite past efforts, European policy makers have not succeeded in establishing a non-corporate search engine. Consequently, Google has become a powerful player challenging politics, law, and economics in Europe and beyond. Whether lack of technical expertise and carelessness have led to policy's loss of control over search technology, or whether governments actively decided to outsource search and related tasks of data collection and citizen surveillance to big companies to profit from their databases in post-9/11 societies, cannot be answered here. What is certain, however, is that politics and also mass media strongly participate in the stabilization of big players, the latter by constantly featuring new services, products and, ultimately, IT companies. This techno-euphoric breeding ground is about to change now that more and more data protection violations and scandals such as the NSA affair are critically discussed in the public domain. This shows that search engines such as Google are not external to society, but rather enacted and negotiated within society. Website providers, users, marketers, journalists, policy makers, and jurists are all part of the actor-network strengthening Google and its capitalist ideology.

This situation gives us the chance to opt out of Google's accumulation cycle, if we want to. If website providers and users broke out of the network dynamic, Google's power and its scheme of exploitation would fall apart. If mass media and activists continue a critical debate about search engines and the myriad of data they collect, store, and process, big players would be destabilized. If politics and law took on a stronger role in the regulation of search technology, limits would be set regarding the collection and use of personal data, and also business practices and advertising schemes. First steps towards a renegotiation of search engines are seen on various levels. A new data protection law is currently being negotiated in the E.U. More critical media debates on Google, Facebook, Amazon, and other IT companies are seen due to the increase of tracking methods, privacy violations, illicit practices of scraping WiFi data, and possible collaborations with secret services.

So the question is, why are users still not turning away from Google and other big players? Why do they not leave big search and move towards smaller search engines? The common answer, even amongst search engine experts, is because there are no real alternatives. But is that actually the case? What about all the other search projects trying to challenge Google and provide an alternative style of search?

Small Search and Its Ideological Inner Life

There are a number of so-called alternative search engines that are not as big as Google, Bing, or Yahoo! and that lead their lives at the margins of the search market.

Of course, Bing could be conceptualized as an alternative to Google in terms of its index and algorithm. However, Bing may also be considered yet another for-profit search engine that is no true alternative from an ideological standpoint. In line with the purpose of this article I conceptualize alternative search engines as search tools that claim to have a particular ideological agenda that clearly distinguishes them from big, corporate search tools.[11] Accordingly, all search engines included in this analysis explicitly devote themselves to a particular ideological framework. Further, all of them are general-purpose search engines with no particular topical focus, even though knowledge engines such as Wolfram|Alpha are specialized in answering factual questions rather than cultural, social scientific, or commercial ones, as I will exemplify later.

The central aim of this article is to discuss whether these chosen search engines may be seen as true alternatives in terms of their ideological stance and what norms, values, and ideas they carry. Further, their self-descriptions will be juxtaposed with their actual practices. Whether these search tools could be true alternatives on a technical level or whether their search results are better than those of their bigger relatives can only partly be answered since this would go beyond the scope of this article.

Privacy First

The first search engine in the analysis is DuckDuckGo, because it claims to be a privacy-concerned search engine. DuckDuckGo was founded by the entrepreneur Gabriel Weinberg, and its developers 'believe in better search and real privacy at the same time'.[12] Its website further explains that DuckDuckGo does not track, filter bubble, or share data with third parties, and it goes on with a lengthy discussion of privacy issues and a visual explanation of what it actually means to be tracked, collected, and shared with third parties when using larger search engines such as Google. So the company clearly tries to provide an alternative to major search engines in terms of data protection and anonymous search. Their default settings protect privacy rather than collecting and offering personal data to third parties (which big search engines usually do). They incorporate privacy in their technical Gestalt and may hence be interpreted as following the principle of 'Privacy by Design'. Privacy by Design builds on the idea of integrating privacy-relevant features into the design process of IT technologies to enable 'value-sensitive innovation'.[13] But can privacy be seen as their ideological framework?

Privacy is a moral concept, no doubt, and a central component of human rights, one codified in international agreements and law including the U.N.'s Universal Declaration of Human Rights and the E.U.'s Charter of Fundamental Rights. More specifically, privacy is regulated in recommendations and legal norms in the context of information technologies, such as the OECD Privacy Guidelines and the E.U. Data Protection Directive

11. Social search or social bookmarking techniques such as Delicious may also be seen as alternatives to big search. Since their search services are limited to a certain platform or user-generated indexes they will not be included in the analysis.
12. See, https://duckduckgo.com/about.
13. Doris Allhutter and Roswitha Hoffmann, 'Deconstructive Design as an Approach for Opening Trading Zones', in Jordi Vallverdú (ed.) *Thinking Machines in the Philosophy of Computer Science: Concepts and Principles*, Hershey: IGI Global, 2010, pp. 175-192.

95/46/EC.[14] The latter is currently under negotiation, since the European Commission plans to unify data protection within the E.U. with a single, binding law, the General Data Protection Regulation. But privacy is not only about rights; it comes with ideas about autonomy and freedom, and it is an essential prerequisite for democratic societies.[15] Privacy can be seen as something stronger than law and regulations; it may be interpreted as an ideological tool to tame the free market, to set boundaries where boundaries are missing, and to provide technological alternatives that enable individual choice. DuckDuckGo may hence indeed be seen as positioning itself as an ideological counterpart to Google with its practice of user profiling. This tactic seems to work in times of increasing privacy violations and scandals, as shown by the record traffic on DuckDuckGo following the news coverage of Google's possible collaboration with the NSA.[16]

So can this become a success story of David against Goliath? In terms of data protection it probably can. When looked at more closely, however, DuckDuckGo is troubled with cosmetic flaws. Even though it does not sell personal data to gain profit it does provide contextual advertising on its site. Its ads are provided by Bing Ads and should adhere to their privacy policy, as its website claims. But DuckDuckGo does not only use Bing Ads; it also uses Bing's search results. Although DuckDuckGo operates its own web crawler, the DuckDuckBot, it is also dependent on results from other search engines and sources. According to its community platform it obtains its results from over 100 sources including crowd-sourced sites such as Wikipedia and also for-profit search tools, including Yandex, Wolfram|Alpha, Bing, and Yahoo! (the latter also displaying Bing results).[17] Maintaining its own web crawler and building a comprehensive web index is a very expensive endeavor.[18] Consequently, most search engines either partner with one search engine or use results from multiple sources. Since DuckDuckGo uses both commercial and non-commercial sources, it partly depends on for-profit search engines such as Bing, which does track users and sells personal data to third parties.

So even if DuckDuckGo provides encrypted search and does not sell user data to third parties itself, it does make use of big players and their business practices. That DuckDuckGo is in alliance with commercial players and their tracking methods, I would say, casts a shadow over the company's belief in privacy and fundamental rights. In fact, the company needs big search in order to keep its small search engine running. This situation similarly applies to other privacy-concerned search engines including

14. For a detailed discussion of privacy guidelines and regulations see, for example, Johann Čas, 'Ubiquitous Computing, Privacy and Data Protection: Options and Limitations to Reconcile the Unprecedented Contradictions', in Serge Gutwirth, Yves Poullet, Paul De Hert, Ronald Leenes (eds) *Computers, Privacy and Data Protection: An Element of Choice*, Dordrecht, Heidelberg, London, New York: Springer, 2011, pp. 139-171.
15. Walter Peissl, 'Information Privacy in Europe from a TA Perspective', Serge Gutwirth, Yves Poullet and Paul De Hert (eds.) *Data Protection in a Profiled World,* Dordrecht, Heidelberg, London, New York: Springer, 2010, pp. 247-257.
16. Jennifer Slegg, 'DuckDuckGo Sees Record Traffic After NSA Prism Scandal', Search Engine Watch, 18 June 2013, http://searchenginewatch.com/article/2275867/DuckDuckGo-Sees-Record-Traffic-After-NSA-PRISM-Scandal.
17. See, DuckDuckGo, 'Sources', https://dukgo.com/help/en_US/results/sources.
18. See also Dirk Lewandowski's contribution in this volume: 'Why We Need an Independent Index of the Web', pp. 49-58.

Ixquick[19] and MetaGer,[20] which also use results from bigger search engines. While such companies fetch results from these other search engines without saving users' IP addresses or passing on personal information, they still would not be able to exist without their data-collecting counterparts.

Green Search

Another model of ideological search is green search. Green search engines offer the possibility to support ecological projects financially by using their search services. Ecosia, for instance, helps plant trees, as it states most prominently on its homepage.[21] The company describes itself as a 'social business' based in Berlin, and its basic idea is to donate 80 percent of its advertising revenue to the Nature Conservancy, which helps to afforest the Brazilian rainforest. The ads it displays on its site are served by Yahoo!, which pays Ecosia a share of revenue generated from these ads. Ecosia's own servers run on green power. However, Ecosia's search results come from Bing, which does not use green energy. This is an example of what Dirk Lewandowski coins the 'partner index model'.[22] Ecosia uses Bing's partner index, and, in turn, the advertising revenue is split between Yahoo! (partnering with Bing) and Ecosia (donating 80 percent to the rain forest). Since online searches are co-produced by computers, computer networks, and servers, a great deal of CO2 emission are produced during each search (up to seven grams of CO2 in the case of Google, according to a Harvard physicist).[23] To compensate for the CO2 emission generated by the Bing searches, Ecosia supports a project in Madagascar.[24]

When looking at its initiatives, Ecosia clearly follows a green agenda. Contrary to search engines such as the Green Planet Search that help find ecological information,[25] Ecosia enables users to take action. Since environmentalism is increasingly embedded in everyday routines and situated in objects,[26] green search engines can function as a vehicle to engage in environment protection. Similar to the recycling bin and other objects, green search engines can be seen as a materialization of civic engagement and political action. According to Noortje Marres such objects '[…] have the capacity to turn everyday material activities into forms of engagement with the environment […]'[27]. Green search engines may hence be interpreted as 'technologies of participa-

19. See, https://www.ixquick.com/eng/.
20. See, http://metager.de/en/.
21. See, http://www.ecosia.org/.
22. Lewandowski, 'Why We Need an Independent Index of the Web', p. 53.
23. Jon Swaine, 'Two Google Searches "Produce Same CO2 as Boiling a Kettle"', *The Telegraph*, 11 January 2009, http://www.telegraph.co.uk/technology/google/4217055/Two-Google-searches-produce-same-CO2-as-boiling-a-kettle.html.
24. In 2010 Google launched its green initiative with the main purpose of cutting down its environmental impact (e.g. by reducing their data center energy use) and investing in environmentally conscious technology. Jack McGrath, 'Google's Green Initiative: Environmentally Conscious Technology', TechnoBuffalo, 18 May 2012, http://www.technobuffalo.com/2011/05/18/googles-green-initiative-environmentally-conscious-technology.
25. See, http://www.greenplanetsearch.com.
26. Jutta Haider, 'The Environment on Holidays or How a Recycling Bin Informs Us on the Environment', *Journal of Documentation* 67.5 (2011): 823-839.
27. Noortje Marres, 'The Costs of Public Involvement: Everyday Devices of Carbon Accounting and the Materialization of Participation', *Economy and Society* 40.4 (2011): 515.

tion'[28] that make involvement easy since they do not require any significant change in the practice itself (compared to green devices that would require crucial material, social, and technical transformations).[29]

Similar to privacy-concerned search engines, Ecosia's green ideology is endangered by its dependence on big search for both search results and advertising revenue – a threat not only in an ideological but also a very practical sense if we look at the history of green search projects. There have been multiple green search engines in the past. Except from Znout,[30] which compensates Google searches with renewable energy certificates, all of these companies have closed down. Businesses that used Google search as their back-end, such as Ecocho, are no longer supported by Google because they 'jibe with Google's AdSense policy, which prohibits the compensation of third parties through the promise of performed searches'.[31]

Their fate hence exemplifies the difficulty that comes with depending on a single search engine. Big players simply can stop supporting small projects if they no longer harmonize with their own advertising policy. Besides, green search engines actively support big search in terms of their revenue model; they not only use big search tools for their own results, they even support advertising practices of corporate search tools since they use (need) them for their own (green) purposes. It is a collaboration that serves both parties. Green search engines may be seen as surfing on the capitalist wave towards more ecological technology. However, their journey can be abruptly stopped at any time if big search tools decide to opt out of green projects, as we have seen in the past. 'Informational capitalism'[32] is the captain steering the green ship through the rough sea of online search after all.

The Commons

Aside from search engines with a centralized web index, there are projects that try to provide decentralized search, following the principle of file-sharing networks such as the Pirate Bay. The most popular proponent of such decentralized search projects is the peer-to-peer network YaCy, created by the German free software enthusiast Michael Christen. While reading through the YaCy website, the major goal and ideological ambition of the search engine jumps out at you right away: 'We want to achieve freedom of information through a free, distributed web search which is powered by the world's users.'[33] The image that is displayed in their 'About Us' section clearly shows that the search engine characterizes itself as a true alternative to centralized search engines such as Google or Bing and their capitalist ideology:

28. Nigel Thrift, *Non-Representational Theory. Space, Politics, Affect*, London: Routledge, 2008.
29. Marres, 'The Costs of Public Involvement'.
30. See, http://us.znout.org/.
31. Nathania Johnson, 'Google Says "No" to Ecocho', Search Engine Watch, 23 April 2008, http://searchenginewatch.com/article/2054343/Google-Says-No-to-Ecocho.
32. Manuel Castells, *The Rise of the Network Society. The Information Age: Economy, Society and Culture, Volume 1*, Malden: Blackwell, 2000.
33. See, http://yacy.net/en/index.html.

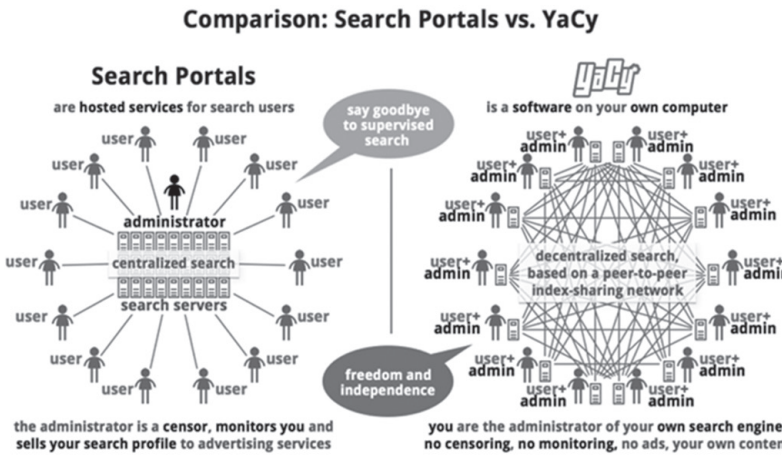

Fig. 1. YaCy homepage, about YaCy.

Freedom and independence are put first. Rather than relying on big search engines, YaCy provides users with the possibility to run a search technology on their own computers and/or participate in a private computer network that is not controlled by a single company or individual. This basically means that there is no central index of the web, such as Google's. Rather, there is an index that each user builds by searching the web through the YaCy Proxy (that one needs to install first). This index is then shared with other peers in the network so that a global index comes into being. Furthermore, a web crawler expands the index, which has gained more and more importance over the last years. When users do a global search, the index of all peers that are currently online is searched.

This means that everyone can see how information is obtained by the search engine and displayed to the user. YaCy is open-source, free software that is completely transparent, as its website claims. No collaboration with big search engines is needed.[34] Quite on the contrary, YaCy wants to make free content accessible through free software so that users do not have to go through proprietary search engines 'in an increasingly monopolistic internet infrastructure because then the monopoly holders decide what information is visible'.[35] Moreover, YaCy protects privacy since there is no central evaluation or monitoring of search queries and helps to green the web because only users' computers are needed and no additional data centers with enormous power consumption are required.

From an ideological standpoint YaCy may be interpreted as devoting itself to 'commons-based peer production', a term coined by Yochai Benkler. 'The salient charac-

34. In contrast to the peer-to-peer search project Seeks, which aims to be a free software/open source project, but uses commercial search engines to generate its index too: http://www.seeks-project.info.
35. YaCy, 'Philosophy', http://yacy.net/en/Philosophy.html.

teristic of commons, as opposed to property, is that no single person has exclusive control over the use and disposition of any particular resource in the commons.'[36] Michael Hardt even goes further by arguing that the commons are able to create not only new goods, but also new humanity:

> Communism should be defined not only by the abolition of property but also by the affirmation of the common – the affirmation of open and autonomous production of subjectivity, social relations, and the forms of life; the self-governed continuous creation of new humanity.[37]

The communist manifesto is not on the list of references that YaCy provides on its website. It does, however, reference and support manifestos by the Free Software Foundation Europe, the Chaos Computer Club, the German Pirate Party, and the Charter of Civil Rights for a Sustainable Knowledge Society. This alliance shows that the free software movement and commons-based peer production are central pillars of YaCy's ideological framework. Following Hardt's argumentation YaCy may even be seen as closer to the communist spirit than to capitalist ideology.

Knowledge Engines

Finally, to round off the picture, knowledge engines are worth mentioning in terms of alternative search projects. Knowledge engines claim to provide users with new knowledge. Rather than pointing users to information available already, they aim at providing users with new answers to their questions. Wolfram|Alpha is well-known for this style of search. Wolfram|Alpha is a search tool, or rather software, developed by Stephen Wolfram, a British physicist and mathematician. Wolfram built the software Mathematica, which integrates computer algebra, symbolic and numerical computation, visualization, and statistics. Wolfram's profession tells us a lot about the ideological underpinning of his software product. On its website, Wolfram|Alpha is described as a scientific tool that provides answers to factual queries by computing materials from external sources: 'Our goal is to build on the achievements of science and other systematizations of knowledge to provide a single source that can be relied on by everyone for definitive answers to factual queries.'[38] Rather than offering users sources and websites that may contain answers to their questions, Wolfram|Alpha wants to provide users with straight answers in a scientific manner. The software favors 'expert-level knowledge', facts, and figures and hence clearly dedicates itself to the scientific paradigm. The attempt to offer knowledge rather than information mirrors the idea of enlightening citizens. In contrast to conventional search engines providing users with heterogeneous, often contradictory information that needs to be actively transformed into knowledge by the individual user,[39] WolframAlpha promotes reason and scientific thought and aims to provide users with straight knowledge. Technically it contains a

36. Yochai Benkler, *The Wealth of Networks: How Social Production Transforms Markets and Freedom,* New Haven, Connecticut: Yale University Press, 2006, p. 61.
37. Michael Hardt, 'Reclaim the Common in Communism', *The Guardian*, 3 February 2011, http://www.theguardian.com/commentisfree/2011/feb/03/communism-capitalism-socialism-property.
38. See, http://www.wolframalpha.com/about.html.
39. Astrid Mager, 'Search Engines Matter: From Educating Users Towards Engaging with Online Health Information Practices', *Policy & Internet* 4.2 (2012b): pp. 1-21.

natural language interpreter at the front-end and a number of key data sources, which have been captured and standardized by Wolfram staff, at the back-end (e.g. Wikipedia, Encyclopædia Britannica, and newspapers).

Another, yet more metaphysical knowledge engine is YossarianLives!. Its algorithm uses metaphors to return image results that are conceptually related to search terms. These results should enable users to see problems in a new way rather than provide users with more of the same information;[40] they should further help to circumvent the filter bubble.[41] Even though YossarianLives! is constituted as a company, it does not seem to have a proper business model yet. In contrast, Wolfram|Alpha has developed a sophisticated business strategy.

Similar to Google, Wolfram|Alpha incorporated the capitalist ideology into its scientific endeavor. Unlike big search, though, the company does not only count on advertising. Besides its free, advertising-based search tool, Wolfram|Alpha offers a Pro version that includes additional features for a monthly subscription fee of $5 and that does not display advertising. It further makes money with sponsoring contracts and licensing partnerships. This underlines the fact that Wolfram|Alpha is a software product rather than a search tool. The Infoworld journalist Neil McAllister argues that Wolfram|Alpha even goes beyond conventional software companies in terms of copyright questions.[42] When reading through Wolfram|Alpha's terms of use, one can see that the software does not only claim ownership for the software itself, but also for its output. This is the exact phrasing:

> In many cases the data you are shown never existed before in exactly that way until you asked for it, so its provenance traces back both to underlying data sources and to the algorithms and knowledge built into the Wolfram|Alpha computational system. As such, the results you get from Wolfram|Alpha are correctly attributed to Wolfram|Alpha itself.[43]

Taking this seriously would mean that Wolfram|Alpha holds a copyright of all users' search queries. Moreover, open data are closed down when being processed by the software that aims to 'bring broad, deep, expert-level knowledge to everyone', as it claims on its homepage. This crucially runs counter to the ideal of both free software and freedom of information. In contrast to YaCy, Wolfram|Alpha contributes to closing down web information that is freely available by simply processing it. Serious trouble with copyright law may follow from this policy since computers should not be entitled to credit for their calculations, as the free software activist Richard Stallman argues.[44]

40. See, http://about.yossarianlives.com/index.html.
41. Frederiek Pennink, 'Rethinking Search: YossarianLives!', Institute of Network Cultures, 16 May 2013, http://networkcultures.org/wpmu/query/2013/05/16/rethinking-search-yossarianlives.
42. Neil McAllister, 'How Wolfram Alpha Could Change Software', InfoWorld, 29 July 2009, http://www.infoworld.com/d/developer-world/how-wolfram-alpha-could-change-software-248?page=0,0.
43. See, http://www.wolframalpha.com/termsofuse/.
44. Richard Stallman, 'Re: How Wolfram Alpha's Copyright Claims Could Change Software', A2K Listserve, 4 August 2009, http://lists.essential.org/pipermail/a2k/2009-August/004865.html.

Conclusions

When considering alternative search projects in the limelight of ideology, we can see that the capitalist spirit is by far not the only ideology shaping contemporary search engines. Quite on the contrary, there are multiple algorithmic ideologies at work. There are search engines that carry democratic values, those that incorporate the green ideology, some that believe in the commons, and others that subject themselves to the scientific paradigm. This means that we can set an ideological example by choosing one search engine over the other.

In daily practice, however, the capitalist ideology appears to be hegemonic since not all ideologies are equal in terms of exercising their power. The majority of users turns to big search engines and hence solidifies the capitalist spirit more than any other ideology.[45] Moreover, most alternative search engines are subordinate to 'informational capitalism'. DuckDuckGo and Ecosia both entered alliances with big search engines by using their search results and advertising methods. They assimilate the capitalist spirit by relying on big search and its capital accumulation cycle. Their ideological agendas are not deeply embedded in technical layers and algorithmic logics because both the index and the algorithms they use are borrowed from other search engines. Their ideology is only carried out on the surface; e.g. their user interfaces, encryption techniques, and donation models. In contrast, Wolfram|Alpha chose to be independent on an algorithmic level, but ended up as a commercial product too. The only exception is YaCy. The peer-to-peer network is the only search tool discussed that provides a true alternative to corporate search engines; it is the most radical alternative to proprietary search and expresses its values on the level of infrastructure, software, and content. YaCy's ideology is deeply woven into its technical Gestalt and computational logics and hence embedded in actual practices. All other search tools absorb the capitalist spirit.

This indicates that opting out of big search and its capitalist underpinnings is not as easy as it may seem at first sight. Everyone is free to choose alternatives, of course. But selecting a true alternative, both in terms of technology and ideology, would require not only awareness and a certain amount of technical know-how, but also effort and patience. The latter has become a rare good in our fast moving, comfortable consumer culture. Using YaCy to its full extent, for example, requires installing YaCy first, accessing the global index, and being patient in case the desired information does not appear immediately. It probably also involves missing some pieces of information other search engines would provide, for better or worse. The network is only as good as its participants, after all. This indicates that the farther you move away from big search engines towards smaller ones, the more beautiful their technical and ideological Gestalt become. Such a move however reveals that the beauty of search comes at a cost. True alternatives can only be reached with a critical mass of users who are willing to sacrifice bits of their convenience in return for a search tool that is created and owned in the public domain.

45. Google has a market share of more than 90 percent in most European countries according to the website SEO Chief: Mobaruk Hussain, 'The Market Share of Google in Various Countries', SEO Chief, 6 July 2010, http://www.seo-chief.com/5950/the-market-share-of-google-in-various-countries.

Whether a peer-to-peer search engine like YaCy will ever be able to compete with Google in regards to the scope and quality of its results will ultimately depend on the number of users participating. But time and money is needed too. Crawling and indexing the web has become a time-consuming and very expensive undertaking that involves sophisticated technology and highly skilled engineers. In the case of centralized search, it further needs large data centers around the globe. Big search engines such as Google possess years of experience with handling big data, an enormously skilled workforce, and large-scale infrastructure. Small search engines, such as the ones discussed in the article, just started out with taming big data and the challenges that come along with it. Whether they will succeed in providing a true ideological alternative to corporate search tools such as Google will depend on the human resources and funding they are able to acquire in the end. Dirk Lewandowski suggests providing public funding to create a public index of the web that would enable programmers to build various search engines on top of it and, as a result, to achieve greater diversity on the search engine market.[46] Whatever the incentives and specific actions will be to strengthen non-corporate search engines in the future, this article has shown that there are still certain barriers to be conquered on the road towards alternative search both in terms of technology and ideology.

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European Search? How to counter-imagine and counteract hegemonic search with European search engine projects

Astrid Mager

Abstract

This article investigates how developers of alternative search engines challenge increasingly corporate imaginaries of digital futures by building out counter-imaginaries of search engines devoted to social values instead of mere profit maximization. Drawing on three in-depth case studies of European search engines, it analyzes how search engine developers counter-imagine hegemonic search, what social values support their imaginaries, and how they are intertwined with their sociotechnical practices. This analysis shows that notions like privacy, independence, and openness appear to be fluid, context-dependent, and changing over time, leading to a certain "value pragmatics" that allows the projects to scale beyond their own communities of practice. It further shows how European values, and broader notions of Europe as "unified or pluralistic," are constructed and co-produced with developers' attempts to counter-imagine and counteract hegemonic search. To conclude, I suggest three points of intervention that may help alternative search engine projects, and digital technologies more generally, to not only make their counter-imaginaries more powerful, but also acquire the necessary resources to build their technologies and infrastructures accordingly. I finally discuss how "European values," in all their richness and diversity, can contribute to this undertaking.

Keywords

Counter-imaginaries, sociotechnical practices, communities of practice, alternative search engines, European values

This article is a part of special theme on The State of Google Critique and Intervention. To see a full list of all articles in this special theme, please click here: https://journals.sagepub.com/page/bds/collections/stateofgooglecritiqueandintervention

Introduction

The European search engine market is strongly dominated by Google (Alphabet), with a stable market share of more than 90%. In Europe, Google is followed by Microsoft's search engine, Bing (3.63%), Russia's search engine, Yandex (1.96%), and Yahoo! (0.97%), which uses Bing's search results. All of these search engines are provided by for-profit companies and none of them have more than a 5% market share. The market for alternative search engines that support a social cause is dominated by DuckDuckGo (0.53%), a US-American, privacy-friendly search engine, and Ecosia (0.29%), a German "green" search engine trying to protect the environment by using parts of its advertising revenue to support tree planting projects.[1] Even though the numbers differ among European countries, with Germany having a larger share of privacy-friendly search engines, for example, and the Czech Republic having its own local search engine, Seznam, with a relatively high number of users (10.8%) due to late investments by Google and better results in the Czech language[2], the overall picture is pretty clear: Google is the undisputed number one on the European search engine market. Its hegemonic position has triggered criticism from early on,

Institute of Technology Assessment, Austrian Academy of Sciences, Vienna, Austria

Corresponding author:
Astrid Mager, Institute of Technology Assessment, Austrian Academy of Sciences, Bäckerstrasse 13, Vienna 1010, Austria.
Email: astrid.mager@oeaw.ac.at

much of which has focused on search engine bias and lack of algorithmic transparency (Introna and Nissenbaum, 2000; Mager, 2012a; Noble, 2018), data-driven business models that contribute to "surveillance capitalism" (Fuchs, 2011; Zuboff, 2019), as well as the company's exploitation of its quasi-monopolist position to gain a competitive advantage (Lewandowski et al., 2018). It has further led to the idea of creating a European competitor that would allow Europe to escape its dependence on US-American, and increasingly Chinese, digital technologies, platforms, and infrastructures.

Already in 2005, the French president at the time, Jacques Chirac, announced project Quaero, meant to create a search engine "to rival Google and Yahoo," which he interpreted as a "threat of Anglo-Saxon cultural imperialism."[3] The project was presented as a joint French/German project and received a significant amount of money from the European Union. Shortly after the announcement, the joint project was split up into a French project focusing on multi-media search and a German project, Theseus, which focused on semantic technologies. While smaller technologies and search tools grew out of this publicly funded project, it failed in its formulated aim of creating a European competitor to Google, partly due to "misguided and unnecessary nationalism," as critics bluntly put it.[4] There are a number of things to learn from this brief European search engine history: First, there has been a long-standing desire to build a European search engine that would push back against hegemonic search. Second, the European context appears to be multi-cultural, heterogeneous, and highly diverse, and this needs to be accounted for in future European technology development projects. How to achieve all of this, however, is an open question that will be discussed in this article. Over the past five years (2017–2022), I studied three alternative search engine projects aiming at social change, all based in Europe: the privacy-friendly search engine Startpage, the peer-to-peer search engine YaCy, and the Open Web Index initiative. Albeit small in scale, these projects may be seen as powerful in terms of challenging increasingly corporate imaginaries of digital futures by collectively building out counter-imaginaries of hegemonic search emphasizing social values rather than profit gain. Drawing on these in-depth case studies, I will address the following research questions: How do developers of alternative search engines counter-imagine and counteract hegemonic search with their projects? What are the social values supporting their imaginaries and how are they co-produced with their sociotechnical practices? And how are European values, and notions of Europe as "unified or pluralistic" (Mahfoud, 2021: 324), intertwined with their imaginaries and practices?

In the following sections, I draw on literature from Science and Technology Studies (STS), critical new media studies, and the politics of scaling. Within this large body of research, I will particularly discuss the increasing commodification of sociotechnical imaginaries (Mager and Katzenbach, 2021), the notion of "counter-imaginaries" (Kazansky and Milan, 2021), the politics of scaling (Pfotenhauer et al., 2022) and "nonscalability" (Tsing, 2012), as well as the co-production of digital technologies/infrastructures and a European identity (Mager, 2017, 2018; Mahfoud, 2021; Mobach and Felt, 2022). After describing my study and methods, I will discuss the empirical analysis in two parts: First, I will investigate search engine developers' counter-imaginaries, what social causes drive their imaginaries, and how they are intertwined with their sociotechnical practices. Second, I will analyze what challenges and constraints developers experience in their scaling strategies, what trade-offs they have to contend with, and what "value pragmatics" this implies. In both sections, a particular focus will be put on the way European values are constructed in developers' attempts to counter-imagine and counteract hegemonic search with their projects. To conclude, I suggest three points of intervention that may help alternative tech projects to strengthen their counter-imaginaries and acquire the necessary resources to build their technologies and infrastructures; especially in the European context with its long-standing desire to counteract big tech companies like Google.

Hegemonic rhetoric and counter-imaginaries

Visions, narratives, and imaginaries are powerful vehicles for shaping digital futures in certain ways. Jasanoff and Kim (2009) have coined the notion "sociotechnical imaginaries" to capture the constitutive role imaginaries play in the shaping of social and political orders in the context of technology politics. They compare sociotechnical imaginaries to discourses, metaphors, and cultural meanings out of which actors build their policy preferences. In comparison to policy agendas, however, sociotechnical imaginaries are characterized as less explicit, less goal-directed, and less politically accountable (Jasanoff and Kim, 2009: 123). While the original concept of sociotechnical imaginaries strongly focused on state actors and nationhood, recent research has shown that powerful imaginaries are also articulated and enacted by corporate actors, civil society, research communities, and other organized groups in processes much more complex and non-linear than those envisaged in the initial concept (Felt and Öchsner, 2019; Mager, 2017, 2018; Olbrich and Witjes, 2016). In the context of digital technologies, the growing importance of corporate actors in envisioning, and thereby constructing, digital futures has been particularly highlighted (Mager and Katzenbach, 2021). In regard to Facebook (Meta), for example, Haupt (2021: 237) has shown how Mark Zuckerberg rhetorically constructs a "corporate vision of a better world, but also blend[s] it with the digital technologies and practices involved in making this vision reality." In a series of public engagement events,

Markham invited participants to reach into the black boxes of digital technologies through critical interventions. While the interventions helped participants to critically engage with digital platforms and datafication attempts, present and possible future visions appeared to be strongly determined by contemporary technologies conceptualized as not really giving people a choice, e.g., either we connect to social media or "we do not exist," as Markham (2021: 397) describes the theme of "inevitability" brought forward by the participants. She concludes that "ideologies embedded in everyday discourses, materialities, and infrastructures function to self-regenerate. Power becomes hegemonic because both the control mechanisms and the ideologies are invisible, naturalized, and then neutralized" (Markham, 2021: 397). In the context of search engines, Mager (2012b, 2014) has defined the concept "algorithmic ideology" to elaborate how capitalist ideology gets embedded in and solidified through corporate technologies. Ideologies, and larger sociotechnical imaginaries, can thus be seen as tightly intertwined with the technologies they co-produce. Given the hegemonic position of big tech companies in imagining and shaping digital technologies, sociotechnical imaginaries have been described as increasingly commodified, but also as multiple and contested at the same time (Mager and Katzenbach, 2021).

Accordingly, a growing body of research has started to investigate the role imaginaries play in citizen engagement with datafication and data infrastructures (Mansell, 2012; Milan and ten Oever, 2016; Lehtiniemi and Ruckenstein, 2019). Lehtiniemi and Ruckenstein (2019: 3) have used the concept of "alternative social imaginaries" to investigate a data activism initiative aiming to shape a more sustainable citizen-centric data economy. Kazansky and Milan (2021) have introduced the notion "counter-imaginaries" to capture counter-cultural voices and practices of technology development that aim at social change. "These counter-imaginaries make apparent how civil society seeks to respond to the ever-complex technological change and the risks it conceals" (Kazansky and Milan, 2021: 366). Like dominant imaginaries, they not only enable us to understand how civil society counter-imagines digital futures, but also to observe practitioners in action as they try to shape their technological present and future (Kazansky and Milan, 2021: 366). The notion of counter-imaginaries is thus well suited to investigating not only how search engine developers counter-imagine hegemonic search, but also how they try to build their search technologies and infrastructures accordingly. In the words of Hilgartner (2015), alternative search engine developers may be seen as an "avant-garde" that aims to drive a wave of change. In his research on "sociotechnical vanguards," the author defines them as "relatively small collectives that formulate and act intentionally to realize particular sociotechnical visions of the future that have yet to be accepted by wider collectives, such as the nation" (Hilgartner, 2015: 36). In this article, I will discuss what strategies developers of alternative search engines follow to scale and grow their projects beyond their own "communities of practice" (Wenger, 1998) and how counter-imaginaries can be anchored in larger European imaginaries.

Politics of scaling and European values

Research on the politics of scaling conceptualizes figures like Mark Zuckerberg, PayPal founder and venture capitalist Peter Thiel, and Tesla CEO Elon Musk as "obsessed" with scaling, while framing it as an indispensable part of contemporary innovation discourses and social, political, and economic life at large (Pfotenhauer et al., 2022: 4). In their analysis of economies of scale, Pfotenhauer et al. (2022) argue that the impetus of scaling is closely related to "corporate America" and disruptive practices of Silicon Valley companies like Uber, and their venture capitalists. These have been characterized as "Blitzscaling," a "shock-and-awe tactic" aimed at social disruption that strives to "achieve massive scale at incredible speed" (Hoffman and Yeh, 2018; cited in Pfotenhauer et al., 2022: 4). Cohen (2013) has made a similar argument from a legal perspective. She argues for critically engaging with the rhetoric of privacy as "antiprogressive" and "overly costly," as framed by Silicon Valley companies, or the larger "surveillance-innovation complex," as Cohen (2016) called it. Against this background, Tsing argues for a nonscalability theory that pays attention to the "mounting pile of ruins that scalability leaves behind" (Tsing, 2012: 506). Not because nonscalability is necessarily better, but because it opens up the view on "diversity-in-the-making." Nonscalability hence enables us to analyze how diversity, local specificities, and moral values—the "situatedness" of my case studies—contribute to developer practices. The term "situatedness," which has a long tradition in science and technology studies (Haraway, 1988; see also Butler, 1990; Thompson, 2001), allows for considering differences in social, cultural, political, economic, and institutional positionality, but also for a "normative critique of hegemonic power structures and colonial tendencies that threaten to erase epistemic and political diversity" (Pfotenhauer et al., 2022: 6).

The three search engines involved in my research are differently situated for various reasons, and not only geographical ones. A central reason lies in their ownership structure being closely related to their ideological underpinnings, which I will describe as market-oriented, civil-society driven, and state-funded in the next section. Despite these differences, however, all three case studies situate themselves in the larger European context whereby constructing different notions of Europe tightly intertwined with their practices and experiences. This is in line with research having argued for developing European digital technologies, platforms, and infrastructures. Van Dijck (2021a, 2021b), most notably, made a plea for working towards

"European platform societies" to counteract the overly dominant American and Chinese "platform ecosystems". She uses the metaphor of the "platformization tree" to describe how big tech companies exert and extend their hegemonic power on all levels of digital infrastructures (Van Dijck 2021a: 2805–2807). The roots of the tree consist of computer hardware, cables, Internet protocols and the like, the trunk includes internet services and software comprising web browsers, search engines, social networking platforms, online advertising, and, finally, the branches of the tree encompass sectoral applications that are built on top of it (see also Rieder's (2022) analysis of the political economy of technical systems in this regard). US-American tech companies (Google, Apple, Facebook, and Amazon (GAFA)), but increasingly also Chinese companies (including Baidu, Alibaba, and Tencent (BAT)) successfully managed to occupy and shape large parts of the trunk, which makes them indispensable parts of connected ecosystems. The question thus is how to diversify "the tree" from the bottom up or, to put it in van Dijck's (2021a: 2815) geopolitical terms: How to develop a "European platformization tree" that

> does not have a trunk that grows taller and thicker fed by proprietary data flows, but has a 'federated', decentralized shape. […] Such a tree may help grow a different kind of ecosystem – one that allows for more variety, openness, and interoperability at all levels.

The notion of Europe as "federated," associated with diversity and openness, recurs in the imaginaries of alternative search engine developers, as we will see later. However, other notions of Europe are also constructed in my case studies.

This corresponds to research having shown how European values are differently constructed and co-produced with data practices, governance of digital technology, and large-scale research infrastructures. Having analyzed the data practices of statisticians, Ruppert and Scheel have shown how a "European people" is enacted in and through data politics and practices, whereby data contribute to enacting the realities that they refer to (Ruppert and Scheel, 2021: 16). In the context of the European data protection reform, Mager (2017) has analyzed how search technology and a European identity are both made and unmade in heated negotiations around this legislative act. While the rhetoric of "European values"—the fundamental right of data protection, most importantly—was strongly pushed in EU policy discourses, practical negotiations of EU-wide data protection standards pictured Europe as a "multiply imagined community" (Jasanoff, 2005) due to its political, cultural, and economic diversity: "Fundamentally different visions and values rooted in different historical experiences, socio-political traditions, economic cultures and ideological foundations all participate in the co-production of search technology and Europe" (Mager, 2017: 255). In the context of their research on the technoscientific infrastructure of the European Organization for Nuclear Research (CERN), Mobach and Felt have shown how the "bringing to life of a technoscientific infrastructure has been performing Europeanness in multiple ways" (Mobach and Felt 2022). In her research on the European Human Brain Project, Mahfoud (2021) has coined the notion of Europe as "unified or pluralized" to discuss the tight entanglements between large-scale science and technology and narratives about Europe as such: "through these narratives Europe itself is posited as a problem – the tension between unification and pluralism is serving as both metaphor for and backdrop to contestations over how scientific communities should be bringing data together in European 'big science' projects" (Mahfoud, 2021: 338). All this research complicates clear-cut notions of Europe by showing how different notions of Europe are co-produced with practices of shaping digital technologies and infrastructures. How developers of alternative search engines construct different notions of Europe in the context of their sociotechnical practices will be analyzed by drawing on three European search engine projects.

Studying alternative search engines based in Europe

From 2017 until 2022, I studied three European search engine projects of very different kinds: the privacy-friendly search engine Startpage[5], the peer-to-peer search engine YaCy[6], and the Open Web Index initiative.[7] The long duration of my fieldwork enabled me to deeply engage with all three developer teams and follow their developments over time. The three case studies differ significantly in terms of the technologies and infrastructures they develop, their social, cultural, and economic embeddings, as well as their "communities of practice" (Wenger, 1998). Moreover, they have different ownership structures and ideological underpinnings that I roughly categorize as market-oriented, civil society-driven, and state-funded. This categorization corresponds to European societies with a "long tradition of organizing their democracies based on balanced cooperation between market, state, *and* civil society actors (Mager, 2018)" (van Dijck, 2021a: 2814, italics in original). It further corresponds to the different ways the three case studies try to counter-imagine and counteract hegemonic search, starting with different approaches to the web index. Search engines do not search the web "live", but rather search a database of websites that have been crawled and indexed before—an archive of the web, so to speak. The size, freshness, and maintenance of such a web index are hence crucial for search engines and can be achieved in different ways.

Following the logics of the market, *Startpage (SP)* aims to run a profitable business with privacy-friendly search

technology. SP is headquartered in The Hague and cooperates with Google to benefit from Google's web index and search engine results. This enables SP to focus on data protection as its unique selling point. The roots of SP go back to 1998, when its predecessor Ixquick was developed as a meta-search engine, which was turned into a privacy-friendly search engine in 2005. SP offers Google search results without storing, using, or transmitting personal user data to Google, except from the search terms. SP users are thus provided with non-personalized Google search results and advertisements related to their search terms, but not to their personal data or "profiles." More recently, Startpage introduced additional privacy features such as "anonymous view" for websites or a browser extension that detects and blocks trackers and cookies on websites. The company also runs StartMail, offering ad-free, encrypted email without user surveillance.

The civil society-driven search engine *YaCy* was created in 2003 by a German free software developer. YaCy tries to build its own web index using principles of peer-to-peer (P2P) networks. This index is supposed to be a de-centralized, open, and independent alternative to corporate, centralized web indexes like the Google index. Surfing the web through the YaCy proxy enables users, or "peers," to build up their own web indexes, which could then be shared with other YaCy users. A crawler further enlarges this jointly created web index. Moreover, YaCy can be used for intranet solutions, search boxes on websites, or just as a search tool on one's own machine, independent from other peers. Since 2016, the YaCy maintainer, together with open source developers from all over the world, has also worked on an open source virtual assistant, *SUSI.AI,*[8] which aims to become an open source alternative to Alexa or Google home.

The third project, the *Open Web Index (OWI)*, relies on state funding to develop a comprehensive index of the web that is open to the public, which would enable a diverse range of different search engines to emerge. More specifically, it counts on the European Union (EU) to fund such a large-scale infrastructure project. The OWI initiative was formed in 2014 and was closely related to the activities of the German nonprofit organization "SUMA-EV–Association for Free Access to Knowledge," which runs the meta-search engine MetaGer. The OWI group was initiated by search engine researchers, computer scientists, journalists, and other interested stakeholders, mainly from Germany. In 2018, a bottom-up approach toward building an open web index started to take shape, trying to interconnect data centers and universities in order to build the index step by step. Just recently, this newly launched "*Open Search Foundation" (OSF)*,[9] together with 14 European research institutions and computer centers, received funding from the EU to "create an open European infrastructure for internet search, based on European values and jurisdiction," according to its website.[10]

To analyze the three case studies, I used a qualitative mixed-methods approach combining interviews, participatory observations, website analyses, and joint workshops with the developer teams. I initially planned to use the method of "mind scripting" for all three case studies, but I had to refine my methodological toolkit throughout the empirical work to be able to grasp the case studies' different "situatedness" (Haraway, 1988) in terms of technology, work practices, and ownership. Mind scripting has been developed to make software developers reflect upon the value systems and normative ideas that guide their work practices, both explicitly and implicitly (Allhutter and Hofmann, 2010; Allhutter, 2012). Rooted in a culture of reflection and debate, this method corresponded well to the work practices of the OWI/OSF group, which was largely made up of researchers and scientists open to participating in such a workshop. Accordingly, I conducted a two-day mind scripting workshop with OWI/OSF advocates in Berlin (2018). In contrast, the hands-on developer culture of YaCy/SUSI.AI and the corporate structures of SP complicated the realization of mind scripting workshops with these developer teams. I therefore decided to engage with YaCy/SUSI.AI developers in their own coding environments by joining them at open tech summits and community events, which ultimately resulted in two joint hands-on workshops at the FOSSASIA open tech summit (Singapore, 2019) and at the Ars Electronica Festival (Linz, Austria, 2020). Finally, I visited the SP headquarters in The Hague for one week, which allowed me to grasp the company spirit, attend meetings, work flows, joint afterwork activities, and conduct a wide range of interviews with SP employees from management, engineering, usability design, PR, and support.

Altogether, 40 semi-structured interviews were conducted with SP employees, OWI and OSF contributors, as well as YaCy and SUSI.AI developers. Twenty-seven interviews were conducted face-to-face at the SP headquarters in The Hague (2019), open tech summits and meet-ups in Berlin (2018), the Chaos Computer Congress in Leipzig (2019), the FOSSASIA open tech summit in Singapore (2019), the Ars Electronica Festival in Linz (2020), as well as in Berlin, Hamburg, and Munich, where many of the OWI/OSF members are based. Thirteen interviews were conducted online as a preparation for and a follow-up to the respective fieldwork on-site. The qualitative interviews followed a rough interview guideline, asking the developers about the early days of their projects, how the projects developed over time, what challenges and breakthroughs they experienced, if/how the European context mattered in their practices, and what they wished for in the future. The mind scripting workshop with the OWI/OSI team and the hands-on workshops with SUSI.AI developers enabled me to deepen insights I gained from the interviews, to participate in their collective work practices and reflections, and to come up with new analytical categories

such as the importance of scaling. All interviews and workshops were transcribed, coded with the help of the qualitative text analysis software MAXQDA, and analyzed according to the research questions following a Grounded Theory approach. This approach enabled me to cyclically collect data, analyze it, and go back to my fieldwork, thereby grounding my theories and concepts in empirical materials (Glaser and Strauss, 1968). It further allowed me to constantly refine my coding scheme that was made up of both top-down categories resulting from the research questions (such as social values, e.g., privacy or hacker ethics constituting the respective counter-imaginaries) and bottom-up categories, including "in-vivo" codes (terms that were used by the interviewees themselves such as Europe as federated or cooperative).

Empirical analysis: counter-imagining and counteracting hegemonic search

Counter-imaginaries, social causes, and European values

All three developer teams conceptualized their projects in opposition to hegemonic search, and to Google in particular. Especially when talking about the beginning of their projects, the motivation to dethrone Google and build an alternative was strongly articulated in the interviews. While the YaCy creator described his motivation as wanting to build a search engine to "fight against the big and powerful; that you can provide your own alternative," an OWI/OSF advocate referred to Google by saying "it is astonishing and obvious that we need our own search infrastructure in Europe to escape from this digital colonialism," which resembles Chirac's initial announcement of Quaero. How the developers counter-imagined hegemonic search and how they constructed European values in the context of their practices, however, was tightly intertwined with their sociotechnical practices and ideological underpinnings, which I categorized as market-oriented, civil society-driven, and state-funded.

In line with its market orientation, Startpage (SP) aims to provide users with a "viable alternative" (SP CEO) to big search and its data-driven business model based on heavy user tracking. It *counter-imagines hegemonic search as a privacy-friendly endeavour* to be achieved with privacy features resembling notions of privacy by design. Contrary to Silicon Valley's rhetoric of privacy as "anti-progressive" and "overly costly" (Cohen 2013), SP tries to turn privacy into a competitive advantage. Being in alliance with Google in order to benefit from its comprehensive web index and search engine results creates certain tensions and ambivalences, as will be discussed later. But SP developers are adamant that privacy cannot be compromised: "Yeah, definitely the privacy we will never ever compromise. That is fixed and they (Google) know that" (SP business-to-business relations). Contrary to Startpage, the civil society-driven search engine YaCy, *counter-imagines hegemonic search as an independent, de-centralized technology* following peer-to-peer principles. Their counter-imaginary to hegemonic search can be described as more radical in the sense of trying to build their own infrastructure deeply rooted in classical hacker ethics: "The philosophy behind it includes freedom of information, self-determination, the uncensored". Or, as the YaCy developer essentially characterized it in an informal conversation at the Chaos Communication Congress: "Hacking is not about technology, it's about self-empowerment" (CCC 2019, fieldnotes). These quotes resonate with the "hacker ethics" put forward by the German Chaos Computer Club,[11] which partly draws on Levy's (1984) initial hacker ethics, including values like free access to computers and free information, decentralization and mistrust of authorities, making public data available while protecting private data, as well as "the hands-on imperative" (Levy, 1984: 22). The third project, the Open Web Index (OWI), counts on state funding to create a comprehensive, competitive web index that is open to the public. *Counter-imagining hegemonic search as basic infrastructure*, the OWI initiator straightforwardly said, "it's an absurd situation, as if a private vendor would own the streets." This is in line with research arguing that public service media and internet technologies are increasingly needed these days (Iosifidis, 2011; 2011; Fuchs and Unterberger, 2021), a plea that grew significantly stronger after Elon Musk acquired Twitter just recently.[12] Given the "sheer size" (OWI initiator) of a comprehensive open web index, "a pan-European initiative" was imagined to fund such an index (Lewandowski, 2014).

Despite their distinct counter-imaginaries, all three projects situated themselves in the European context and thereby constructed European values tightly intertwined with their sociotechnical practices and experiences. Startpage developers constructed *privacy as a European value* to be achieved in practice. Their European company location in The Hague was described as an advantage, for example, because "the trend is more privacy friendly here" and "we fall under European regulations, which gives people […] more trust," according to the SP management. Trust was framed as a very important element for privacy. Running European servers was also described as a way of evoking trust on the user side since they are "inside European jurisdiction", at least for those users who are "educated" and look for the "right properties," as one of the SP usability designers said. External quality marks such as the EU's privacy seal, "EuroPriSe,"[13] which SP acquired through a tough technical and legal audit, were further framed as raising trust in the search engine. Finally, alliances with European institutions, policy actors, and civil society were seen as ways of raising awareness about data protection, and, in turn, Startpage as a privacy-friendly search engine. In the context of their practices, SP

developers constructed privacy as a European value by contrasting Europe to other cultural contexts, most importantly the US with its big tech companies and practices of user-surveillance. This resembles EU policy discourses that frame data protection as a "core European value" by crafting a European identity in opposition to "the other," especially the US (Mager, 2017).

Developers of the civil society-driven search engine YaCy, and the open source virtual assistant SUSI.AI, also situated themselves in the European context, though in a very different way. In the context of their work practices and experiences, they shaped *Europe as highly bureaucratic*. Initially, the YaCy developer mainly counted on public funding, research and development calls, and consulting for public institutions to "keep the project alive." Recruiting public money in Europe was described as very bureaucratic and distant from the "hands-on imperative" (Levy, 1984) of the developer community. Referring to his specific experiences with German funding bodies, one of the main SUSI.AI developers complained about juries that lacked both technical and entrepreneurial skills and therefore mainly looked at formal criteria such as CVs, university degrees, and academic papers. Contrasting European funding bureaucracy with Google, the YaCy developer described Google's funding strategy as "cherry picking" projects with innovative ideas and "the capacity to take initiative" rather than formal criteria. This way, Google was described as much closer to developer communities with their hands-on coding cultures than to European funding, which the developer interpreted as a "totally distinct world." A SUSI.AI developer finally referred to the bureaucracy involved in starting a European business: "Innovation definitely happens in Europe, it's just difficult to have innovation through small businesses because it's difficult to start a small business in Europe." In this context, European bureaucracy was also opposed to "the other", the US and partly China in this case, which have been described as having more dynamic funding and start-up cultures rooted in different entrepreneurial spirits. The developer concluded by saying: "In the US, it's like, if you fail 10 times we love you; because you've made all those mistakes we don't want you to make any more. In Europe you need to build slowly and show you're profitable."

The Open Web Index (OWI) advocates imagined a joint European effort in terms of funding and supporting the building of an open web index. The notion of search engines as "basic infrastructure" was strongly associated with Europe's long tradition of public funding and public service media. Besides public funding, however, diversity was staged as a central characteristic of the open web index, both in terms of diversity of knowledge and diversity of search engines. Having been asked what the advantage of an open web index would be, compared to hegemonic search engines, the initiator said, "Well, the unique selling point is that access to an index would be provided in the first place and that thousands of different services could flower on this index, which is currently impossible." Contrary to one-size-fits-all search engines like Google, an open web index would "lay the groundwork" (OSF initiator) to enable different actors and institutions to build their own individual search tools, ranking instruments, applications, and services on top of it and would therefore better meet the needs of specific user groups, including public institutions, civil society actors, but also industrial actors. Rather than "downscaling" (Breiger, 2015) big tech platforms and networks to meet users' diverse needs and practices, an open web index was framed as better corresponding to different cultural values, sociopolitical contexts, user needs, and localized demands right from the start. In this context, the *notion of Europe as federated, multicultural, and diverse* was shaped, evoking van Dijck's (2021a) work on the "European platformization tree." This notion of Europe gained further strength in the context of the bottom-up approach towards web crawling that has taken shape in recent years to lift the OWI from the ground, as will be discussed in the next section.

Scaling strategies, value pragmatics, and Europe as "unified or pluralistic"

All search engine projects encountered challenges and constraints in their attempts to counteract hegemonic search with their sociotechnical practices, especially in regard to their scaling strategies to (be)come sustainable in the longer run. In these practices, notions of privacy, independence, and openness appeared to be constantly negotiated and renegotiated, resulting in a certain "value pragmatics" enabling them to grow their projects. Moreover, different notions of Europe, such as Europe as "unified and pluralistic" (Mahfoud, 2021), were constructed and co-produced with sociotechnical developer practices and infrastructures rather than being fixed or stable.

Counter-imagining hegemonic search as a privacy-friendly endeavor, SP strongly focuses on *data minimization in its sociotechnical developer and scaling practices*. Data minimization was described as creating a number of challenges and constraints—deep down in SP's hardware, on its software level, as well as on the surface level of its social media and marketing strategies. On the hardware level, running their own (European) servers was seen as much more complicated than using cloud computing, for example. On the software level, data minimization was framed as adding "algorithmic complexity" (SP developer) to their coding practices, while also having wider implications for users. If the service gets uncomfortable for users, they may start to "mistrust" SP altogether (SP usability designer). This implies a trade-off between privacy and usability, partly also between "full transparency and still making a good marketing case," as the SP CEO put it. This trade-off

was heavily debated in regard to social media and marketing strategies SP wanted to intensify after their relaunch in 2018; particularly in German-speaking countries, which SP developers described as their "natural market" given the strong emphasis on privacy in this cultural context. Talking about Facebook marketing, the SP CEO put it like this:

> We had some ethical discussions in the company: Is that right to do? No, it's not right because you use information, very personal information, and you exploit that. Yes, it is right, because we want to have an impact and we want to get those people from the bad situation they're in to a better situation. Not always easy.

In this context, their alliance with hegemonic search was critically reflected on, too, "because eventually the data that Google gathers is part of why they're so successful, not just financially, but also with their product" (SP management). The same applies to venture capital as a means of growing their company. All these examples show that SP's notion of privacy was constantly negotiated, renegotiated, and co-produced with hardware solutions, software practices, usability design, and marketing strategies. Moreover, it changed over time due to lessons learned along the way, such as the realization that putting a simple counter on the website does not necessarily count as user tracking. The SP CEO concluded: "So, our whole knowledge and ideas about privacy developed and refined a lot." This indicates that SP developed a certain "value pragmatics" as an outcome of a complex interplay of engineering practices, infrastructural requirements, data practices, and scaling strategies that are all at play when designing privacy-friendly features. Nissenbaum's work on "privacy in context" comes to mind here, which highlights that privacy should not be seen as fixed or stable, but rather as co-produced with the contexts around them, e.g., the context in which personal information is generated, processed, and distributed through digital technologies (Nissenbaum, 2010: 2). It further shows that specific cultural contexts, "German-speaking countries" most particularly, were raised when talking about ways of growing their user base with marketing attempts. This indicates that "European values" like privacy, which are strongly emphasized in abstract terms, were partly conflated with more situated cultural specificities evoking the notion of Europe as pluralized rather than unified.

Counter-imagining hegemonic search as an independent, de-centralized technology, YaCy and SUSI.AI developers counted on *community-driven scaling strategies*. Open tech summits and other meetups were described as central locations to "reach out to the community" (SUSI.AI contributor), resembling Wenger's (1998: 214) notion of "communities of practice" as a "privileged locus" for both the acquisition and the creation of knowledge. Community-driven scaling attempts involved a central challenge, which the YaCy maintainer described as a "chicken-and-egg-problem": "Especially with search engines like YaCy, which can only work out if many people use them and which are only used by many people if they are good, right?" To solve such issues, the developer added, certain trade-offs between developers' ideology and end users' needs are required. Lack of money and resources, however, increasingly became an issue too, especially for SUSI.AI developers who wanted to scale the project. Having been disappointed by European funding agencies, as elaborated earlier, SUSI.AI developers decided to experiment with the Google Summer of Code funding program (GSOC), a funding scheme for open source projects benefitting from paid computer science students who contribute to the project over the summer. While the peer-to-peer search engine YaCy was initially rooted in the rather strict German free software movement, more pragmatic values entered the developer community, with people now contributing to SUSI.AI from all over the world through GSOC, most importantly from India. This multiculturalism entailed a diversification of values and ideologies within their own developer community that ranged from "market liberalism" to "communism," according to an Asian SUSI.AI contributor I interviewed at the FOSSASIA summit in Singapore. Moreover, the strong emphasis on data protection was renegotiated in more pragmatic approaches towards developing open source virtual assistants that rely on open data. In the context of machine learning used for speech-to-text translations, a SUSI.AI contributor concluded that "open is not trivial": "What does open data mean? With which data was the model trained? Can we use them? Can we train the model anew?" Accordingly, values like independence and openness appeared to be renegotiated and co-produced with new technologies, machine learning models, and funding opportunities, also leading to certain "value pragmatics." This resonates with Coleman's (2013) research on the heterogeneity of "hacker ethics." It further corresponds to Birkinbine's (2020: 8–9) distinction between the free software movement, tightly intertwined with its radical founder Richard Stallman, and open source communities described as more open, flexible, and less anti-capitalist. In the interviews, German developers tended to relate themselves to data protection and anti-commercial ideology more than Asian developers, who inscribed themselves in more pragmatic, partly liberal, open source communities. This indicates that just like privacy, other supposedly "European values" like openness and independence were partly conflated with more specific, culturally situated contexts. Moreover, the imaginary of bureaucratic Europe was localized when talking about frustrating experiences the developers had with particular German funding bodies, as argued earlier, hinting at multiculturalism and diversity within European countries instead of notions of Europe as a coherent whole.

Counter-imagining hegemonic search as basic infrastructure to be built from scratch, funding was discussed as a

central issue by my interviewees. The OWI initiator put it like this: "It's not a research project and it's not a project that would fit into any funding program because of its sheer size." Since recruiting *major EU investments from the top down* (hundreds of millions of Euros were hoped for) appeared to be challenging and to take a long time in practice, the imaginary of a bottom-up approach toward web indexing took shape (they finally received an EU grant of 8.5 million Euros to start the project, at least[14]). The main initiator of this newly founded Open Search Foundation (OSF) envisioned libraries, data centers, universities, and other European entities building a crawling and indexing algorithm that would accumulate a web index step by step. Later in the interview, he described the project as "a kind of computational movement in Europe" evoking the notion of Europe as being culturally diverse, federated, and cooperative: "This is why we need a special spirit here to benefit from the federated, rather cooperative structures in Europe." In contrast to the US, which has a "huge lever in terms of a big market" that would allow for strategies of "Blitzscaling" (Hoffman and Yeh, 2018; Pfotenhauer et al., 2022), Europe would need to slowly coordinate its federated structures to build a comprehensive web index from the bottom up, the OSF initiator concluded. This resonates with Tsing's (2012) notion of "nonscalability," enabling us to grasp "diversity-in-the-making." Moreover, the long duration that is needed to build such a large-scale search infrastructure proved to be challenging according to the mind scripting workshop participants. This is in line with infrastructure studies which argue that it is not only lack of time and resources, but also temporality that matters in building large-scale infrastructures. Karasti et al. (2010) introduced the notions of "project time" and "infrastructure time" to better understand the multiple temporalities that are at stake. Ribes and Finholt (2009) use the concept of "the long now" to capture tensions between demands of the present and a desired future that infrastructure developers have to constantly balance. In particular, "taken-for-granted short-term temporalities" (Karasti et al., 2010: 380) hamper more long-term funding, but also conceal the long durations needed for building up large-scale infrastructures.

The *bottom-up approach towards web crawling and indexing* therefore also resulted in a certain "value pragmatics" that were described in terms of breaking the big task of indexing the web into small "projects", which could be made "manageable". Then "people specialize only on those small pieces and work together in a very open community way" according to an OSF developer. This would enable different projects to "run in the same infrastructure" and also attract "low-level potential end users", the OSF contributor added. This, however, also points to the "infrastructural complexity" (Star and Ruhleder, 1996; Karasti et al., 2010) involved in building such an infrastructure and the governance questions that come along with it. One question raised by my interviewees is the question of what data and documents to exclude from the index and on what infrastructural level. Drawing a comparison to Google, an OSF developer explained: "then you have this, let's say, decision which is made very low down in Google. […] and the end users have to live with that". Contrary to meta-search engines that cannot challenge "the American rules about indexing, what is being found and so on", an open web index would allow for "totally reorganizing the way you collect the data and how you build indexes and how you make competition on all levels", as he explained. All these examples resemble the entrepreneurial practice of breaking big tasks into small projects, but also the notion of a pluralized Europe associated with federalism, multiculturalism, and diversity. They show that different approaches to building an open web index are intertwined with different notions of Europe that resonate with Mahfoud's (2021) research on the Human Brain Project. In the light of this research, the OWI and OSF approaches may not only be seen as enacting different visions of the open web index, but also as co-producing different imaginaries of Europe as "unified or pluralistic" (Mahfoud, 2021: 324). How to coordinate different projects, crawling attempts, and ordering mechanisms – or "how to unify while retaining diversity?" (Mahfoud, 2021: 338) – remained an open question for my interviewees. What their project underlines, however, is that just like European values, broader notions of Europe appeared to be highly context-dependent due to the cultural heterogeneity of Europe, but also due to the "infrastructural complexities" (Star and Ruhleder, 1996) involved in building a comprehensive web index from scratch.

Discussion: Three points of intervention

In the empirical analysis, I have shown how alternative search engine projects try to challenge increasingly corporate imaginaries of digital futures by collectively building out counter-imaginaries to hegemonic search that are devoted to privacy, independence, and openness. I have shown that trade-offs between ideology and feasibility, partly also between ideology and usability, are needed to enable them to scale and (be)come more sustainable in the longer run. In these trade-offs, social values appeared to be negotiated and renegotiated, as well as to change over time, resulting in a certain "value pragmatics" that allowed the projects to grow beyond their own "communities of practice" (Wenger 1998). Moreover, European values, and broader notions of Europe, turned out to be context-dependent and co-produced with sociotechnical developer practices and search infrastructures. In the following, I suggest three points of intervention that can help counter-imaginaries to grow and alternative technologies and infrastructures to flower . How "European values" can contribute to this undertaking will be finally discussed.

1. *Funding and slow scalability*: Considering the "infrastructural complexity" (Star and Ruhleder, 1996) involved in building and running a comprehensive web index, major funding would be required, first of all. Not only is the amount of money relevant in this respect, the temporality also needs to be considered. In addition to funding short-term "cutting-edge technology projects," "innovation that emerges in the long-term" is critically important, according to Karasti et al. (2010: 407–408). Moreover, bureaucratic processes of public funding described by my interviewees may be reconsidered given that certain "communities of practice" (Wenger, 1998) are organized around the "hands-on imperative" (Levy, 1984) rather than formal CVs or academic practices of writing grant applications. Especially in Europe, where well-funded public institutions and media have a long tradition, bolder ways of funding and fostering digital technologies and platforms need to be found. Funding programs that better correspond to the hands-on spirit of developer communities would bring public institutions closer to the social values, technical skills, and knowledge that are needed to build more open, democratic, and sustainable technologies. Such programs would be able to better correspond to the "situatedness" (Haraway, 1988) of localized projects associated with notions of Europe as diverse, federated, and cooperative. Rather than "downscaling" (Breiger, 2015) big tech platforms and infrastructures to meet specific user needs, such projects would be embedded in localized contexts right from the beginning. This would facilitate more heterogeneous search engine landscapes, thus diversifying the access to and ordering of knowledge. To reach this goal, Europe may be advised to count on "slow scalability" and long-term funding, which would be needed to build search engines and infrastructures devoted to the public good instead of using quick venture capital and strategies of "Blitzscaling" (Hoffman and Yeh, 2018; Pfotenhauer et al., 2022) promoted by big tech companies.
2. *Continuous auditing and advice*: Second, the fluidity of notions like privacy, independence, and openness needs to be considered in the development and governance of digital technologies. All three case studies have shown that both the technologies and their value systems are constantly changing and transforming along with the introduction of new features, practices, infrastructures, marketing strategies, and funding opportunities. This confirms research by Gürses and Hoboken (2018: 598), who have argued that the "agile turn" in software development needs to be considered in governance practices since "the way in which digital functionality comes into the world" affects "privacy and the conditions for its governance". Rieder and Hofmann (2020) suggest the notion of "platform observability," in contrast to transparency, to highlight the fluid and transformative nature of digital platforms, practices, and infrastructures. This would require new institutions like a "European Platform Observatory" that would be provided with highly specialized technical expertise, a public interest mandate, adequate funding, and strong regulatory support so as to practically hold platforms accountable (Rieder and Hofmann, 2020: 23). Given the results of my study, however, continuous auditing and advice are not only needed after the implementation of digital technologies, platforms, and algorithmic systems, but even more so before that. Especially in the phase of developing digital tools and infrastructures, constant advice and public scrutiny are needed with regard to legal requirements, ethical and governance issues, as well as social implications. This supports research showing that ex-post auditing of profiling systems in public sectors (Allhutter et al., 2020) or of human rights protocols (ten Oever, 2021; Ermoshina and Musiani, 2022) is often too late and that new institutions would be needed with enough resources and interdisciplinary expertise, including those from civil society actors, to accompany sociotechnical development processes right from the start.
3. *Opening up data?:* Finally, data was mentioned as a necessary ingredient for growing European infrastructures. The lack of user data, open data infrastructures, and training data for AI developments have all been raised as possible constraints in the context of developing digital technologies devoted to the public good. The central question is thus what framework conditions would be needed to grow an alternative digital ecosystem that "does not have a trunk that grows taller and thicker fed by proprietary data flows, but has a 'federated', decentralized shape" (van Dijck, 2021a: 2815). Given that "open is not trivial," as one of my interviewees put it in the context of machine learning, the question is how to open up proprietary data. Data sharing mandates have been discussed in this context as a way to legally force big tech companies to open up their data and share it with societal stakeholders (Grafenstein et al., 2019). Van Dijck (2021a: 2815) refers to the principle of "data sovereignty" in this context, which would give

> users the ability to control the storage, accessibility, and processing of their own (meta)data. When switching between different platforms, users could be allowed to choose a specific data regime: they can keep their self-generated data private, donate it anonymously to a "data commons", or put their data at the disposal of particular platform operators.

More recently, there have been demands for collective ways of owning and protecting user data that would make it possible to go beyond individual control of and

responsibilities towards personal data. In the health context, Prainsack et al. have proposed the notion of "data solidarity" to strengthen collective control and ownership of data (Prainsack et al., 2022; see also Prainsack 2019). Alternative modes of data governance would also be a necessary requirement for the "European Platform Observatory," raising the complicated question of "how data and analytical capacities should be made available to whom, and for what purpose. This clearly goes beyond data access" (Rieder and Hofmann, 2020: 21).

Conclusion

At the beginning of this article, I raised the question of how to consider multi-cultural, heterogeneous, and highly diverse European contexts in digital technology developments. Some answers can be drawn from my research. First, a diverse set of "European values" can be used to strategically position alternative search engines in opposition to hegemonic search, Google in particular. They can be used to make their counter-imaginaries more powerful by anchoring them in larger European imaginaries revolving around data protection (Mager, 2017), but also around broader notions such as openness, fairness, and sustainability—all stated values in recent EU policy documents outlining "the European way for the Digital Decade" (European Commission, 2021). Future research is invited to investigate more deeply how European policy imaginaries relate to, overlap with, and contradict counter-imaginaries of technology projects from below. Second, notions like "bureaucratic Europe" highlight the challenges and constraints technology projects experience in Europe and how to intervene – also in more localized, "situated" (Haraway, 1988) contexts that are partly conflated with more abstract framings of Europe. The notion of Europe as unified lends itself particularly well to these purposes since it makes it possible to draw a bigger picture by distinguishing Europe from both the US and China with their corporate digital technologies and surveillance practices. Finally, the notion of Europe as federated, multicultural, and diverse can be strengthened to promote digital technologies and infrastructures devoted to values like decentralization, collectivity, and cooperation. Diversifying technology developments can contribute to a range of different search engines, social media platforms, and infrastructures, which would enable users to bypass hegemonic gatekeepers and their commercial bias and discriminatory content that have long been criticized (Introna and Nissenbaum, 2000; Mager, 2012a; Noble, 2018). It could lead to "fundamentally different projects that challenge power at their source," as data justice scholars have called for (D'Ignazio and Klein, 2020: 65).

The importance of maintaining diversity in technology design and creating alternatives to corporate, centralized platforms can also be seen in light of Elon Musk's recent acquisition of Twitter and the worrying developments that followed. The non-centralized social network Mastodon, created by a German free software developer, is quickly gaining traction now that many users are fleeing Twitter. Mastodon counts on federalism not only in terms of its technical shape, but also in terms of its mode of governance, which has been coined "convenantal" instead of "contractual" (Gehl and Zulli, 2022). However, once the social network grows significantly, many of the challenges and constraints discussed in this article will need to be urgently dealt with– and not only those of a technical nature, but especially those of a cultural, social, and political nature, including questions of governance, anti-discrimination, and sustainability. To properly address these questions major resources will be needed in terms of long-term funding, but also in terms of interdisciplinary expertise and oversight abilities. Given its long-standing desire to build European infrastructures, the European Union (but also other actors like public service media) may well be advised to not miss the momentum and start thinking about ways of supporting and engaging with digital technologies driven by distinct European values, in all their richness and diversity, rather than trying to mimic big tech companies evoked in notions of "rivaling" Google & co. The possible first steps that could be taken in this direction have been discussed in this article.

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ORCID iD

Astrid Mager https://orcid.org/0000-0001-7447-2957

Notes

1. All percentages stem from Statcounter GlobalStats: https://gs.statcounter.com/search-engine-market-share/all/europe (accessed January 2023).
2. https://www.ft.com/content/99d3e98a-8406-11dd-bf00-000077b07658 (accessed January 2023)
3. https://www.telegraph.co.uk/finance/2921407/Chirac-backs-eurocentric-search-engine.html (accessed January 2023).
4. https://en.wikipedia.org/wiki/Quaero (accessed January 2023)
5. https://www.startpage.com/ (accessed January 2023)
6. https://yacy.net/ (accessed January 2023)
7. https://openwebindex.eu/ (accessed January 2023)
8. https://github.com/fossasia/susi_server (accessed January 2023).
9. https://opensearchfoundation.org/en/ (accessed January 2023).
10. https://opensearchfoundation.org/en/openwebsearch-project/ (accessed January 2023).
11. https://www.ccc.de/de/hackerethics (accessed January 2023)
12. Both within the EU, e.g.: https://www.tagesspiegel.de/gesellschaft/medien/debatte-zum-offentlich-rechtlichen-rundfunk-mehr-digitale-offenheit-wagen-8853490.html and beyond: https://theconversation.com/canadas-public-broadcaster-should-use-mastodon-to-provide-a-social-media-service-194116 (both accessed January 2023)
13. https://www.euprivacyseal.com/de/ (accessed January 2023)
14. https://openwebsearch.eu/the-project/ (accessed January 2023)

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Digital Europe from below. Alternative routes to the Digital Decade

Astrid Mager, Institute of Technology Assessment, Austrian Academy of Sciences

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Introduction

In March 2021 the European Commission outlined "the European way for the Digital Decade" (EC 2021a). The dream of digital Europe, however, is hardly new. In the early 2000s, the EC formulated its "eEurope" action plans (EC 2000, EC 2002) to increase the use of Information and Communication Technologies (ICTs) in the areas of public sectors (eGovernment), businesses (eBusiness), education (eLearning), and health (eHealth). The four main goals formulated back then appear to be strikingly similar to the new "Digital Compass" intended to guide Europe on its path to the Digital Decade – aiming at the year of 2030, now (EC 2021). The main targets of the Digital Compass include digital skills, digital transformations of businesses, secure and sustainable infrastructures, and digitalization of public infrastructures, including services that have been labelled as eGovernment and eHealth in the previous action plans. In these documents, the framing of European technology politics as a "technological race with the United States" (Jasanoff 2005, Mager 2017), and increasingly China, is quite persistent (Ulnicane 2021).

What is comparatively new, however, is the rhetoric of the "European way" towards digital transformations that took shape over the past 20 years. In contrast to the US with its surveillance capitalism and China with its practices of state surveillance (Aho and Duffield 2020), Europe conceptualizes itself as taking a "human-centric approach" towards digital innovation that is rooted in social values and fundamental rights. In the context of the General Data Protection Regulation (GDPR), a European imaginary formed, framing data protection as a "core European value" to be defended against "the other", most importantly the US, with its data-driven technology companies (Mager 2017). In more recent EU communications and legal acts, including the Digital Decade policy program (EC 2021a), the proposal for the Artificial Intelligence Act (EC 2021b), or the European Data Governance Act (EC 2020), the set of "European values" to be preserved has been broadened to encompass notions of digital sovereignty, transparency, fairness, and sustainability – sometimes configured under the more generic notion of ethics. While formal EU policy tends to promote its "human-centric approach" towards digitalization, a growing body of research has shown how supposedly European values appear to be fragile, contested, and contradictory when looked at more closely. Research on EU policy discourses on digital innovations, Artificial Intelligence most importantly, has pointed to competing imaginaries regarding the EU's normative goals of promoting European values and the EU's economic interests, which are reflected in the long-standing notion of the Digital Single Market (Ulnicane 2021). Research on the building of European research infrastructures has shown how different notions of Europe are enacted and co-produced with large-scale infrastructures that challenge clear-cut, unified notions of Europe (Mahfoud 2021, Mobach and Felt 2022). Contrary to top-down governance measures and European infrastructure projects that are increasingly explored through the lens of "sociotechnical imaginaries" (Jasanoff and Kim 2009), little is known about the way "Europeanness" (Mobach and Felt 2022) is imagined, mobilized, and co-shaped by alternative technology projects growing at the margins of dominant sociotechnical imaginaries.

Against this background, this article investigates how developers of alternative technology projects imagine "digital Europe" from below. More specifically, it sheds light on three alternative search engines from Europe that follow a social cause: the privacy-friendly search engine Startpage, the peer-to-peer search engine YaCy, and the Open Web Index initiative. This analysis shows how search engine developers draw on "European values" to situate and promote their projects, but also how

alternative notions of Europe are enacted that make it possible to see the challenges and constraints that search engine developers experience in the particular European context, as well as opportunities for change that are worth pursuing. In the following, I draw on literature from Science and Technology Studies (STS) and European Studies to embed my analysis in larger discussions about the competing European imaginaries that drive the EU's digital technology politics, which is torn between "Normative Power Europe" and "Market Power Europe" (Ulnicane 2021). I also locate my analysis within discussions of the tensions between notions of "Europe as unified and pluralistic" (Mahfoud 2021) that are inherent in large-scale European infrastructure projects and flagship initiatives. After describing my case studies and methods, I will discuss the empirical results in three parts: I will start with analyzing how developers of alternative search engines align their visions and values with European imaginaries to situate and promote their projects. I will then investigate how they construct and co-produce alternative notions of Europe that direct our view towards both the challenges and constraints they experience in the European context, as well as towards opportunities for change in terms of charting alternative routes to the Digital Decade that better correspond to European multiculturalism and diversity than empty notions of "catching up" with the US or China. To conclude, I will discuss what we can learn from bringing marginal voices to the table of European technology politics to embrace European pluralism and diversity, but also to bring Project Europe closer to public concerns.

Competing European imaginaries

There is a rich body of work analyzing the role metaphors (Wyatt 2004, 2021; Katzenbach and Larsson 2017), social imaginaries (Flichy 2007, Mansell 2012), and future expectations (Liao and Iliadis 2021, Mager and Katzenbach 2021, Mützel 2021) have played in the shaping and governing of internet technologies from early on. More recently, scholars have started to investigate European imaginaries driving digital technology politics, using the notion of "sociotechnical imaginaries" (Jasanoff and Kim 2009). Drawing on the idiom of co-production (Jasanoff, 2004, 2005; Latour, 1992; Marcus 1995), this research enables us to understand how digital technologies and a European identity are co-produced in European innovation politics – often by contrasting Europe to the US. In the context of the tough negotiations involved in creating the General Data Protection Regulation (GDPR), Mager (2017) has shown how a European imaginary of search engines and other digital technologies took shape, conceptualizing the fundamental right to data protection as a "core European value" to be defended against "the other", the US-American "innovation-surveillance complex" most of all (Cohen 2013). Guay and Birch introduced the notion of "prehistories" to compare different practices of data governance in the EU and the US. Their analysis has shown how the United States performed "a trade-off between the socio-economic benefits of data economies over privacy rights, whereas the EU entailed an emphasis on privacy rights (e.g. data protection)." (Guay and Birch 2022: 10). These different practices of data governance have been grounded in larger sociotechnical imaginaries the authors called a "market-based regime" (US), in which self-regulation and market institutions were framed as being suitable to manage data governance and a "state-market regime" (EU) in which new market framework conditions were deemed necessary by state actors, resulting in new regulations and new markets that included privacy-friendly products (Guay and Birch 2022: 10). In contrast to the US, European technology politics has been described as "reactive" (Aho and Duffield 2020) and following a certain "politics of control" (Mager 2017, 2018).

At the same time, the trope of a "technological race" with the US, and increasingly China, is strongly evoked in contemporary EU policy documents on digital innovations, Artificial Intelligence (AI) most importantly:

"There is a strong global competition on AI among the USA, China and Europe. The USA leads for now but China is catching up fast and aims to lead by 2030. For the EU, it is not so much a question of winning or losing a race but of finding the way of embracing the opportunities offered by AI in a way

that is human-centred, ethical, secure, and true to our core values" (European Commission 2018: 12-13, cited in Ulnicane 2021: 265).

This quote illustrates the crucial tension running through EU policy that Ulnicane (2021) captured with the notions of Normative Power Europe and Market Power Europe. Having analyzed EU policy discourses on AI, the author has pointed to competing narratives between the "human-centred approach" towards digital innovations and the rhetoric of the EU's economic interests widely captured with the notion of the Digital Single Market. Ulnicane (2021) concluded that the EU strongly emphasizes Normative Power Europe, while at the same time repeating its competition discourse inherent in Market Power Europe. Krarup and Horst (2023) have even argued that the EU's single market integration constitutes a fundamental structuring principle of new AI regulation: "Under the influence of this principle, removing barriers to competition and free flow of data, on the one hand, and securing ethical and responsible AI, on the other hand, are seen as compatible and even mutually reinforcing" (Krarup and Horst 2023: 1). Accordingly, European attempts to govern big tech and their data practices, such as the GDPR or the recently negotiated Data Act, have been analyzed as depicting crucial balancing acts between protecting individual privacy, considered a core European value, and promoting a thriving European data economy intended to boost digital innovations in Europe (Marelli et al. 2021, Algorithm Watch 2022, Krarup and Horst 2023). These competing imaginaries have a long tradition in the EU's digital innovation policy going back to the eEurope action plans mentioned earlier, in which ICTs were already framed as both a technical solution for societal problems and as central drivers for economic growth (Felt et al. 2009). In the context of European infrastructure projects, yet another long-standing tension within Project Europe has been observed: the tension between a unified and a pluralized Europe.

Tensions between a unified and a pluralized Europe

The European Organization for Nuclear Research (CERN), one of the oldest and largest European research infrastructure projects has not only been praised for its scientific success, but also as "manifest evidence of European unity" (Mobach and Felt 2022). Similar ambitions were expressed with the launch of the European Human Brain Project (HBP): "The EC's vision for the flagships brought up quite a few European techno-scientific tropes – competition with the United States, and the role of science and technology in unifying Europe" (Mahfoud 2021: 331). European attempts to build digital technologies and infrastructures with flagship initiatives were accompanied by big announcements of a similar kind. The recent initiative GAIA-X, a project to build a European cloud ecosystem, was framed as "Europe's moon shot", but also in terms of a geopolitical fight for "European sovereignty" in the IT sector (Baur 2023). The notion of European sovereignty was also mobilized when announcing Quaero in 2005, which was promoted as an attempt to build a European search engine. Quaero was presented as a joint German/French search engine project meant "to rival Google and Yahoo", which were interpreted as a "threat of Anglo-Saxon cultural imperialism" at the time[1] (see also Lewandowski 2014).

The aim of strengthening Europe's sovereignty by developing its own search engine failed, however, due to "misguided and unnecessary nationalism", as critics put it bluntly.[2] This rhetoric evokes a tension between attempts to unify Europe through digital means and the notion of a pluralized Europe standing in the way of coordinated digitization efforts. Tensions between a unified and a pluralized Europe were also identified in regard to large-scale infrastructure projects such as the Human Brain Project (Mahfoud 2021). In the course of building this large research infrastructure, tensions between the EC's singular, top-down vision of doing "big science in a European way" and the need to represent the diversity and plurality of neuroscientific efforts in different European

[1] https://www.telegraph.co.uk/finance/2921407/Chirac-backs-eurocentric-search-engine.html (accessed January 2023)

[2] https://en.wikipedia.org/wiki/Quaero (accessed January 2023)

countries and research communities were expressed. Mahfoud (2021: 338) therefore concluded: "And through these narratives, Europe itself is posited as a problem – the tension between unification and pluralism serving as both metaphor and backdrop to contestations over how scientific communities should be bringing data together in European 'big science' projects". This corresponds to Mobach and Felt's (2022) analysis of 60 years of CERNs narratives of organizational identity, which showed how different notions of "Europeanness" were enacted and co-produced with the building of such large-scale research infrastructure over time – relating to European values such as unity, cohesion, collaboration, and geography. Notions of a pluralized Europe could also be found in EU policy, when seen more closely. The tough negotiations around the GDPR, for example, opened up very different perceptions of privacy and data protection among the member states, which were deeply rooted in different histories, economic cultures, and techno-political identities depicting Europe as a "multiply imagined community" (Jasanoff 2005) rather than unified (Mager 2017: 255). Having analyzed the national AI strategies of France, Germany, the US and China, Barais and Katzenbach (2022) have shown that certain elements of AI imaginaries such as AI's inevitability are globally shared, while others are strikingly different, mirroring cultural, political, and economic differences between the countries, also within the EU.

This indicates that European digital technology politics and infrastructure projects not only contribute to the making of Europe, but also to the unmaking of Europe due to the crucial differences at stake. It further indicates

"that sociotechnical imaginaries should not be seen as monolithic or stabilized, but rather as multi-faceted and dynamic. The European search engine imaginary appears to be coherent in the European policy arena, contested when confronted with lobbying attempts, and multiple given the heterogeneity of national interests and agendas at stake",

as Mager (2017: 256) concluded in the context of the GDPR. Moreover, sociotechnical imaginaries may also take shape in particular "communities of practice" (Wenger 1998) and their respective sociotechnical practices and experiences (Mager 2018, Barker 2015, Lehtiniemi and Ruckenstein 2019). This corresponds to research arguing that "sociotechnical imaginaries" appear to be increasingly commodified, but also multiple and contested in the context of digital technologies (Mager and Katzenbach 2021). In my previous work (Mager 2023), I used the notion of "counter-imaginaries" (Kazansky and Milan 2021) to investigate how providers of alternative search engines contest hegemonic discourses and practices by counter-imagining hegemonic search as a privacy-friendly endeavor, as a decentralized technology, and as basic infrastructure. This analysis has shown that counter-imaginaries, and the vision and values constructing them, are negotiated and co-produced along with the respective search technologies. It has further shown that European values, and broader notions of Europe, are enacted in the context of sociotechnical developer practices that will be further investigated in this article.

Studying alternative search engines from Europe

The European search engine market is strongly dominated by Google, which has a market share of more than 90%,[3] but alternatives exist as well. What constitutes an alternative search engine is debatable, however. One can argue that every search engine other than Google is an alternative even though corporate search engines like Bing are not much different from the quasi-monopolist. One can argue that all search engines trying to build their own web indexes may be considered alternatives even though most of them only have a small index of their own and partner with other search engines to enlarge their search results. In fact, only Google, Bing (Yahoo), the Russian search engine Yandex, and the Chinese search engine Baidu have a comprehensible web index of their own – all are run by companies. A web index is of crucial importance for search engines since it provides

[3] https://gs.statcounter.com/search-engine-market-share/all/europe (accessed January 2023).

the backbone of search engines that do not search the web live, but rather search their own databases of websites that have been crawled and indexed before – an archive of the web, so to speak.

For the purpose of this article, I conceptualize alternative search engines as search engines that follow a social cause such as privacy-friendly search engines (e.g. Startpage, DuckDuckGo), "green" search engines that donate parts of their revenue to rain forest projects (e.g. Ecosia), or decentralized, open source projects (e.g. Open Crawl or YaCy). The first case study, Startpage, is a privacy-friendly search engine that uses Google search results, but provides users with anonymity. The second search engine, YaCy, has the goal of building a decentralized, peer-to-peer search engine that runs on the machines of users. The final project, the Open Web Index, counts on public funding to develop an independent index of the web that is open to the public.

The privacy-friendly search engine Startpage[4] is based in the Netherlands. Like many other search engines, it does not have a web index of its own, but partners with Google to use Google search results as its back-end. This enables Startpage to focus on privacy features offering users the possibility to use the search engine anonymously since no personal data are transmitted to Google except the search terms. It provides users with non-personalized Google results and non-personalized ads that are related only to the search terms people use. The peer-to-peer search engine YaCy[5] provides a more radical alternative by building a decentralized index that runs on the machines of its users or "peers". This index is further enlarged with a crawler to complement the user-generated index. YaCy was created by a German free software enthusiast who is also working (together with developers from all over the world) on an open source virtual assistant called SUSI.AI,[6] designed to be an open source alternative to Google Home or Alexa. Both YaCy and SUSI.AI are deeply grounded in the free and open source software (FOSS) ideology, which promotes open, independent, and anti-commercial digital technologies. Finally, the Open Web Index initiative[7] was formed by German search engine scholars, computer scientists, journalists, and other stakeholders with the aim of building a comprehensive open web index. Due to the sheer size of such a large-scale infrastructure project, including crawling capacities, indexing algorithms, and the data centers needed to build a web index, the European Union is imagined as a potential funding body, evoking ideas of Quaero and other European flagship projects discussed earlier. Since major EU funding was not easy to achieve, a bottom-up approach towards web crawling took shape in recent years, trying to make use of existent resources from data centers, universities, and other stakeholders that could contribute crawling and data storage capacities to the project. This newly founded Open Search Foundation,[8] together with a network of 14 European partners, just recently received funding from the European Union to "create an open European infrastructure for internet search, based on European values and jurisdiction" (or the core of such an index, at least),[9] according to its website.

To analyze the three search engines, I used a mixed-methods approach combining qualitative interviews with the three developer teams, participatory observations, as well as workshops with the developer teams. Altogether, I conducted 40 qualitative interviews; participatory observations at the Startpage headquarters in The Hague (2019), at the Chaos Computer Congress in Leipzig (2017), at Open Tech Meet-Ups in Berlin (2018) and at the FOSSASIA Open Tech Summit in Singapore (2018);

[4] https://www.startpage.com/ (accessed January 2023)
[5] https://yacy.net/ (accessed January 2023)
[6] https://github.com/fossasia/susi.ai (accessed January 2023)
[7] https://searchstudies.org/research/open-web-index/ (accessed January 2023)
[8] https://opensearchfoundation.org/en/ (accessed January 2023)
[9] For more information on the project funded under the EU's Horizon research and innovation program, see: https://openwebsearch.eu/ (accessed January 2023)

and workshops with the developer teams, including a two-day "mind scripting workshop"[10] with the OWI/ OSF contributors (Berlin, 2018) and two hands-on workshops at FOSSASIA (2017) and at the Ars Electronica Festival together with YaCy/SUSI.AI developers (Linz, 2020). The interviews and workshops were transcribed and coded with top-down categories resulting from the initial research questions about social visions, values, and "counter-imaginaries" (Kazansky and Milan 2021) and bottom-up categories emerging from the interviews and workshop discussions, such as those on European values, with the help of MAXQDA. The long duration of my fieldwork (2017-2022) and the mixed-methods approach enabled me to engage deeply with the three developer teams and their distinct sociotechnical practices and experiences in a cyclical way, following a Grounded Theory approach (Glaser and Strauss 1968).

Empirical analysis: Imagining digital Europe from below

In the following, I elaborate how developers of alternative search engines tap into larger European imaginaries to situate and promote their projects, but also how they enact alternative notions of Europe in a way that makes visible the challenges and constraints they experience in Europe, as well as opportunities for change.

1) Value-based Europe: Tapping into European imaginaries

Despite crucial differences in their "counter-imaginaries" (Mager 2023), all three developer teams situated their projects in the European context by enacting, mobilizing, and constructing European values of various kinds. First of all, the notion of value-based Europe was strongly articulated in a way that resembled EU policy rhetoric on digital innovation. Startpage developers most explicitly aligned their goal of providing users with anonymous search and other privacy features with EU policy imaginaries revolving around data protection. In this context, they conceptualized data protection as a "core European value" to be preserved through rules and regulations, but also through digital technologies following the principle of privacy by design. Startpage's CEO refers to European "culture" in this context: "And I think that our mission resonates culturally with a lot of folks in Europe. (…) It fits very well with our European roots and identity". Later he added that SP's "European core is really a key part of our identity". Beyond tapping into European policy imaginaries, they aligned their project with European technology politics by building strategic alliances with important stakeholders from EU policy circles and civil society. Moreover, they acquired the EU's "EuroPriSe" quality seal through a tough and expensive technical and legal audit to show how seriously they take privacy in accordance with European values. All these measures, combined with SP's European headquarters and servers, were framed as creating trust in the search engine, which was considered "a very important element for privacy" (Startpage management). While data protection was drawn upon by all three search engine developers in one way or another, other European values were raised as well. The Open Web Index initiative, for example, relied heavily on the European tradition of public libraries and public service media to promote their ideal of creating a publicly funded web index that would be open to the public. Imagining the EU as a potential funding body for building such a large-scale infrastructure, they tapped into a broader set of European values, including independence, openness, and transparency. One of the OWI initiators framed the importance of Europe's independence by drawing on the global geopolitics of internet technologies: "This is always so astonishing and obvious that we need our own search infrastructure in Europe to escape from the digital colonialism and to be able to practically handle our data and digital demands on our own".[11]

[10] Mind scripting is a method used to make software developers reflect upon the value systems and normative ideas that guide their work practices, both explicitly and implicitly (Allhutter and Hofmann, 2010; Allhutter, 2012).

[11] All German quotes were translated by the author.

Another OWI advocate framed their project as "conveying identity for Europe (…) yes, to highlight our own sovereignty and independence, and to also assure it technically". This notion of independence may be seen as strongly resonating with the EU's rhetoric of "digital sovereignty" as put forward in bold announcements of European flagship projects such as, for example, Gaia X, which was conceptualized as "Europe's moonshot" (Baur 2023). In this context, Europe was strongly compared to other cultural contexts, the US with its data-driven tech companies first and foremost. Similar to EU policy rhetoric, they shaped their European identity by contrasting it to "the other" when talking about data-driven business models and practices of user surveillance that they all rejected: "So, at least in Europe there's possibilities of having some kind of controls over that. (…) there is some degree of privacy protection and some amount of digital freedom", as an open source developer from the SUSI.AI project put it straightforwardly. One interviewee from the Startpage management team phrased it more bluntly: "I think the advantage of being based in Europe is that we're not based in the US". Developers of the peer-to-peer search engine YaCy, and its sister project SUSI.AI, however, enacted a different notion of Europe that is less prominent in formal European digital politics: "bureaucratic Europe".

2) Bureaucratic Europe: Challenges and constraints

All three developer teams argued that Europe has made important contributions to the geopolitics of digital innovation by crafting legislation to control big tech companies and their data-driven technologies and business models. The GDPR is mentioned most notably in this context: "Yeah, and those regulations are needed, you know (…) so that's good, and Europe has practiced bureaucracy for a couple thousand years now. Europe's good at it" (SUSI.AI developer). Despite appreciating the EU's "politics of control" (Mager 2018), the downside of "bureaucratic Europe" was discussed more critically, especially in regard to funding opportunities, or the lack thereof. The YaCy creator, for example, said they basically gave up on public funding and public tenders due to overly bureaucratic application processes that did not fit their hands-on developer culture. Frustration was further expressed about the lack of recognition and "political will" to support digital technologies aiming at independence and sustainability, both considered as core European values in EU policy:

"Well, that could have gone really great if someone from politics would have understood that part of the responsibility of a country is to maintain its independence by investing in information technology so that sustainability and, at the same time, an understanding of the open source movement could emerge. Both are lacking." (YaCy creator)

An OWI initiator also expressed frustration over the lack of political will in the EU to support and fund their idea of building a comprehensive, European web index that would be open to the public as an alternative to corporate indexes by Google and other big tech companies. The YaCy maintainer pointed to a huge "gap" between politics and developer communities, which he framed as "two totally separated worlds" and which would need to get closer together and work "hand in hand" to let more projects flourish the way they deserve. This resonates with historically anchored notions of "technocratic Europe" (Kaiser and Schot 2014, Laurent 2022) suffering from a democratic deficit. It resembles "the narrative of a confrontation between European bureaucracy and people's concerns", as Laurent (2022: 4) put it in the context of "European objects" of various kinds including food products, chemicals, drinking water, and occupational environments.

Moreover, Europe's start-up culture was described as highly bureaucratic. A SUSI.AI contributor put it straightforwardly: "Innovation definitely happens in Europe. It's just difficult to have innovation through small businesses because it's difficult to start a small business in Europe." Moreover, the lack of technical expertise in European policy and funding agencies was framed as an obstacle to digital innovation. Reflecting on the question of "what could Europe do differently or better?", one of the main SUSI.AI contributors expressed his frustration again. Speaking about new funding programs that European governments are trying to release, he questioned the expertise of the juries that decide

over the projects because: “Those are not people who worked in this area, they don’t have a technical background, (…) Well, they did not found a start-up by themselves and cannot always assess the situation that well.” In a similar manner, the Startpage CEO referred to lack of technical expertise in European policy circles by telling a story about a meeting with a European parliamentarian who served as a spokesperson for privacy at the time and who didn’t even have a clue what a cookie was, as he put it.

The many stories my interviewees brought to the table to express their frustration about bureaucratic funding, lack of recognition, and technical incompetence can be seen as building towards a more general framing of “bureaucratic Europe” that was associated with a particular European “culture” distinct from other cultural contexts. The SP CEO referred to different “entrepreneurial spirits” between Europe and the US in this context:

“It’s also the entrepreneurial spirit, you see that Europeans have a different take on entrepreneurship. In the US it’s fine to fail. If you fail 10 times we love you, because you’ve made all those mistakes and we don’t want you to make any more. Here in Europe you need to build slowly and show you’re profitable. If you’re profitable you get more money. In the US they say, if your idea is great and you believe in it, even if you live in a fantasy, we’ll throw money at it.”

The different “failure cultures” were mentioned time and again by interviewees from all three search engine projects, almost like a cliché. A SUSI.AI contributor framed the US-American culture of failure colloquially as a “macho thing”. With a wink, he described it like this: “If you fall off your horse, you get right back on”. The different failure cultures were also related to different funding cultures by comparing Europe to the US, again. One interviewee from SP management referred to the US-American “mentality” of investors that would spend money on companies more easily than in Europe: “Hey, here’s 100 million, good luck, we’ll see how it goes – while here you have to fight to get a couple of million in budget, and then, yeah, what’s a couple of million if the other ones in the US are getting 100 million, right?” Later in the interview, he concluded that “99% of the projects” would fail in the US, but those that succeed tend to have a “worldwide impact”, a situation that is lacking in Europe, in his perception. These quotes illustrate that the different failure and funding cultures were interpreted as a competitive disadvantage in the “technological race” with the US. As with notions of value-based Europe, the framing of bureaucratic Europe was crafted in contrast to other cultural contexts, the US with its envisioned culture of failure and rapid funding, most importantly. While Europe was largely imagined as unified in contrast to other cultures and customs, it appeared to be pluralized and diverse when looked at more closely, as will be discussed below.

3) Pluralized Europe: Opportunities for change

Both the notions of value-based Europe and bureaucratic Europe were also utilized when talking about particular, more localized sociotechnical practices and experiences. In the context of marketing strategies, for example, the Startpage team conceptualized Germany, or German-speaking countries more generally, as their “natural market” due to historic and cultural reasons. An interviewee from SP management framed German-speaking countries as more privacy-friendly than other European countries, such as the Netherlands, by recalling the Second World War and the subsequent surveillance practices of the Stasi, the East German Ministry for State Security. By concluding “It’s in your genes much more than in ours because of that, I think”, he evoked the notion of a pluralized Europe rather than a unified Europe. Similarly, YaCy contributors spoke about their specific experiences with German funding bodies, thereby localizing the notion of bureaucratic Europe in the particular German context. Accordingly, the European market for digital innovations was framed as much more heterogeneous than the US-American one. While this was partly described as hampering innovation in Europe because “in every country it’s a market in itself” (SP management), it was also framed as an opportunity for European companies, which would have a better knowledge of

European specificities in terms of cultural contexts, languages, as well as local rules and regulations, according to SP employees.

The Open Web Index contributors most explicitly embraced the notion of a pluralized Europe, making it possible to see alternative routes towards achieving a digital Europe that better corresponds to European multiculturalism than bold notions of "catching up" with the US or China. An OWI contributor described his ideas like this:

"I see it as a positive thing that pluralistic ideas grow in Europe more easily because we have a long historic experience with different cultures, with conflicts among these cultures, also with different viewpoints. This can contribute to really not forgetting any idea, (…) we have to find consensus, we have to find compromises. And this ability to find compromises can be a great strength."

This quote illustrates how European history is mobilized in imaginaries of a pluralized Europe associated with values such as multiculturalism, but also with the ability to cooperate and achieve compromises. The bottom-up approach towards building an open web index by using and interconnecting data centers, crawling capacities, and existent resources was framed as a federated project that corresponded well with European multiculturalism and diversity. The initiator of the Open Search Foundation imagined their effort as "a kind of computational movement in Europe". Referring to Europe's pluralism, he further added:

"This is why we need a special spirit here to benefit from the federated, rather cooperative structures in Europe. Therefore, we need to join forces instead of using venture capital and trying to achieve everything at once with a large lever."

This quote shows that European federalism was not only seen as a barrier to market entry in this context, but also as opening up alternative routes to digital innovation focusing on decentralized, cooperative structures rather than centralized, competitive ones. Such an index would, in turn, enable a diverse landscape of different search engines, ranking instruments, and applications, which would better correspond to localized markets, cultures, and user needs, as one of the OWI advocates concluded.

When talking about the plethora of technical and governance questions involved in coordinating multiple data centers across Europe, and their individual crawling and indexing algorithms, the Open Web Index advocates agreed that achieving "a single common approach in Europe" will be a tough challenge. One of the mind scripting workshop participants said, in this context: "Well, too many cooks can spoil the broth. One can also get lost among all the good ideas." He referred to technical standards, but also to different government structures, legal contexts, and data protection standards – the downside of pluralized Europe – and concluded: "This is easier if there is only one country with one legislation. It's easier to agree there." The task of coordinating and harmonizing different data centers and algorithmic cultures can be grasped with the notion of the "structure-agency paradox" that Star and Ruhleder (1996: 113) coined to capture inherent tensions in large-scale infrastructure projects: "This paradox is integral to large scale, dispersed technologies (Brown and Duguid, 1994; Star, 1991). It arises from the tension between local, customized, intimate and flexible use on the one hand, and the need for standards and continuity." It can, however, also be grasped with the more fundamental question Tara Mahfoud (2021: 338) formulated in the context of the Human Brain Project: "How to unify while maintaining diversity?". This question speaks to both challenges and constraints in large-scale infrastructure project such as building an open web index from scratch, but also to inherent tensions in Project Europe, which is constantly torn between a unified Europe and a pluralized Europe, but also between Normative Power Europe and Market Power Europe. What we may learn from bringing marginal voices to the table of European technology politics will be finally discussed.

Conclusion: Alternative routes to the Digital Decade

In this article, I have analyzed how developers of alternative search engines imagine digital Europe from below. Drawing on three particular case studies, the privacy-friendly search engine Startpage, the peer-to-peer search engine YaCy, and the Open Web Index initiative, I have analyzed how the three developer teams aligned their vision and values with larger European imaginaries, but also how alternative notions of Europe were enacted in the context of their sociotechnical practices in ways that illustrate the challenges and constraints experienced by alternative technology projects in Europe, but that also point to opportunities for change.

There are several things to learn from inviting marginalized groups to European digital politics. Anchoring "counter-imaginaries" (Kazansky and Milan 2021) in larger European imaginaries that evolve around privacy and digital sovereignty can help alternative technology projects grow beyond their own "communities of practice" (Wenger 1998, Mager 2023) and take root in wider society. Notions like "bureaucratic Europe" allow to reconsider and reconstruct formal, traditional ways of funding digital technologies and infrastructures, and to pave the way towards more creative and yet more professional funding opportunities for digital innovations that better correspond to the hands-on spirit of developer communities and start-up cultures. This would help to close the "gap" between policy and developer communities and let alternative technology projects flourish the way they deserve to, as one of my interviewees put it. Imaginaries of a "pluralized Europe" can enable us to envision alternative approaches to web search that are better corresponding to Europe's multiculturalism and diversity than those promoted in digital flagship initiatives. In this way, bold visions of developing a European search engine to "rival" Google and other big tech companies may shift towards visions of more diverse landscapes that include multiple search engines, ranking instruments, and applications. An open web index would provide a central backbone for search engine diversity, as discussed in this article. Search engines like Startpage and many others that currently partner with big tech companies would be able to grow and flourish on such an index – living up to Europe's aspirations of digital sovereignty in the area of search, but also to more nuanced European values including openness, diversity, and sustainability. Moreover, new business models, modes of governance, and oversight bodies could be jointly imagined and developed. New institutions could be installed on the European level to professionally assist such projects by bundling technical know-how with legal expertise, civil society skills, and experiential knowledge in order to meet the challenges and constraints involved in building large-scale (search) infrastructures. These include some that big search engines already struggle with (e.g. data protection, transparency, and algorithmic bias), but also others that are inherent in large technological infrastructures in need of coordination (such as the "structure-agency paradox" (Star and Ruhleder 1996)). More open, participatory, and diverse technological landscapes would be better prepared for tackling sociotechnical challenges in a more democratic and sustainable manner than corporate, centralized technologies that figure as black boxes. How important this is can be seen in Elon Musk's acquisition and remaking of Twitter into X and the need for alternatives such as the decentralized social network Mastodon, which quickly gained traction after Musk's Twitter buy-out, and which incorporates some of the European imaginaries envisioned by my interviewees.

More conceptually, the analysis of bottom-up imaginaries of digital Europe contributes to the growing body of research showing that sociotechnical imaginaries should not be seen as monolithic and stabilized, but rather as multiple and contested. Bringing counter-cultural voices to the fore can help envision alternative routes to the Digital Decade that remain obstructed from view by analyses that only focus on dominant sociotechnical imaginaries. Inviting counter-cultural voices to the table of European technology politics can help to create more diverse, inclusive, and sustainable visions of digital Europe and allow us to move beyond long-standing tropes of "a technological race" between the US and China. Complementing large-scale European imaginaries with localized visions and values makes it possible to paint a richer, more colorful picture of European innovations devoted to social and cultural values rather than mere profit. It can help to challenge hegemonic discourses and practices and come up with more nuanced imaginaries of digital Europe as an "alternative innovation space" (Felt 2015) rather than chasing after big tech companies and their harmful business practices

largely at odds with Normative Power Europe (Ulnicane 2021). Fundamentally, it allows us to reimagine Project Europe as more diverse, inclusive, and democratic – ultimately, as more desirable – than historically anchored notions of "technocratic Europe" that are framed as rather distant from public concerns such as those raised in this article.

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Future imaginaries in the making and governing of digital technology: Multiple, contested, commodified

Astrid Mager
Austrian Academy of Sciences (ÖAW), Austria

Christian Katzenbach
Alexander von Humboldt Institute for Internet and Society (HIIG), Germany

Abstract

Visions of the future are omnipresent in current debates about the digital transformation. This introductory article and the full special issue are concerned with the function, power, and performativity of future visions and how they relate to the making and governing of digital technology. Revisiting existing concepts, we particularly discuss and advance the concept of sociotechnical imaginaries. In difference to ephemeral visions and partisan ideas, imaginaries are collectively held and institutionally stabilized. Nonetheless, we hold that they are multiple, contested, and commodified rather than monolithic, linear visions of future trajectories enacted by state actors. Introducing and summarizing the articles of the special issue, we conclude that imaginaries are increasingly dominated by technology companies that not only take over the imaginative power of shaping future society, but also partly absorb public institutions' ability to govern these very futures with their rhetoric, technologies, and business models.

Keywords

digital technology, future visions, governance, practices, sociotechnical imaginaries

Corresponding author:
Christian Katzenbach, Alexander von Humboldt Institute for Internet and Society (HIIG), Französische Str. 9, 10117 Berlin, Germany.
Email: christian.katzenbach@hiig.de

In January 2018, the software platform *Blockchain* announced its partnership with the cryptocurrency dealer SFOX that enables US-American users to easily buy and sell digital assets. In their self-description, they straightforwardly promised: "We are on a mission to build a more open, accessible, and fair financial future, one piece of software at a time."[1] Similarly, the self-driving car company *Waymo* (a subsidiary of Google's parent company, *Alphabet Inc*.) expressed their mission as follows: "Imagine if everyone could get around easily and safely, without tired, drunk or distracted driving."[2] These two quotes illustrate how software developers and technology companies dig into the rich pool of cultural norms, visions, and values to support digital tools and artifacts. In a similar vein, policy and public institutions promote their roadmaps, rules, and regulations. The *European Commission*, for example, promotes its General Data Protection Regulation (GDPR) as "an essential step to strengthen citizens' fundamental rights in the digital age and facilitate business by simplifying rules for companies in the Digital Single Market."[3] Such evocations of possible or fantastic, desirable or dystopian futures are necessarily genuine sociopolitical processes with material consequences in the present. To make decisions in the present, we need future prospects, be they realistic or fantastical, for guidance and orientation. The future is then not only imagined, but it is also very concretely constructed, made, and unmade in different constellations and contexts. By guiding the making of things and services to come, imaginations of the future are co-producing the very future they envision. Hence, future visions are performative.

This special issue is concerned with the function, power, and performativity of future visions and how to relate them to the *making and governing of digital technology*. It traces how future visions emerge in different cultural settings, how they gain strength across time, space, and sectors, how they compete and complement each other, and how they struggle over dominance when alternative futures appear on the horizon. The special issue also asks how future visions materialize in the shaping of digital technology. How do they become productive in the actual construction of the future? The contributions can be roughly divided into three groups of articles. One set of articles analyzes the emergence of corporate sociotechnical imaginaries articulated by powerful actors such as Facebook's CEO Mark Zuckerberg and other actors in power. A second group of papers deals with the transformation of global, transnational imaginaries into local contexts, scientific practice, and Internet infrastructure. And a final group of contributions focuses on the role of counter-imaginaries, participatory interventions, and our own choice of words in imagining and creating alternative futures. Taken together, these articles provide a rich repertoire of situated case studies and in-depth analyses of future imaginaries in the making and governing of digital technologies, infrastructures, and social practices.

Studying the nexus of discourse, technology, and politics

Narratives of the future, and their relation to the present, is a long-standing theme in the social sciences and humanities. Scholars from the sociology of science and technology, from media and communication studies, and from linguistics have developed a vast body of notions that help to identify, describe, and scrutinize how future visions are emerging

as relevant narratives, are mobilized by stakeholders with vested interests and are then, in turn, informing and shaping practices in the present. In the sociology of futures, scholars have proposed notions, such as "expectations and stories about the future" (Van Lente, 2012; Van Lente and Rip, 1998) and "contested futures" (Brown and Michael, 2003; Brown et al., 2000). In research that studies communities of practice as cradles of future technology, scholars have scrutinized the "vanguard visions" (Hilgartner, 2015) of these pioneers. With more attention to language and discourse, particular as represented in the media, scholars in linguistics, media and communications, and the social sciences have looked at "metaphors" (Lakoff and Johnson, 1980), "myths" (Mosco, 2005) and their relation to technology (Katzenbach and Larsson, 2017; Wyatt, 2004) and more broadly at "discourses" (Hajer, 1995, 2006) or "frames" (Goffman, 1974), and their constructive power. In broader social theory, Arjun Appadurai (1996), Charles Taylor (2004), George E. Marcus (1995), and Patrice Flichy (2007) have established the notions of "social imaginary," technoscientific imaginaries, and "imaginaire". In addition, there is a substantial body of literature that looks at the conjunction with technology and science (cf. McNeil et al., 2017 for an overview). Most notably, Robin Mansell (2012) mobilizes the notion of imaginaries to understand the institutionalization of the Internet in contemporary society.

In research that is concerned with the political quality of technology and imaginaries, the concept of "sociotechnical imaginaries" (Jasanoff and Kim, 2009, 2015) has become one of the most prominent. In recent years, this concept has become a popular analytical tool to describe and understand the co-production of technoscientific projects, social constellations, and politics. It serves as a lens through which the interplay and mutual shaping of science, technology, and society can be identified and analyzed. In the initial definition, Jasanoff and Kim (2009) positioned sociotechnical imaginaries (referred to as SIs in the following) as an analytical device that captures the "collectively imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects" (p. 120). This initial understanding of SIs strongly focused on how nation states, governmental actors, and public institutions envision and enact technoscientific developments (Jasanoff and Kim, 2009). This restricted focus on state actors has become an object of critique recently. Scholars have highlighted that imaginaries are also articulated and enacted by corporate actors, civil society, research communities, and other organized groups in processes much more complex and non-linear than envisaged in the original concept (Felt and Öchsner, 2019; Jasanoff and Kim, 2015; Lehtiniemi and Ruckenstein, 2019; Mager, 2018; Olbrich and Witjes, 2016). In turn, Jasanoff (2015a) herself has argued that the concept needs to be "refined and extended in order to do justice to the myriad ways in which scientific and technological visions enter into the assemblages of materiality, meaning, and morality that constitute robust forms of social life" (p. 4). In the introduction to her edited volume (Jasanoff and Kim, 2015), she thus broadened the definition of SIs to encompass "collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff, 2015a: 4).

SIs: multiple, contested, commodified

This special issue further advances this elaboration of the concept in the context of digital technologies. It brings together a set of empirical case studies and theoretical contributions showing that SIs often appear to be multiple, contested, and commodified rather than being monolithic, linear visions of future trajectories that are primarily enacted by state actors. Not only state actors and governments unfold their power to imagine, govern, and program digital innovations and related social practices, but also big technology companies, influential CEOs, corporate communications, technology events, industry consultants, research groups, and grassroot activists.

SIs are multiple

The concept of SIs refers to "collectively held and institutionally stabilized" (Jasanoff, 2015a: 4) visions of the future—that is to say, not every articulation of possible futures constitutes a SI. It needs resonance among collectives, the allocation of resources, and the adoption into practices of making, governing, and doing to become institutionalized. Restricting the notion to ideas that are soundly embedded in cultures, institutions, and materialities is necessary to retain its analytical value and differentiate it from notions, such as ideas, frames, and visions, which are rather agnostic about their footprint beyond the discursive dimension. Yet, the initial monolithic picture of SIs has proven to be misleading. There are almost always multiple imaginaries in circulation that are more or less powerful. While the widely referenced study on visions of nuclear energy in the United States and South Korea seemed to indicate that there is a single imaginary in each country that changes and adapts (Jasanoff and Kim, 2009), numerous studies on SIs demonstrate that the circulation of single imaginaries is the exception, not the rule. For example, scholars who have analyzed SIs in EU digital policy have identified different imaginaries in the context of search engines (Mager, 2017) and big data solutions (Rieder, 2018) and showed how these imaginaries travel into and transform in national sociopolitical contexts and communities of practice (Mager, 2018). In the context of European search engine policy and data protection, Mager (2017: 256) concludes "sociotechnical imaginaries should not be seen as monolithic or stabilized, but rather as multi-faceted and dynamic." Studying visions of digital technologies thus also implies tracking the trajectories of multiple imaginaries and their relation to one another.

SIs are contested

When imaginaries are multiple and not singular, they often appear to be not consensually defined. The future is, as Brown et al. (2000) write, "a contested object of social and material action" (p. 3). Actors at individual and institutional levels—framed by their own sociocultural contexts, guided by their respective interests, and equipped with differing resources—construct future expectations and strive to translate these into encompassing and sustaining imaginaries, intentionally or not. Some of the visions and imaginaries might run peacefully in parallel, while others may contest each other and seek for dominance or resistance (Jasanoff, 2015b: 329). Sang-Hyun Kim's (2015) detailed account of imaginaries that challenged the official visions of the South Korean state in

nuclear power, biotechnology, and food safety offer a prime example of the contestation of dominant imaginaries. Lehtiniemi and Ruckenstein (2019) illustrate the contestation of dominant imaginaries in the making and governing of digital technology in their study on data activism in Denmark: here, bottom-up initiatives not only seek to shape future visions of the Internet, but also work to materialize this vision into technological infrastructure. Similarly, Barker's (2015) reconstruction of hobbyists and research networks in Indonesia shows how alternative imaginaries challenge incumbent institutions and material infrastructure. Mansell's (2012) sweeping account of imaginaries of the Internet also shows how two conflicting imaginaries have shaped the design and governance of our digital networks. The study of imaginaries of digital technology thus often involves the investigation of more or less explicit contestations and struggles over dominance.

SIs are commodified

In this process of negotiating the future, it is often not state actors that act as primary agents of powerful imaginaries, as originally held in the concept of SI, but corporate players:

> Multinational corporations increasingly act upon imagined understandings of how the world is and ought to be, playing upon the perceived hopes and fears of their customers and clients and thereby propagating notions of technological progress and benefit that cut across. (Jasanoff, 2015a: 27)

Especially in the context of digital technologies, this discursive embedding of technological developments and commercial products is pervasive. Entrepreneurs routinely attire their products and services in utopian visions of the future, narratives of community-building, and the promise of technological fixes for social problems (Katzenbach, 2019; Turner, 2006). Tech companies have adopted notions, such as "sharing" (John, 2013, 2017) and "community" to propel imaginaries of new socio-economic orders that comfortably accommodate their business interests and commercial products (Srnicek, 2016). Scholars have further pointed to the importance of corporate imaginaries in the context of radio-frequency identification (RFID) tagging (Felt and Öchsner, 2019) and commercial satellite imagery (Olbrich and Witjes, 2016). Thus, the circulation of imaginaries is often not motivated and propagated by state actors and their interests, but by commercial actors' assumptions about technology that directly shape the design of their products.

Hitting the ground: how imaginaries matter in the actual making and governing of digital technology

Contemporary SIs are multiple, contested, and commodified. By foregrounding these three aspects, this special issue expands and advances the ongoing conceptual debate about the role of discourses and visions in shaping the emerging digital society in general, and contributes to the elaboration of the concept of SIs in particular. The different case studies yield fine-grained analyses showing how global SIs and grand visions

solidify and institutionalize: how they get embedded and materialize in digital technology and local practices. The articles draw their inspirations from different research traditions, including sociology, new media studies, science and technology studies, future studies, critical data studies, and critical pedagogy as well as feminist practices of speculation. Methodologically, they use a mix of methods and empirical data ranging from qualitative ethnography, interviews, discourse analysis, and participatory interventions to quantitative analyses of heterogeneous documents, mailing lists, and media materials. Consequently, they provide a rich picture of how future imaginaries, visions, and values gain ground and settle in Internet architecture and governance bodies (ten Oever), social media platforms (Haupt), digital payments (Mützel), augmented reality (Liao/Iliadis), brain models (Mahfoud), start-up cultures (Hockenhull/Cohn), alternative technologies (Kazansky/Milan), and, ultimately, in people's minds (Markham) and our own metaphorical language (Wyatt). By specifically looking at research communities, software practices, and industry gatherings, the authors shed light on the complex processes and practices of translating and transforming future imaginaries into today's technologies and mundane practices.

By bringing together future imaginaries of various kinds and scales, the contributions open up the view on how big technology companies make use of future imaginaries to expand their "technological zones" (Barry, 2001, 2006; Mager, 2017) going beyond geopolitical and cultural boundaries. And, they also demonstrate how bottom-up imaginaries, speculative interventions, and—ultimately—our own choice of words as vigilant researchers can help to push back and create alternative digital futures. Observing, and partly participating in, actual practices and projects makes us understand how tensions, ambivalences, and ruptures emerge when future visions are encoded in technology and how scale matters when it comes to competing imaginaries, hegemonic narratives, and counter-cultural voices.

Contributions to this special issue

For this special issue, we deploy this question of scale as the organizing principle. Thus, the contributions are sorted along the axis of scale. We start with the corporate visions dominating contemporary technology developments and end with counter-imaginaries and critical interventions emerging on the horizon. The first group of articles investigates the emergence of corporate SIs articulated by powerful individuals, such as Mark Zuckerberg and other industry actors. The second set of articles deals with the transformation of global, transnational imaginaries into local contexts, scientific practices, and Internet infrastructure. And a final group of contributions focuses on the role of smaller counter-imaginaries, participatory interventions, and our own choice of words in imagining and creating alternative futures.

Corporate SIs

The special issue opens with a contribution by Joachim Haupt analyzing Mark Zuckerberg's "discursive construction of a better world." Drawing on a discourse analysis of Zuckerberg's public communications and working with the notion of "corporate

sociotechnical imaginary," the article analyzes how Facebook's future imaginaries change over time, how central discursive elements like "global connectivity" or "global community" are substantiated, and how normative notions help to support these imaginaries. This fine-grained empirical work allows the author to reconstruct how the discursive work of a single actor solidifies over time in corporate communications, goals, and technologies, and how it is strategically used to legitimize corporate action and unleash its power in broader discursive struggles. The author concludes by arguing that Facebook can be seen as a paradigmatic case illustrating how "prophetic corporations" seek to provide future visions of a better world to guide and legitimize their own digital technologies and business practices.

The second article, written by Tony Liao and Andrew Iliadis, investigates 10 years of past futures in the "Augmented Reality (AR) Hype Cycle." Building on "the sociology of futures" and a comparative analysis of macro- and micro-level futures, the article maps the interrelationships of different future imaginaries across the stages of the Gartner hype cycle. By juxtaposing ethnographic fieldwork at global AR conferences with an analysis of an AR media database, the authors can track shifts in futures over time and understand the broader deployment of futures in the shaping of a technology as it enters different phases. There are few studies that empirically bring together the imagining of futures and the making of future and relate these to each other. This accomplishment positions Liao and Iliadis's article as a particularly important contribution to understanding the dynamics in emerging technologies and the multiple futures at stake.

The last article dealing with corporate imaginaries, by Sophie Mützel, focuses on future imaginaries of digital payments. Having analyzed a decade of industry reports on digital payments the author identifies the following three imaginaries or "stories of the future" that are shaping the banking and payment industry: data monetization, the growth of digital payments, and the payment experience. This analysis enables the author to retrace the platformization of the financial industry and to show how digital payments and its narratives have restructured financial services toward a "re-personalization of money." It summarizes that digital payments play a central role in the current economic transformations. This development is led and promoted by global technology companies that excel in the tracking, production, categorization, and classification of digital data.

Translation of global imaginaries into local contexts, scientific practice, and infrastructure

The next set of articles begins with a paper by Michael Hockenhull and Marisa Leavitt Cohn who focus on how global "sociotechnical imaginaries" of digital technologies get translated locally into the context of the Danish welfare state. Drawing on ethnographic fieldwork of Danish technology events, the contribution conceptualizes "hot air" as a lens through which the dynamics of hype and critique in performing and sustaining SIs can be described. This analysis shows how global SIs are performed, contested, and translated into local contexts through promotional talks, conferences, and events. The contribution demonstrates convincingly how talk about futures can be "simultaneously vacuous and productive." It is in this process of translating abstract imaginaries and

fantastic hype into local practices that the notion of "hot air" helps to understand how grand visions are specified, transformed, and made material, as the authors conclude.

The next article, written by Tara Mahfoud, analyzes "competing visions" of how brain models should be built and research communities should be organized in the context of the Human Brain Project (HBP). Based on multi-sited ethnographic fieldwork in Austria, France, Germany, the United Kingdom, and the HBP headquarter in Switzerland, the article relates how the conflict over this massive project's goal to build a model of the brain was entangled with questions of research infrastructure, international collaboration, and even the identity of the European Union. She concludes that the initial vision of the HBP was not abandoned because it proved to be scientifically or technologically untenable, but because the initial vision did not meet with the identity of the research community nor of the European Union at large as unity in diversity. With that analysis, Mahfoud provides a striking example of how future visions get embedded in scientific concepts and research infrastructures.

The last article of this sub-set is written by Niels ten Oever and examines the Internet architecture imaginary that guides the co-production of policy and technology tracing back to the early phases of the Internet. Using a combination of quantitative and qualitative methods, the article shows how the Internet architecture's "sociotechnical imaginary" and its technical affordances got reconfigured over time following the commercialization and privatization of the Internet. It argues that the imaginary is anchored in the principles of end-to-end, permissionless innovation, and openness and is operationalized through a process of co-production. While the initial Internet architecture imaginary and its self-regulatory governance model are still professed by the Internet Engineering Taskforce, ten Oever carves out how economic drivers have increasingly undermined the design goals of the Internet architecture and prioritized economic interests. As a result, the study demonstrates that the long-time prevailing Internet imaginary as decentralized, end-to-end network affording permissionless innovation, and openness for everyone has become out of touch with the reality of a thoroughly commodified and increasingly centralized Internet.

Alternative imaginaries, interventions, and our own choice of words

The last group of articles deals with initiatives and strategies to counter this development of commodification and corporatization, focusing on alternative imaginaries, and critical interventions that seek to contribute to more just digital futures. The article by Becky Kazansky and Stefania Milan analyzes civil society's responses to dominant imaginaries of datafication and their associated harms and risks. Using an ethnographic case study approach, this article investigates how "counter-imaginaries" of datafication are enacted in three open source software projects. Having investigated a secure desktop ecosystem, an Internet of Things awareness device and a critical response to the facial recognition hype, the authors show how grassroot initiatives try to "bulwark autonomy, increase agency and provoke critical inquiry into new ways of being and doing amidst the threats of pervasive datafication." Despite their smallness, the authors convincingly argue, these sociotechnical interventions matter. And indeed, such alternative imaginaries and interventions are only one part of broader civil society strategies and contested politics of

data—that may jointly challenge the dominant corporate visions. In the long run, they can constitute a small building block in articulating and enacting more beneficial digital futures for the many, not the few.

Annette Markham's contribution in turn shows how hard it is to challenge dominant narratives and their taken-for-grantedness. In her public engagement experiments called The Museum of Random Memory (MoRM), the author specifically pinpoints the power of the theme of inevitability. These experiments show that even as participants began to think more critically about digital platforms, it seemed hard for them to not reproduce current ideological trends or to cede control to external, often corporate stakeholders. In Markham's analysis, this is the result of companies' very successful "discursive closure" that naturalizes, neutralizes, and legitimizes the specific and contingent values and infrastructures of today's networks, closing off discussion of alternatives that might counter current hegemonic power. Consequently, the author is planning to use more direct critique of current trajectories and the notion "aspiration," rather than "imagination," in their future interventions to help participants "think entirely otherwise."

In the concluding essay, Sally Wyatt reminds us of the importance of our own choice of words as researchers in imagining and creating alternative digital futures. Revisiting her early work on metaphors of the Internet and analyzing current nature-related metaphors, including "cloud computing" and "big data as new oil" the author focuses on the responsibilities of critical scholars of the Internet and new media to be vigilant about their own metaphorical language. Arguing that metaphors are not only descriptive, but also carry a normative dimension the author concludes with a plea for moving beyond deconstructing the metaphors of others and creating new metaphors and new ways of thinking about the future.

Conclusion—the politics of digital futures

As a number of contributions in this special issue show, corporate future imaginaries travel, translate into and gain ground in local contexts, social practices, and even people's mind. Annette Markham pinpoints this pervasive influence with the notion of "inevitability." This indicates that technology companies not only take over the imaginative power of shaping future society from state actors, but partly also their ability to govern these very futures with their rhetoric, technologies, and business models. In this sense, this special issue may also be seen as extending research on the ongoing privatization of Internet governance through modes of private ordering, lobby attempts, and mundane practices (Gillespie, 2018; Hofmann et al., 2017; Klonick, 2018; Mager, 2018). As it appears, the *making* and *governing* of digital technology are not two separate spaces and sets of practices, as we meant to reference in the title of this special issue. Most notably, much of the governing of digital technology seems to be executed in the making of digital technology and its rhetoric.

Beyond the cases in this collection of articles, we can currently observe this phenomenon in the debate on "Artificial Intelligence" (AI). While tech companies' strong discursive and technological clutch to shape and govern future developments is evident in the case of platforms (Gillespie, 2010; Poell et al., 2019), it is becoming increasingly

relevant in the intense debate about AI. Despite critics' fear that AI will eliminate democratic societies and the autonomy of humans, proponents position AI technologies as a means to fix fundamental problems of our societies: the promise of accident-free autonomous vehicles, automated detection of illnesses, automatic filtering of misinformation, and hate speech to name but a few examples. These utopian visions of the future are strongly spearheaded by the same "big five" corporations—Apple, Amazon, Google, Facebook, Microsoft—that currently drive and dominate most digital markets (Dolata, 2017). With that move, they claim to take on challenges and issues usually tackled and governed by state actors and public institutions—while pursuing their own business interests.

More broadly, the current hype seems to suggest that AI is inevitable and that it will fundamentally change how we live, communicate, work, and travel. While these claims are clearly the product of a contingent hype, they nevertheless have powerful effects in how they structure actors and resources. The few studies that exist show that media representation of AI is strongly dominated by corporate actors and products today (Brennen et al., 2018; Chuan et al., 2019), while it was more about research in earlier phases of interest in AI (Fast and Horvitz, 2017). Even in governmental regulations and national AI strategies, the industry's narrative of inevitability of AI as a key technology that will necessarily become a central sociotechnical institution is the dominant imaginary (Katzenbach, 2019; Katzenbach and Bareis, 2019). In that way, technology companies are shaping futures. The vast "interpretative flexibility" (Pinch and Bijker, 1987) of vague and contested terms, such as AI are increasingly becoming filled with specific meanings that meet corporate interests—instead of alternative options. These, in turn, influence the plurality of technological options, struggles, and possible trajectories encapsulated under this umbrella term (Cardon et al., 2018) and guide the formation of 21st-century AI. Hence, these influential corporations steer the making and governing of digital technology both with their products and with their prophecies.

This increasing influence of corporate SIs on society and policy has significant implications for the future of democracy. As future imaginaries settle in technology, infrastructure, and daily routines, they unfold their capacity to redefine the very nature of privacy, democracy, and the self (Cohen, 2012). Cohen (2013: 1913) argues that networked information technologies "mediate our experiences of the world in ways directly related to both the practice of citizenship and the capacity for citizenship, and so they configure citizens as directly or even more directly than institutions do." At the same time, these companies have neither been elected, nor are they democratically legitimized, as a member of the European Parliament argued. This EP member frames Silicon Valley companies like Google as "exterritorial agency shaping future developments without any democratic legitimacy, without any accountability to citizens" (anonymized interview quoted in Mager, 2018: 3666). Since networked information technologies have the capacity to contribute to or prevent "citizens' capacity for democratic self-government" (Cohen, 2013: 1912), Cohen concludes that ownership, transparency, and accountability of networked technologies are necessary ingredients for democratic societies.

Thus, political orders and technologies are always co-produced, as captured with the notion of SI. At the same time, these futures are often commodified as they are enacted

and performed by hegemonic technology companies and their expanding infrastructures, services, and products. As a response to their hegemonic position in imagining and shaping future society, we may start thinking about ways of strengthening alternative technologies and their visions of the future. Despite their creativity to come up with alternative technologies and future visions, civil organizations, activists, and researchers seem to have a hard time asserting their imaginaries against dominant visions and versions of future society, as a number of contributions of this special issue show (Kazansky/Milan, Markham). Accordingly, we have to ask how to support counter-imaginaries and civic technologies and turn their "vanguard visions" (Hilgartner, 2015) into collectively held SIs traveling and settling beyond their own communities. We hope that this special issue has taken a first step toward this ambitious goal by showing how dominant future imaginaries emerge and spread, how they compete with alternative visions, and what mechanisms prevent counter-imaginaries from proliferating. How to intervene in these dynamics and contribute to more open, democratic, and sustainable digital futures will be a key question to be addressed in future research and political action.

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ORCID iDs

Astrid Mager https://orcid.org/0000-0001-7447-2957
Christian Katzenbach https://orcid.org/0000-0003-1897-2783

Notes

1. https://medium.com/blockchain/the-wait-is-over-buy-sell-is-coming-to-america-855e91fa775c (accessed 25 February 2020)
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Author biographies

Astrid Mager is a senior postdoctoral researcher at the Institute of Technology Assessment (ITA), Austrian Academy of Sciences (ÖAW). In addition, she teaches at the Department of Science and Technology Studies, University of Vienna, on a regular basis.

Christian Katzenbach is senior researcher at the Alexander von Humboldt Institute for Internet and Society (HIIG), Berlin. At HIIG, he directs the research programme “Digital Society”. He is speaker of the section "Digital Communication" of the German Communication Association (DGPuK).

Editorial

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Advancing search engine studies: The evolution of Google critique and intervention

Astrid Mager[1], Ov Cristian Norocel[2] and Richard Rogers[3]

Abstract

In this piece, which frames the special issue, "The State of Google Critique and Intervention," we provide an overview of research focusing on Google as an object of critical study, fleshing out the European interventions that actively attempt to address its dominance. The article begins by mapping out key areas of articulating a Google critique, from the initial focus on ranking and profiling to the subsequent scrutiny of user exploitation and competitive imbalance. As such, it situates the contributions to this special issue concerning search engine bias and discrimination, the ethics of Google Autocomplete, Google's content moderation, the commodification of engine audiences and the political economy of technical systems in a broader history of Google criticism. It then proceeds to contextualize the European developments that put forward alternatives and draws attention to legislative efforts to curb the influence of big tech. We conclude by identifying a few avenues for continued critical study, such as Google's infrastructural bundling of generative artificial intelligence with existing products, to emphasize the importance of intervention in the future.

Keywords

Search engine studies, Google, political economy, EU policy, internet governance

This article is a part of special theme on The State of Google Critique and Intervention. To see a full list of all articles in this special theme, please click here: https://journals.sagepub.com/page/bds/collections/stateofgooglecritiqueandintervention

From PageRank to "assetization" of audiences: Articulating Google critique

Google's celebrated PageRank algorithm was critiqued quite soon after the launch of the search engine in 1998. The innovation in search results ranking was the initial employment of the number and quality of hyperlinks a website receives to evaluate a website's value, in the tradition of citation analysis (Mayer, 2009). As early as 2000 Introna and Nissenbaum pointed to the emergence of information hierarchies by arguing that PageRank would favor large, well-connected and often commercial websites at the expense of smaller ones and would therefore undermine the early democratic ideals of the web (Hindman et al., 2003; Introna and Nissenbaum, 2000; Rieder, 2012). Empirical studies followed, such as those from the healthcare context, which reaffirmed the findings by demonstrating how SEO'd or "search engine optimized" websites such as commercial portals tended to be ranked higher than smaller websites of self-help groups (e.g. Mager, 2009; Nettleton et al., 2005; Seale, 2005). Additional research pointed towards media convergence

[1]Institute of Technology Assessment, Austrian Academy of Sciences, Vienna, Austria
[2]Department of Gender Studies, Lund University, Lund, Sweden
[3]Media Studies, University of Amsterdam, Amsterdam, The Netherlands

Corresponding author:
Ov Cristian Norocel, Department of Gender Studies, Lund University, Box 117, Lund, 221 00, Sweden.
Email: ov_cristian.norocel@genus.lu.se

and concentration with established institutions and commercial concerns foregrounded in search engine results (and sponsored ads) at the expense of counter-cultural or more critical voices (Eklöf and Mager, 2013; Mager, 2012a; Nettleton et al., 2005; Rogers, 2004).

This initial search results critique developed into a more fundamental criticism of gender and race bias in algorithmic systems. The more dominant Google became, and the more websites, data and images it ingested, the greater the biases grew over time. In her popular book, *Algorithms of Oppression*, Noble (2018) collected devastating examples showing that search terms like "black girls" or "gorillas" produced discriminatory results ranging from massive porn content to images of African Americans tagged as apes owing to data bias, corporate dynamics, and ill-trained image recognition software. While Google quickly patched these search associations, the structural bias and discrimination search engines and other recommender systems produce have still not been resolved. On the contrary, with the integration of more and more data-driven algorithms, analytics, and artificial intelligence (AI) in both commercial and public domains, algorithmic bias and asymmetries continue to lead to inequalities and social disadvantages (Allhutter et al., 2020; Benjamin, 2019; Eubanks, 2018). Following this line of research, three contributions to the present special issue explicitly focus on search engine bias and discrimination in the context of extreme-right dynamics of exclusion (Norocel and Lewandowski, 2023), the ethical dimensions of Google Autocomplete (Graham, 2023), and Google's balancing of suggesting and moderating offensive content (Rogers, 2023).

The empirical bias studies are forms of algorithmic auditing, which themselves draw on social scientific "auditing" traditions of uncovering particularly racial discrimination in housing and loan applications. The "fair housing audit," for example, seeks to identify "systematic differential treatment" of the same kind of housing applicants, save their race (Galster, 1990: 165). When applied to search engines (and social media feeds) the techniques, used by researchers and journalists alike, compare the results of ostensibly the same queries, albeit with switched gender, race, or other intersectional markers (Collins, 2019). The findings often point to either the perpetuation of particular stereotypes and biases or their outright blockage (Leidinger and Rogers, 2023).

A second strand of search engine critique that emerged in the 2000s focused on Google's revenue model based on consumer profiling. Van Couvering's (2008) was among the early scholarship discussing the commercialization of search engines, tracing Google's history from its early roots in academic research at Stanford University towards the introduction of its AdWords and AdSense advertising platforms. That lineage has been discussed in terms of "informational capitalism" (Fuchs, 2010; 2011), "cognitive capitalism" (Pasquinelli, 2009) as well as "surveillance capitalism" (Zuboff, 2015; 2019). At the heart of this critique is the "service-for-profile" business model (Elmer, 2004), where users receive services for free, while paying with their data. User data are translated into user profiles and sold to advertising clients. As such, consumer profiling has been described as "an ongoing distribution and cataloging of information about desires, habits, and location of individuals and groups" (Elmer, 2004: 9). Based on users' search histories, locations, and search terms, search engines started to develop detailed user profiles, capturing desires and intentions of individuals and groups of users. Google's multitude of services in combination with Android, its mobile phone operating system, provided "data points" for the creation of these profiles. The level of granularity of user profiling for online advertising platforms was revealed after data activists and journalists unearthed a file on the website of Microsoft's ad platform, Xandr (Keegan and Eastwood, 2023). It contains 650,000 "audience segments," capturing and combining categories ranging from health conditions and religious preferences to mental states.

Intrusive practices of user profiling have been conceptualized in the field of surveillance studies for some time now (Christl and Spiekermann, 2016; Lyon, 1994; 2003; 2007). While Elmer (2004) discussed search engines as Google as a "Panopticon" enabling user surveillance and shaping user behavior, Pasquinelli argued that the metaphor should be turned around: "Google is not simply an apparatus of dataveillance from above, but an apparatus of value production from below" (Pasquinelli, 2009: 153). Following a Marxist tradition, Pasquinelli (2009) argued that Google's PageRank algorithm would exploit the collective intelligence of the web since each link Google uses to measure a website's value would represent a concretion of intelligence to create surplus value. In a similar way, Fuchs (2011) elaborated how Google exploits not only website providers' content, but also users' practices and data. He labeled Google as the "ultimate economic surveillance machine and the ultimate user-exploitation machine" (Fuchs, 2011: 44, see also Mager 2012b).

More recently, big tech's means and mechanisms to turn user attention into "assets" through the measurement, governance, and valuation of digital traces and user engagement have been criticized in the tradition of audience commodification by media corporations (Fuchs, 2012; Smythe, 1977), also referred to as the creation of an "attention economy" (Birch et al., 2021; Pederson et al., 2021). Accordingly, not only the accumulated data, but especially the large-scale measurements and metrics conducted by platforms like Google, and their advertising networks, enable the commodification or "assetization" of audiences and user engagement (Birch et al., 2021). Reflecting these concerns in this special issue, the commercial dynamics of Google are traced back to Brin's and Page's first

description of their PageRank algorithm (Ridgway, 2023) and embedded in the political economy of "technical systems" (Rieder, 2022). Moreover, the study of Google audiences, particularly the means by which the engine directs attention, contributes not only to what is visible and amplified, but also to ignorance (Haider and Rödel, 2023).

Tracing European interventions

Starting from Google's commercial dynamics, Mager (2012b) showed that "the new spirit of capitalism" (Boltanski and Chiapello, 2007) becomes embedded in search algorithms by way of social practices. Both website providers and users should be seen as not only passively exploited by Google, and other big tech companies, but rather as actively contributing to Google's "capital accumulation cycle" (Fuchs, 2011) with their own sociotechnical practices. They also co-produce its "algorithmic ideology" (Mager, 2012b; 2014a). Shifting the perspective from the political economy of search engines towards power relations in the making and stabilization of corporate search engines like Google enables us to start thinking about "social or political interventions that pave the way towards change" (Mager, 2012b: 783).

In the European context, some of the earliest discussions of alternatives were mobilized by critical librarians (Jeanneney, 2008). They also coincided with the "Googlization" critique, or the view that Google's "free" model would take over not only industry after industry but also cultural institutions such as the library (Vaidhyanathan, 2006). Buoyed by the framing of Google's hegemony as an European issue, quite a number of political and legal interventions have taken shape since then, especially after the US National Security Agency (NSA) leaks by Edward Snowden. In June 2013, Snowden revealed practices of mass surveillance conducted by American and British intelligence agencies. He accused big tech companies such as Google, Facebook, Apple, and others of collaborating with the NSA, which led to heated media debates (Mager, 2014a). With large-scale online surveillance and privacy violations pushed into the limelight, the European Union (EU) has tried to exert varying measures of control over big technology companies from the USA, and increasingly from China. Especially the entanglements between corporate surveillance and state control shaped policy debates and legislative acts within the EU. The rising salience of privacy issues led the EU to fend off lobbying attempts by big tech companies and helped privacy advocates to incorporate their interests into the General Data Protection Regulation (GDPR) (Regulation (EU), 2016/679). The Snowden revelations "saved" the GDPR, as Rossi (2018) straightforwardly concluded. Even though critique of the GDPR has emerged over the past few years, especially of its narrow, individualistic concept of personal data and its strong reliance on the "notice-and-consent" model (Mayer-Schönberger and Padova, 2016; Marelli et al., 2020; Prainsack, 2020), it is nonetheless considered a milestone in the EU's attempt to regulate big tech and their intrusive business and data practices.

In the aftermath of the NSA leaks, a number of significant court rulings and legislative acts have been passed in the EU. The European Court of Justice (ECJ), most notably, made crucial interventions, where the first important court ruling was "the right to be forgotten case," which the ECJ passed against the company in 2014. Based on the former European data protection directive, the ECJ forced Google to delete illegal or inappropriate information about a person from the Google index if the person concerned requests it (at least from its European databases). This judgment has been described as remarkable, since it successfully applied European data protection legislation to a US technology company for the first time. This right to erasure has later been integrated into the GDPR.

In 2015, Google was faced with its first antitrust actions when the European Commission accused the company of cheating competitors by privileging its own shopping service in its search results (Lewandowski et al., 2018). Two other cases have resulted in formal charges against the company for privileging the Android operating system as well as Google AdSense. These three court rulings resulted in total fines of 8.25 billion euros (Chee, 2022).

More recently, the EU has adopted a number of legislative acts aimed at containing and controlling big tech companies including the Digital Services Act (DSA) (Regulation (EU), 2022/2065), the Digital Markets Act (DMA) (Regulation (EU), 2022/1925), and the European Data Governance Act (Regulation (EU), 2022/868). A fourth, the Artificial Intelligence Act, is still under negotiation. Within these legislative efforts, the amount of rhetoric concerning the preservation of "European values" has increased and been expanded from an earlier, narrow focus on privacy issues towards such notions as digital sovereignty, transparency, fairness, and sustainability—sometimes configured under the more generic phrasing of ethics. While formal EU policy tries to promote its "human-centric approach" towards digitalization, a growing body of research has shown how supposedly European values appear to be fragile, contested, and contradictory when examined with greater scrutiny. Research on digital innovations and most importantly AI has pointed to competing imaginaries regarding the EU's normative goals of promoting European values and the EU's economic interests, which are reflected, for instance, in the long-standing notion of the Digital Single Market (Ulnicane, 2021).

While there is research focusing on EU's digital innovation policies and the sociotechnical imaginaries surrounding them (Barais and Katzenbach, 2022; Krarup and Horst, 2023; Mager, 2017; Mager and Katzenbach, 2021; Ulnicane, 2021), relatively less is known about technology projects and infrastructures developed in Europe. Such a

paucity should be addressed, given the burgeoning interest over the past few years in building European digital technologies and platforms to address the dominant American and Chinese "platform ecosystems" and their infrastructural power (Rieder, 2022; Van Dijck 2021a; 2021b). In fact, there are a number of European technology projects in the pipeline, often below the radar of public attention and overshadowed by Silicon Valley rhetoric. Besides big flagship initiatives such as the European Human Brain Project (Mahfoud, 2021) or the European cloud infrastructure Gaia-X (Baur, 2023), a series of digital tech projects aim at social change rather than market dominance. In the area of search, there is a multiplicity of search engines, applications, and initiatives that seek to provide an alternative to hegemonic search engines like Google.

The German/French project Quaero was one of the first search engine projects that aimed at creating a European alternative to big US-based search engines (Lewandowski, 2014). In 2005, the project was announced by Jacques Chirac as an attempt to "rival" Google and Yahoo, given the "threat of Anglo-Saxon cultural imperialism" (Litterick, 2005). Even though the project did not succeed in building a competitive European search engine, the idea of creating an alternative search infrastructure in Europe endured. In 2014, Lewandowski suggested creating an open, publicly funded web index, ideally as a "pan-European initiative" (Lewandowski, 2014). Moreover, search engines with a social cause have been created that piggyback on well-established search indexes and search results such as the "green" search engine Ecosia, metasearch engines of various sorts, or privacy-friendly search engines (Mager, 2014b). This aspect is explored further in the present special issue, in particular the manner in which European search engine providers counter-imagine and counteract hegemonic search through alternative search engine projects (Mager, 2023).

Contemporary Google studies: Special issue contributions

This special issue collects five original research articles (Haider and Rödl, 2023; Mager, 2023; Norocel and Lewandowski, 2023; Ridgway, 2023; Rogers, 2023) and two invited commentaries (Graham, 2023; Rieder, 2022), all of which are devoted to the state of Google critique and intervention by engaging critically with its study as well as prospecting for alternatives. Three contributions focus on search engine bias and discrimination in the context of right-wing extremism (Norocel and Lewandowski, 2023), Google Autocomplete (Graham, 2023), and content moderation (Rogers, 2023). Another three tackle the commercial dynamics of Google, tracing its roots to the first description by Brin and Page (1998) of their PageRank algorithm (Ridgway, 2023), embedding it in the political economy of "technical systems" (Rieder, 2022) and relating it to how search engines contribute to the creation of ignorance (Haider and Rödel, 2023). Finally, the last contribution analyzes how to step beyond big tech and create alternative search engines and infrastructures in particular in the European context (Mager, 2023).

In the first piece, Ov Cristian Norocel and Dirk Levandowski (2023) develop a critical big data perspective to explore the manner in which search engine users may be directed towards extreme-right content, despite Google's proclaimed quality control and content moderation. Norocel and Lewandowski gauge the tentative contours of data voids whereby Google queries return skewed and manipulatory content, which reflect extreme-right dynamics of exclusion in the aftermath of the 2015 humanitarian crisis in Europe (Hellström et al., 2020; Norocel, 2017). They add complexity to existing analyses of data voids by expanding the framework of investigation outside of the US context by concentrating on Germany and Sweden. Building on previous big data analytics addressing the politics of exclusion, Norocel and Lewandowski develop a catalog of queries concerning the issue of migration in both Germany and Sweden on a continuum from mainstream to extreme-right vocabularies. This catalog of queries enables specific and localized queries to identify data voids. Examining critically the results of these queries, Norocel and Lewandowski argue that Google's reliance on source popularity may lead to extreme-right sources appearing in top positions. Furthermore, using platforms for user-generated content provides a way for these localized websites to gain top positions.

In their research commentary, Rosie Graham (2023) approaches the issue of the ethical dimensions of Google Autocomplete, highlighting some of the key ethical issues raised by Google's automated suggestion tool that provides potential queries below a user's search box. Much of the discourse surrounding Google's suggestions, or 'predictions', has been framed through legal cases in which complex issues can become distilled into black-and-white questions of the law. In turn, in their commentary Graham argues that by focusing primarily on the legal aspect, it obscures many other moral dimensions raised by Google Autocomplete. Building on existing typologies, Graham first outlines the legal discourse, before exploring five additional ethical challenges, each framed around a particular moral question in which all users have a stake.

In the third contribution, Richard Rogers (2023) deploys "algorithmic probing" as means to investigate the manner in which Google balances prompting and moderating offensive results. The contribution begins with the observation that Google results have been initially examined for what they privilege (in terms of the surface web, the optimized and personalized pages, and/or their own properties), but more recent scholarly efforts have concentrated on scrutinizing another topic, namely the recurrence of offensive results. Adopting "algorithmic probing," Rogers revisits a selection of offensive and other problematic results,

which had initially been identified by either journalists or other researchers. He re-runs the original queries to study the potential moderation of results in Google Web and Image Search, but mainly in Google Autocomplete. The purpose of the study is to examine the extent of moderation pertaining either to a different kind of privileging—Google's hierarchy of concerns—or specific categories or languages. Rogers finds that Google appears to heavily moderate issues of religion, ethnicities, and sexualities (though in a selective manner), whilst issues of stereotypical depictions of gendered professions and ageism are left largely untouched. Concerning languages, content in English is moderated to a greater degree in comparison to Southern European and Balkan languages. In conclusion, Rogers discusses the stakes of Google's moderation, especially with regard to its uneven coverage.

In the group of articles concerning the commercial side, Renée Ridgway (2023) examines the deleterious consequences of the manner in which Google's original sociotechnical affordances have shaped the "trusted user" by means of ubiquitous googling and smart algorithms in surveillance capitalism. Departing from the fact that Google dominates over 90% of the search market worldwide (as of late 2022), Ridgway argues that its hegemonic position in search is hardly accidental, arbitrary, or (un)intentional. She revisits Brin and Page's original paper (1998), drawing on six of their key innovations, concerns, and design choices (namely counting citations or backlinks, trusted user, advertising, personalization, usage data, and smart algorithms), in order to examine how Google's hypertext search engine technologies evolved by means of "moments of contingency," which then led to corporate lock-ins. Building on earlier research (Zuboff, 2015), Ridgway describes the manner in which Google as an infrastructure is intertwined with big data's platformization and the *ad infinitum* collection of usage data, beyond for personalization only. This extraction and refinement of usage data as "behavioral surplus," she argues, results in "deleterious consequences": a "habit of automaticity," which shapes the trusted user through "ubiquitous googling" and smart algorithms, whilst simultaneously generating prediction products for surveillance capitalism. As such, Ridgway contributes a new taxonomy of Google sociotechnical affordances to critical science and technology studies, media history, and web search literature.

Bernhard Rieder (2022) in his research commentary proposes a conceptual framework to enable the study of big tech companies like Google as "technical systems," which organize their operation around the mastery and operationalization of key technologies that facilitate and drive their continuous expansion. Using Google as an example, Rieder shows how to interrogate software and hardware through the lens of transversal applicability, discussing software and hardware integration. He proposes the notion of "data amalgams" to contextualize and complicate the notion of data. The goal of his commentary is to complement existing vectors of "big tech" critique with a perspective sensitive to the materialities of specific technologies and their possible consequences.

In turn, Jutta Haider and Malte Rödl (2023) analyze the relationship between Google and different kinds of ignorance related to climate change. Haider and Rödl build their study on concepts from the field of agnotology to examine the manner in which environmental ignorances, in particular those related to the climate crisis, are shaped at the intersection of the logics of Google Search, everyday life and civil society/politics. They pursue their argument by means of four vignettes, each of which explores and illustrates how Google Search is configured into a different kind of socially produced ignorance: (1) ignorance through information avoidance: climate anxiety; (2) ignorance through selective choice: gaming search terms; (3) ignorance by design: algorithmically embodied emissions; and (4) ignorance through query suggestions: directing people to data voids. As such, Haider and Rödl highlight that while Google Search and its underlying algorithmic and commercial logic pre-figure these ignorances, they are also co-created and co-maintained by content producers, users, and other human and non-human actors, as Google Search has become integral of social practices and ideas about them. They conclude by drawing attention to a new logic of ignorance that is emerging in conjunction with a new knowledge logic.

Last but not least, Astrid Mager (2023) zooms in on the European context and studies how European search engine projects have attempted to counter-imagine and counteract Google's hegemonic position. Mager examines how developers of alternative search engines to Google have construed counter-imaginaries of search engines centered around social values, thereby competing with the corporate imaginaries centered on mere profit maximization. By means of three in-depth case studies of European search engines, Mager evinces how search engine developers build out these counter-imaginaries, which social values underpin them, and how they are intertwined with the developers' sociotechnical practices. She shows how such notions as privacy, independence, and openness, by being treated as context-dependent and changing over time, lead to specific "value pragmatics," which enable the projects to scale beyond their own communities of practice. Furthermore, she unveils how broader notions of Europe as "unified and pluralistic" are constructed and co-produced by and through the developers' attempts to counter corporate imaginaries about search. In conclusion, Mager suggests three points of intervention to enable alternative search engine projects, and discusses how "European values," in all their richness and diversity, may contribute to such an effort.

The way ahead? Concluding remarks

AI has entered the conversation about the future of search as well as the future of alternatives to Google, albeit divorced

from the discussion above on alternatives following a social cause, at least to date. One example is Google's Bard, an AI generative text system which advertises itself as being helpful in "explaining to your kids why the sky is blue," together with "helping with lines of source code" and "drafting an email," and then importing it into Gmail (Google, 2023). Google's Bard is yet another example of interspersal product development in the Google infrastructure, touched upon above, and a possible way ahead for how Google envisages the integration of generative AI as sets of suggestions that stand alone as an answer machine, but can also be linked to other products.

By accumulating infrastructural power in using AI to couple products, Google invites AI engine critique somewhat differently from earlier search engine criticism that concentrated more on socio-epistemological concerns such as how the algorithms marginalize some sources and promote others. Such critique may focus on the way value is created from infrastructural complexity and how the integration of large language models into search products is used to extend market power by Google, but also by Microsoft as it hopes to catch up with its "AI-powered" search engine Bing and its Edge browser framed as "an AI copilot for the web" on the official Microsoft blog (2023).

The new "bundlings" of products and services pose further infrastructure governance and competition challenges. As AI search product development presses on, much of the attention and innovation are in the regulatory and legislative arena, especially in Europe; such as the AI act, as discussed above. Emerging themes in the realm of platform governance are interdisciplinary oversight bodies as well as platform or social media councils. These independent monitoring bodies, unlike Facebook's oversight board, would not only be situated in the legal and ethical realm. They would also represent the interests of the users and the public interest more broadly (Efferenn, 2023). Calls for big tech and social media observatories are further evidence of the broadening of the scope of platform governance considerations. For example, Rieder and Hofmann's "European Platform Observatory" would be "driven by a public interest mandate" (2020).

These initiatives and others put Google critique and intervention into practice, building on over two decades of work studying how the search engine privileges certain voices and marginalizes others, introduces and reifies bias, extracts data and sells profiles in exchange for its free services, and creates surplus value from the collective work that is the web, as mentioned above. There have been inventories of the critique (Rogers, 2018), but few of the alternatives. Given the opportunity to study and learn from alternatives, from Europe and beyond, we could not just anticipate the AI search products ahead but provide frameworks and imaginations for critical intervention.

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ORCID iDs

Astrid Mager https://orcid.org/0000-0001-7447-2957
Ov Cristian Norocel https://orcid.org/0000-0002-7349-4000
Richard Rogers https://orcid.org/0000-0002-9897-6559

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