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Imaginaries of Artificial Intelligence

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Abstract

Artificial intelligence (AI) is considered a key technology in contemporary societies. Discursive and public imagination play a pivotal role in envisioning and determining trajectories of AI and its integration in society. Particularly, the approach of socio-technical imaginaries offers a meaningful perspective to analyze the characteristics and impact of imaginaries surrounding technological advances. As AI seems to be in a formative phase – both as a technology and infrastructure as well as regarding its public perception, it is particularly relevant to understand how imaginaries impact economic, research, and political agendas, and who is pushing which agenda to the foreground above other potential lines of development. Therefore, this chapter provides an introduction to the concept of imaginaries and offers a critical analytical framework to question AI imaginaries. In addition, it provides an overview of current research on sociotechnical imaginaries around AI and related technological discourses considering relevant stakeholders, media representations and public perceptions of the technology.

Keywords: Artificial Intelligence, Sociotechnical Imaginaries, STS, Discourse, Stakeholders, Communication.

Introduction

Artificial intelligence (AI) is considered a key technology in contemporary societies, expected to substantially change sectors as diverse as health, warfare, mobility, or communication. At the same time, with the increasingly advanced and pervasive usage of AI in everyday activities, it also has the potential to significantly reshape our daily practices and interpersonal interactions (LaRosa & Danks, 2018; Mou, 2020). Consequently, political and economic stakeholders in many countries have allocated considerable resources to AI development, and the technology has been the object of extensive public debates. These political and public debates, however, are often critiqued for (too) strongly highlighting AI's potentials (Brennen et al., 2018; Elish & boyd,

2018; Zeng et al., 2022) and exaggerating its actual capabilities and impact (Goode, 2018). In these debates the term "AI" is mobilised for many different things, and usually remains vague and is used inconsistently (Mager & Katzenbach, 2021). This indicates the inherent ambiguity of broad technologies such as AI: Their development and societal integration is contextual, shaped by political, economic and sociocultural interests, and subject to discursive negotiations in public arenas. Given the vast amount of interest and resources invested in AI research and technology, and its expected impact on the individual, organizational and societal levels, it is important to question how the characteristics and development of AI are socially constructed, negotiated or restrained by socio-political contexts.

In that process, discursive and public imagination play a pivotal role in envisioning and determining trajectories of AI and its integration in society. Therefore, stakeholders have an interest in shaping the debate to their advantage by impacting what the public imagines AI or its capabilities to be. The concept of imaginaries has proven to be helpful in this respect, as it foregrounds the role of discursive and collective visions of desirable futures. Particularly, the approach of socio-technical imaginaries based in Science and Technology Studies (STS) (Jasanoff & Kim, 2015; Mager & Katzenbach, 2021) offers a meaningful perspective to analyze the characteristics and impact of imaginaries surrounding technological advances. Where classic studies investigate imaginaries and trajectories of nuclear energy (Jasanoff & Kim, 2009) and national energy policies (Jasanoff & Kim, 2013), or more recently of mobile technology, the application of this perspective to AI is particularly important, because massive amounts of resources are currently devoted to a technology that is still often vague and under-determined. The concept foregrounds that imaginaries surrounding AI – i.e. the societal understandings of the future possibilities, potentials and risks of AI – are to a considerable degree socially constructed and not inherently determined by characteristics of the technology and its development itself. These imaginaries thus play a large role in influencing how societies deal with emerging key technologies like AI, but also how the technological sector in turn continues to develop AI technologies.

This is especially relevant right now, as AI seems to be in a formative phase – both as a technology and infrastructure as well as regarding its public perception. In such a phase, it is particularly relevant to ask who drives the agenda and which agenda is pushed to the foreground above other potential lines of development? Therefore, this chapter provides an introduction to the concept of Imaginaries as well as a critical analytical framework to question AI and other technological imaginaries. In addition, it provides an overview of current research on sociotechnical imaginaries around AI specifically and related technological discourses in general considering relevant stakeholders, media representations and public perceptions of the technology.

The Concept of Imaginaries

Analyses from Science and Technology Studies (STS), Social Studies of Science (SSS), Social Construction of Technology (SCOT), reflexive technology assessment and other interdisciplinary fields have long demonstrated that technologies are socially (co)constructed (Bijker, 2012; Law et al., 2016; Lösch et al., 2016). They show that technological development and institutionalization are not driven by an inherent, instrumental logic of a given technology, but shaped by political, economic, cultural, legal and other social forces. In consequence, technological fields such as AI feature high levels of contingency and "interpretative flexibility" (Pinch & Bijker, 1984; Meyer & Schulz-Schaeffer, 2006) with different possible trajectories. In retrospect, technology always "might have been otherwise" (Bijker & Law, 1992, p. 3). These scholarly fields provide a rich literature investigating how and which societal factors inform and influence technological development, how technologies are taken up and re-shaped by society, in which ways social values are inscribed into technologies and which socio-political effects technologies may have (e.g. Simon, 2016; Winner, 2010).

The concept of sociotechnical imaginaries has proven useful in this context, especially to understand the role of perceptions, discourses and future visions in the complex interactions and negotiations of co-constructing technological developments. But it is embedded in a broader strand of social theory: Considering the 'imagined' as part of social ordering has been conducive to understand how people think about institutions such as the nation state and the development of nationalism (Anderson, 1983), for example. These broad institutional concepts are bound to communal imaginaries constructing a collective and a political community, although members of this 'imagined community' might have never met. Focusing on the social aspect of imaginary construction, Charles Taylor (2003) considered the evolving nature of social imaginaries, which have been challenged and revolutionized to adjust to what is accepted as normal in social interactions (97f.). His work considers moral and social structures upholding society. Both Anderson's and Taylor's work has inspired the more recent work on 'sociotechnical imaginaries' by Sheila Jasanoff & Sang-Hyun Kim (2009, 2015), as well as research on specific sociotechnical aspects such as 'algorithmic imaginaries' (Bucher, 2016), 'platform imaginaries' (van Es & Poell, 2020) and influencer imaginaries (Arturo & Bishop, 2021).

Jasanoff and Kim (2009) introduced the term sociotechnical imagiaries (SI) to capture (a) the high relevance of shared narratives and imaginations for collectives in line with Anderson and Taylor, and (b) to highlight the role and contingency of technology in building and ordering society (cf. SCOT, above). SI are "collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects" (Jasanoff & Kim, 2009: 120). The concept thus aims to bridge the often separately investigated spaces of public and mediated discourse, political action and technological development. As SI

are always "associated with active exercises of state power, such as the selection of development priorities, the allocation of funds, the investment in material infrastructures" (Jasanoff & Kim, 2009: 123), they differ from concepts such as frames used in communication science or sociology. Beyond the communicative dimension, they integrate state interventions, corporate investments, technological developments and other contributions to the materialization of an envisioned future into the empirical investigation. In addition, SI feature a prominent temporal dimension: they "at once describe attainable futures and prescribe futures that states believe ought to be attained" (Jasanoff & Kim, 2009, p. 120), guiding current activities and decisions by providing desirable futures. In other words: They describe potential developments of technologies, either ones that are spatially close but lie further in the future, or ones that are spatially detached, i.e. happening in other regions of the world, but temporally close, i.e. happening now or very soon.

While the concept of SI has become a popular analytical tool with various theoretical adjustments and empirical manifestations, it remains underdeveloped both in terms of conceptual complexity as well as empirical operationalization. Conceptually, the initial focus on the imaginaries presented by nation-states and state actors has been eased, acknowledging that imaginaries are also articulated and enacted by corporate actors, civil society, research communities and other organized groups (Jasanoff, 2015: 4; Mager & Katzenbach 2021). STS scholars, for example, have pointed to the importance of corporate imaginaries in contexts such as RFID tagging (Felt & Öchsner, 2019) and satellite imagery (Olbrich & Witjes, 2017). They have analyzed how the European Union envisions corporate search engines (Mager, 2017) and big data solutions (Rieder, 2018) and how these imaginaries travel into and transform in national socio-political contexts and communities of practice (Mager, 2017). Finally, they have shown how bottom-up initiatives shape future imaginaries of the Internet through data activism in Denmark (Lehtiniemi & Ruckenstein, 2018) as well as hobbyists and research networks in Indonesia (Barker, 2015). This more complex understanding of SI was also adopted by Sheila Jasanoff in her updated definition of SI as "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, 2015: 4) But it still lacks conceptual and methodological clarity, particularly regarding the processual nature of imaginary building and formation, and the negotiation of competing imaginaries in public arenas (Mager & Katzenbach, 2021). Also the concrete operationalization of the concept in empirical work remains vague and differs considerably across studies building on the concept.

In addition to concepts such as ideas, frames, and visions that also highlight the discursive dimension in the relation between technology and society, the concept of (sociotechnical) imaginaries integrates the "resonance among collectives, the allocation of resources, and the

adoption into practices" of the respective technological visions, as Mager & Katzenbach (2021, p. 226) argue. For that reason, the lens of imaginaries particularly enables scholars to reconstruct and highlight the contestations and negotiations between different actors in processes of technological development and its integration into society, as research on energy transitions (Rudek, 2021), governance of sustainability developments (Becks et al., 2021) smart cities (Sadowski & Bendor, 2018) has shown.

Imaginaries of AI

The concept of imaginaries provides a particularly fitting conceptual lens for the investigation of AI's current integration and institutionalization into societies across the world. From this angle, mapping and questioning different imaginaries around AI can have a profound impact in understanding not only how different stakeholders think about an increasingly relevant technology, but how they simultaneously shape and impact the development of a technological vision for AI. Dominant imaginaries influence the way in which individuals, institutions and societies deal with socio-technical developments. Technologies such as AI are being stabilised through social, political, cultural and economic negotiation processes. The concept of imaginaries can provide an analytical framework to address these questions around technological perception, public acceptance or dissonance, and future technological visions within public, but also corporate, political and other discourses. In turn, it enables scholars help understand, replicate or disrupt strategies of managing AI imaginaries.

As AI is an umbrella term that refers to both broad technological fields and innovations as well as a diverse array of specific applications, the concept of SI can be particularly useful because it focuses less on the technical specificity but on the social understanding of the technologies and, hence, their adaptation and trajectory. AI can be considered an imaginary itself as it has become a very ambiguous term in public discourse with the meaning strongly dependent on context and purpose. Originally, the term AI referred to a specific field of research, primarily in computer science starting around the 1950s, which considered AI according to Marvin Minsky as "the science of making machines do things that would require intelligence if done by men" (quoted from Bolter, 1986, p. 193). Since then, however, the boundaries and structuring of the research field have become more blurred, with controversies around questions such as what constitutes AI research and AI technologies (Cardon et al., 2018). However, a largely consensual structuring of the field is the division in two camps: the *symbolists*, focused on expert systems that suggest classifications and decisions based on (often very many) well-defined criteria (e.g., credit scoring based on residence, income, spending habits, etc), and *connectivists*, where systems develop decision rules themselves based on given input data and already classified output data, an approach popularly called 'machine learning'. But AI, like other technological developments, cannot be explained in functional terms alone. They are not simply the result of a

uni-directional and one-dimensional movement of progress in which technology keeps improving. Instead, technological developments are always characterized by interpretative flexibility, controversy and potential closure while they are starting to stabilize socially and economically (Pinch & Bijker, 1984; Katzenbach, 2012).

Both the conceptual ambiguity as well as the shifting between different paradigmatic camps of AI research gaining popularity at different times in academic and public discourse has led to several hype cycles and AI winters over the decades (Bostrom, 2014). Studies have documented and analyzed these changes in the perception of AI through the lens of social construction of knowledge, scientific practices, and expertise (Woolgar, 1985; Courtial & Law, 1989; Collins, 1993; Suchman, 2008).

> *"If we want to understand our relationship with intelligent machines, we must be continually reminding ourselves where the knowledge that the machines are gathering is coming from. We must always be reminding ourselves that machines do not come ready fitted out with culture; someone is mothering and fathering them." (Collins, 2018: 16)*

Along these lines, recent work has started to question the understanding of machine learning as something independent of human interaction (Bechmann & Bowker, 2019; Reigeluth & Castelle, 2019), provided detailed ethnographies of machine learning cultures (Mackenzie, 2017), identified metaphors and rhetoric in AI research (Natale & Ballatore, 2017; Campolo & Crawford, 2020) and mapped the trajectories of competing sub-fields of AI research (Cardon, Cointet & Mazières, 2018). Increasing academic as well as public debates about issues of racism, sexism, and discrimination in the context of AI-powered technologies (Chokshi, 2019; Wellner & Rothman, 2019; Zou & Schiebinger, 2018) are only starting to surface the routinely hidden social forces in the making of AI and in shaping its impacts by calling into question the dominant imaginaries of AI as a tool or technological solution for human bias.

As we are currently negotiating the deep integration of AI into most areas of contemporary social life and sectors of society, this attention for the dependencies of discourse and technological development positions SI as a highly productive concept for studying the institutionalization of AI in contemporary societies. The conjunction of vague discourse and high levels of political and economic activity is indicative of the problematic ambiguity of the umbrella term AI, specifically inviting social processes to guide technological development and stakeholders to steer public and policy attention in directions beneficial to them. Thus, AI seems to be in the middle of a forceful process of institutionalization with different actors mobilizing different future visions in order to shape future developments in AI and its integration into contemporary and future societies. Operating in "the understudied regions between imagination and action, between discourse and decision, and between inchoate public opinion and instrumental state policy" (Jasanoff & Kim, 2009: 123), a SI informed comparative study on

AI imaginaries thus allows to go beyond frame and content analyses of AI representation in public discourse and in legacy as well as online and social media.

Negotiating Imaginaries: Stakeholder, Media and the Public

The social construction and implementation of AI and related technologies into society has received a rising amount of scholarly attention in recent years. This has focused on stakeholders in different AI sectors, media representations of AI, as well as public perceptions of AI. While all of these can be seen as bringing forth different imaginaries of AI, there is still little research employing the concept of SI in regards to AI. But studies have described analytical elements that can be interpreted as aspects of imaginaries surrounding AI, such as AI-related visions of specific stakeholder (groups), descriptionf of the (potential) desired and undesired outcomes of the implementation of AI, or hopes of ideal future developments regarding public adoption. Reflecting on the development and adaptation of AI imaginaries in society, three main foci are currently reflected in research focused on AI stakeholder, the role of media representation, and the public perception of AI.

AI STAKEHOLDER

The representation of different stakeholders, evaluations and specific arguments towards a given topic in public communication is always contested (Ferree et al., 2002; Hilgartner & Bosk, 1988). Stakeholders compete for public attention both for themselves, to be seen as relevant voices, but also for their evaluations and positions towards a given topic, in order to influence public perceptions and decision-makers and, eventually, to shape the developmental path of a given technology (Gerhards & Schäfer, 2006; Schäfer, 2007, 2009).

Many of the respective studies focus only on stakeholders within a specific sector, such as supranational associations, businesses, and governmental actors with individuals or civil society actors with little regards to their differences in power and agency (...). Other literature considering AI more generally are often focused on overarching issues such as AI ethics, trust, and transparency with a strong focus on power disparities, however, not applicably to specific cases (...). Three general AI stakeholder groups can be identified across current research on AI stakeholders: Industry, Governmental, and Civil Society Actors; however, a clearer distinction is often needed for a strong analysis as these stakeholder groups themselves contain a complex network of actors such as different departments, ministries, or advocacy groups.

Industry stakeholders have become dominant in current discourse playing an decisive role in shaping public and political discourse through their dominance in the media representation of AI (Fischer & Puschmann, 2021; Cui & Wu , 2019). „Technology companies [do] not only take over the imaginative power of shaping future society, but also partly absorb public institutions'

ability to govern these very futures" (Mager & Katzenbach, 2021). Through their public facing communication on websites, PR material and social media as well as their political lobbying on regulatory decisions such as the US Bipartisan Innovation Act, USICA, potentially bringing large research investments into AI (Birnbaum, 2022) and the tech lobby trying to shape the EU's digital economy policies (Bank et al., 2021), they actively push their ideal imaginaries of AI to benefit their economic agendas. Current research on AI stakeholders has found a prominence of industry driven imaginaries in different sectors often linked to a strong solutions focus. For example, the believe in an Ed-Tech revolution due to the power of AI (Bulathwela et al., 2021) is currently prominent alongside an imaginary around AI technology moving society into a fourth industrial revolution, which is strongly underpinned by media framing (Vicente & Dias-Trindade, 2021). However, industry stakeholder in AI also have to account for public and political acceptance. Ongoing controversies around AI adoption in various fields have led to shifts in the AI industry towards what has been called a „participatory turn" in designing AI applications (Delgado et al., 2021), including various stakeholders in the development process of AI. Similarly, research shows the need for the inclusion of other stakeholder opinions into the production but also communication around AI to make AI concepts such as explainable AI more comprehensable to the broader public (Brennen, 2020).

Government and supranational governance actors have also established themselves as powerful actors in shaping AI development and AI imaginaries. On the national level, most governments have issued national AI strategies sketching out visions and measures of national AI policy. These strategies constitute "a peculiar hybrid between policy and discourse. They are at the same time tech policy, national strategic positioning and an imaginary of public goods" according to Bareis and Katzenbach's (2021) research into national AI imaginaries present in policy papers. They are reinforcing and shaping existing AI narratives to sketch the horizon of digital futures, and at the same time formulate concrete measures to help arrive at these futures. In Western European policy discourses, AI is construed through sensationalization and mythologizing it "as a salvific force that works for the good of the nation" (Ossewaarde & Gülenç, 2020, p. 54f.). However, the Chinese government is also playing a role in presenting AI as an instrument to boost the country's political influence on the global stage. China's recent uptake in political and regulatory activities with regard to AI strongly contributes to shaping public imaginaries of AI and their negotiation (Zeng et al., 2022; Jing & Lou, 2019). Additionally, national and supranational organizations are launching guidelines and regulatory frameworks for AI development and restrictions on AI operation such as the EU's AI Strategy White Paper (European Commission, 2020). In 2018, the German federal parliament set up a new Inquiry Commission to investigate how AI and algorithmic decision-making will affect society and issued its own national AI strategy (Deutscher Bundestag, 2018). Overall, a general push toward international competitiveness can be observed, but also a reliance on historically grown structures (Savage, 2020), and the demand of citizen empowerment. On the supranational level,

the European Comission (2020) and Organizations of the United Nations (2021) are also partaking in the shaping of AI along different imaginaries.

In recent years, civil society actors and citizens have become part of measures to generate an "AI ecosystem". Previous research already argued that formats of citizen consultation in national AI policies go beyond building trust and reaching legitimacy, as they can be seen as cases of "collective envisioning and imagining" (Paltieli, 2021, p. 6), which outline relationships between the mutual expectations of citizens and governments. Especially regarding ethical concerns and questions of equitability, civil society actors are now considered essential in governing AI as the case of Germany shows (Jones, 2022). But also research into civil society involvement in AI design (Delgado et al., 2021) and AI application and innovative use by disability advocacy groups (El Morr et al., 2021) highlights the shift and need for involving various civil society stakeholders in envisioning (their) futures with AI and other digital technologies (Williams, 2018). Activist groups and civil society organizations play an important role in paving the way for this public engagement not only in the application but the development of AI introducing their own AI ethics and principles as manifests of best practices (...). This stakeholder group, therefore, often focuses on questions of equality, ethics, and power disparities between decision makers such as big corporations and institutions and the lived-experiences and concerns of citizens generally and minority groups specifically. As the AI Now report (Whittaker et al., 2018) stated: "The people most at risk of harm from AI systems are often those least able to contest the outcomes." The visions of desirable futures for (different) citizens, hence, can vary widely from corporate and political stakeholders. Furthermore, current research emphasizes that "AI has complicated the networks between people and technology, but done so unevenly across global regions, so that any kind of activism will demand much more than singular ideologies or a uniformity in action" (Taylor et al., 2021). Considering the current research landscape, there is still a clear lack in studies representing these differences in impact, but also imaginaries around AI and potential futures with AI technology.

MEDIA REPRESENTATION

Media representation plays a crucial role in shaping public perception and, hence, imaginaries of AI, constituting what has been theorized as master fora. However, "while [the media landscape today] still includes news media, those are now available in various online and digital formats, and, most importantly, have been complemented by new online and social media (Kaplan & Haenlein, 2010; Schäfer, 2015). This is particularly true for communication about new technologies: Scholarship has demonstrated that legacy and social media are crucial sources for many people about technological developments in many countries (e.g. Eurobarometer, 2014; Science Board, 2018). Scholars have also shown that different media construct these

technologies differently and that for some of them, pronounced differences exist between countries (for an overview Milde, 2017).

Against this background, it is likely that broader SI – e.g. on the potential development, successes, opportunities and limitations of AI – are strongly influenced by public and particularly media communication.´In the existing studies on media coverage of AI in Europe and the US, researchers have not used imaginaries as a conceptual focus. But they surface that AI is constructed in specific ways in different media and countries, showing, e.g. that AI coverage is often sensationalised (Goode, 2018), industry-driven (Elish and boyd, 2018; Fischer & Puschmann, 2021), and politicised (Brennen et al., 2018). For instance, Elish and boyd's (2018) study on AI rhetoric reveals that the business community is responsible for manufacturing an over-hyped vision of AI, which eagerly focuses on AI's potential while obfuscating its actual methodological capabilities. Similarly, Brennen et al. (2018) found a dominance of industry concerns, such as products and initiatives, among news coverage of AI in the UK. Recent studies of media coverage of AI in China reveal a similar dominance of the private sector in propagating positive discourses around the emerging technology (Zeng et al., 2022; Jing & Lou, 2019; Cui & Wu, 2019). Different central topics and fields of interest from economic to technical and societal relevance, identified in a recent study of the German media discourse by Fischer & Puschmann (2021), are pushed to the foreground especially by dominant industry actors. The study corpus also showed that AI as such has been on the rise since around 2015 highlighting that the term AI itself has been slowly established again to refer to the technological development previously often considered under terms such as algorithms and machine learning. Overall, the changes in media representation reflect a shift in dominant imaginaries of AI towards strong industry associations pushing normative and political debates around ethical concerns and individual rights.

PUBLIC PERCEPTION

The public perception of AI also plays a crucial role as they impact stakeholders in turn by pushing corporate and national agendas as well as advocacy groups (Cave et al., 2018). There have been a number of surveys and studies over the last years exploring the public perception of AI by country, geographic regions such as the EU as well as globally. These studies visualise and map expected benefits and concerns around AI development and implementation but also changes in public visions of AI and accepted, if not desired, futures concerning AI adaptation as well as global differences. Currently, this research is still limited due to its strong focus on a Western and often English-speaking context (Kelley et al., 2021), however, more studies are being conducted across global regions and with non-Western foci such as China.

In the European context, a 2018 UK survey (Holder et al., 2018) found that while the respondents had a broad understanding of AI, there was no indepth understanding of the

technology, which might explain the general lack of understanding of privacy and data production issues. With ambivalent expectations, young people seemed to be more optimistic about AI's application, but the concerns around employments disruptions prevailed across the population mirroring previous studies (Aloy, 2017) expecting more accountability from industry stakeholders. Similarly, a global survey from 2021 including participants from Australia, Canada, the United States, South Korea, France, Brazil, India, and Nigeria, similarly highlighted a global concern for job loss through automation as well as for privacy (Kelley et al., 2021). While AI is expected to impact various sectors of society significantly, the perception of concerns and benefits vary across different sectors of implementation. Across both surveys, AI is consistently perceived ambivalently and ambiguously allowing little grasp on the broad technology for publics across the globe. While there is a wish and potentially even excitement for positive implementation around key terms such as responsible, ethical, and explainable AI (Kelley et al., 2021), especially in the US the perception of potential harms by AI prevail optimistic views (Zhang & Dafoe, 2019). This might be due to public imaginaries of AI being less build on factual knowledge. Rather historical and contemporary popculture strongly perpetuates and informes narratives around AI, which emphasizes the strong sociocultural situatedness of current public perceptions of AI technology in different regions (Cave et al., 2020).

Research into China's AI development and public perception of AI has become a counterpart to the US and Europe centric focus. A study on two chinese social media platforms found a similarly wide range of concerns (Mao & Shi-Kupfer, 2021). In contrast to Western discourses, however, ethical discussions and imaginaries of fairness and bias were not generally addressed but public backlash against specific application resulted in legislative and corporate change. Similarly to social media discourse, journalism played an important role in shaping public perception in China (Cui & Wu, 2019). In turn, the public perception of AI use in chinese journalism found a general acceptance of AI news anchors and application use for news production (Sun et al., 2022), just as AI applications are generally accepted in the medical field (Gao et al., 2020). The same was found in The findings mirror research into different AI narratives impacting the public perception in different global regions where East Asia had a more positive perception of AI and robots through positive popular culture examples, while the western perception was leaning towards fear-inducing portrayals of AI (Cave et al., 2020).

Conclusion

Socio-technical imaginaries – defined as "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" by Sheila Jasanoff (2015: 4) – have become a prominent and powerful analytical lens for the analysis of technological developments. They are embedded in a broader social-theoretical

tradition focusing on the 'imagined' and couple it with pervasive ideas about the sociocultural and sociopolitical co-construction of technologies championed by interdisciplinary fields such as STS or SCOT. As a result, socio-technological imaginaries emphasize the importance of visions of futures surrounding given technologies that can be embedded in different societal realms, can manifest in political decisions as well as popular culture or news media, and that may influence how the public, stakeholders and decision-makers approach the respective technologies.

Arguably, imaginaries are particularly relevant and useful for the analysis of AI – both due to the importance of the technology and its applications and to its (related) pronounced "interpretative flexibility" (Pinch & Bijker, 1984). AI is widely used as a broad umbrella term referring to broad technological fields as well as a to wide range of specific applications.

Accordingly, some scholars have applied the concept of imaginaries already to AI or related applications. They have shown, for example, that national AI strategies strongly build on narratives of functional progress and foreground technological solutionism (Bareis & Katzenbach, 2021), or that AI imaginaries and technological have substantially contributed to the constitution of the research field (Natale & Ballatore, 2017). But so far, the amount of scholarly work systematically applying the concept of imaginaries to AI is comparatively small, focuses on a few select countries such as the US or China, on specific societal fields such as politics or the economy, and on select stakeholders such as politicians or business representatives only.

Furthermore, these studies, in their entirety, also demonstrate that the concept of socio-technological imaginaries – both in general and in its application to AI – would benefit from further conceptual clarification and empirical operationalization. Conceptually, for example, the field would benefit from a clearer delineation of the concept from related, partially overlapping, but not synonymous concepts such as frames, narratives or discourses. The role of pervasive public fora in which imaginaries may manifest themselves, such as political parliaments, news or social media as well as popular culture, should be more clearly articulated conceptually as well. And relatedly, the potential for competing imaginaries surrounding the same technology in the same context at the same time is under-emphasized in the respective literature. Imaginaries of AI (or other technologies) may only become "collectively held [and] institutionally stabilized" after they have been negotiated in institutional or public contexts – and these very negotiations are a promising avenue for future research.

Further readings

Bareis, J., & Katzenbach, C. (2021). Talking AI into Being: The narratives and Imaginaries of national AI strategies and their performative politics. *Science, Technology, & Human Values*, 016224392110300. https://doi.org/10.1177/01622439211030007

Jasanoff, S., & Kim, S.-H. (Eds.) (2015). *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago: University of Chicago Press.

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. https://doi.org/10.1177/1461444820929321

Zeng, J., Chan, C., & Schäfer, M. S. (2022). Contested Chinese Dreams of AI? Public discourse about Artificial intelligence on WeChat and People's Daily Online. *Information, Communication & Society*, 25(3), 319–340. https://doi.org/10.1080/1369118X.2020.1776372

Bibliography

Aloy, J.-B. (2017, November). *Revolution@Work: Fears and expectations - ipsos*. Ipsos. Retrieved June 30, 2022, from https://www.ipsos.com/en/revolutionwork-fears-and-expectations

Anderson, B. (1983). *Imagined communities. Reflections on the origin and spread of nationalism*. London: Verso.

Arriagada, A., & Bishop, S. (2021). Between commerciality and authenticity: The imaginary of social media influencers in the platform economy. *Communication, Culture and Critique*, *14*(4), 568–586. https://doi.org/10.1093/ccc/tcab050

Bank, M., Duffy, F., Leyendecker, V., & Silva, M. (2021). (rep.). *The Lobby Network: Big Tech's Web of Influence in the EU*. Brussels and Cologne: Corporate Europe Observatory and LobbyControl e.V.

Bareis, J., & Katzenbach, C. (2021). Talking AI into Being: The narratives and Imaginaries of national AI strategies and their performative politics. *Science, Technology, & Human Values*, 016224392110300. https://doi.org/10.1177/01622439211030007

Barker, J. (2015). Guerilla engineers: the Internet and the politics of freedom in Indonesia. In: Jasanoff S and Kim SH (eds) *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago; IL; London: University of Chicago Press, pp. 199–218.

Bechmann, A., & Bowker, G. C. (2019). Unsupervised by any other name: Hidden layers of knowledge production in artificial intelligence on social media. *Big Data & Society*, *6*(1), 205395171881956. https://doi.org/10.1177/2053951718819569

Beck, S., Jasanoff, S., Stirling, A., & Polzin, C. (2021). The governance of sociotechnical transformations to sustainability. *Current Opinion in Environmental Sustainability*, *49*, 143–152. https://doi.org/10.1016/j.cosust.2021.04.010

Bijker, W. E. (2012). Social Construction of Technology. In Friis, Jan Kyrre Berg Olsen, S. A. Pedersen, & V. F. Hendricks (Eds.), *A Companion to the Philosophy of Technology*. London & New York: Wiley-Blackwell.

Bijker, W. E., & Law, J. (Eds.) (1992). *Building Society, Shaping Technology*. Cambridge: MIT Press. Blei, D., Bostrom, N. (2014). *Superintelligence: Paths, Dangers, Strategies*. Oxford: Oxford University Press.

Birnbaum, E. (2022, June 29). *The Ai 'Gold Rush' in Washington*. POLITICO. Retrieved June 30, 2022, from https://www.politico.com/newsletters/digital-future-daily/2022/06/29/small-fry-ai-dc-try-00043278?tab=most-read

Brennen, A. (2020). What do people really want when they say they want "explainable ai?" we asked 60 stakeholders. *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems*. https://doi.org/10.1145/3334480.3383047

Brennen, J. S., Howard, P. N., & Nielsen, R. K. (2018). An industry-led debate: How UK media cover artificial intelligence. Available at: https://reutersinstitute.politics.ox.ac.uk/our-research/industry-led-debate-how-uk-media cover-artificial-intelligence

Bolter, J. D. (1986). *Turing's man Western culture in the computer age*. Penguin Books.

Bucher, T. (2016). The algorithmic imaginary: exploring the ordinary affects of Facebook algorithms. *Information, Communication & Society*, *20*(1), 30–44. https://doi.org/10.1080/1369118x.2016.1154086

Bulathwela, S., Pérez-Ortiz, M., Holloway, C., & Shawe-Taylor, J. (2021). Could AI Democratise Education? Socio-Technical Imaginaries of an EdTech Revolution. *arXiv.* https://doi.org/10.48550/arXiv.2112.02034

Cave, S., Craig, C., Dihal, K., Dillon, S., Montgomery, J., Singler, B., & Taylor, L. (2018). (rep.). *Portrayals and perceptions of AI and why they matter*. London.

Cave, S., Monique, D. K. S., & Dillon, S. (2020). *Ai Narratives: A history of imaginative thinking about intelligent machines*. Oxford University Press.

Campolo, A., & Crawford, K. (2020). Enchanted Determinism: Power without Responsibility in Artificial Intelligence. *Engaging Science, Technology, and Society, 6* (2020), 1-19 https://doi.org/10.17351/ests2020.277.

Cardon, D., Cointet J-P., & Mazières, A. (2018). Neurons spike back: the invention of inductive machines and the artificial intelligence controversy. *Réseaux* 211(5): 173.

Chokshi, N. (2019, May 15) Facial Recognition's Many Controversies, From Stadium Surveillance to Racist Software. In *New York Times*. Available at: https://www.nytimes.com/2019/05/15/business/facial-recognition-software controversy.html

Collins, H. M. (1993). *Artificial experts: Social knowledge and intelligent machines*. London: MIT press.

Collins, H. M. (2018). Artifictional Intelligence: Against Humanity's Surrender to Computers. Wiley.

Courtial, J. P., & Law, J. (1989). A co-word study of artificial intelligence. *Social Studies of Science, 19*(2), 301-311.

Cui, D., & Wu, F. (2019). The influence of media use on public perceptions of artificial intelligence in China: Evidence from an online survey. *Information Development*, *37*(1), 45–57. https://doi.org/10.1177/0266666919893411

Deutscher Bundestag (2018). Bericht der Enquete-Kommission Künstliche Intelligenz – Gesellschaftliche Verantwortung und wirtschaftliche, soziale und ökologische Potenziale. Retrieved June 30, 2022, from https://dserver.bundestag.de/btd/19/237/1923700.pdf

Elish, M. C., & Boyd, D. (2018). Situating methods in the magic of Big Data and AI. *Communication monographs*, *85*(1), 57-80.

El Morr, C., Maret, P., Muhlenbach, F., Dharmalingam, D., Tadesse, R., Creighton, A., Kundi, B., Buettgen, A., Mgwigwi, T., Dinca-Panaitescu, S., Dua, E., & Gorman, R. (2021). A virtual community for Disability Advocacy: Development of a searchable artificial intelligence–supported platform. *JMIR Formative Research*, *5*(11). https://doi.org/10.2196/33335

Eurobarometer (2014). *Public Perceptions of Science, Technology and Innovation*. European Commission.

European Commission (2020). *White Paper On Artificial Intelligence - A European approach to excellence and trust*. [White Paper]. Brussels. https://ec.europa.eu/info/sites/default/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf

Felt, U., & Öchsner, S. (2019). Reordering the "world of things": the sociotechnical imaginary of RFID tagging and new geographies of responsibility. *Science and Engineering Ethics* 25: 1425–1446.

Fischer, S., & Puschmann, C. (2021). *Wie Deutschland über Algorithmen schreibt. Eine Analyse des Mediendiskurses über Algorithmen und Künstliche Intelligenz (2005–2020).* Bertelsmann Stiftung.

Gao, S., He, L., Chen, Y., Li, D., & Lai, K. (2020). Public perception of artificial intelligence in medical care: Content analysis of social media. *Journal of Medical Internet Research*, *22*(7). https://doi.org/10.2196/16649

Gerhards, J., & Schäfer, M. S. (2006). *Die Herstellung einer öffentlichen Hegemonie. Humangenomforschung in der deutschen und der US-amerikanischen Presse*. Wiesbaden: Verlag für Sozialwissenschaften.

Goode, L. (2018). Life, but not as we know it: AI and the popular imagination. *Culture Unbound: Journal of Current Cultural Research*, *10*(2), 185-207.

Hilgartner, S., & Bosk, C. L. (1988). The rise and fall of Social Problems: A public arenas model. *American Journal of Sociology*, *94*(1), 53–78. https://doi.org/10.1086/228951

Holder, C., Watts, M., & Khurana, V. (2018). (rep.). *Artificial Intelligence: Public Perception, Attitude and Trust*. London, United Kingdom.

Jasanoff, S., & Kim, S.-H. (2009). Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva, 47*(2), 119–146. https://doi.org/10.1007/s11024-009-9124-4.

Jasanoff, S., & Kim, S.-H. (2013). Sociotechnical Imaginaries and National Energy Policies. *Science as Culture*, *22*(2), 189–196. doi: 10.1080/09505431.2013.786990

Jasanoff, S., & Kim, S.-H. (Eds.) (2015). *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. Chicago: University of Chicago Press.

Jones, M. (2022). Towards Civil Strategization of AI in Germany. *HIIG Discussion Paper Series* 2021-1. 20 pages. https://doi.org/10.5281/zenodo.6091638.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! the challenges and opportunities of social media. *Business Horizons*, *53*(1), 59–68. https://doi.org/10.1016/j.bushor.2009.09.003

Katzenbach, C. (2012). Technologies as Institutions: Rethinking the Role of Technology in Media Governance Constellations. In N. Just & M. Puppis (Eds.), Trends in Communication Policy Research: New Theories, New Methods, New Subjects (pp. 117–138). Intellect.

Kelley, P. G., Yang, Y., Heldreth, C., Moessner, C., Sedley, A., Kramm, A., Newman, D. T., & Woodruff, A. (2022). Exciting, Useful, Worrying, Futuristic: Public Perception of Artificial Intelligence in 8 Countries. Retrieved June 30, 2022, from https://arxiv.org/pdf/2001.00081.pdf

LaRosa, E., & Danks, D. (2018). Impacts on trust of Healthcare AI. *Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society*. https://doi.org/10.1145/3278721.3278771

Law, J., Shankar, K., Hakken, D., Østerlund, C., Wyatt, S., Milojevic, S., . . . Alac, M. (2016). *The Handbook of Science and Technology Studies*. Cambridge: MIT Press.

Lehtiniemi, T., & Ruckenstein, M. (2019). The social imaginaries of data activism. *Big Data & Society*, *6*(1), 205395171882114. https://doi.org/10.1177/2053951718821146

Lösch, A., K. Böhle, C. Coenen, P. Dobroc, A. Ferrari, D. Fuchs, R. Heil, & Hommrich D. (2016). Technikfolgenabschätzung von soziotechnischen Zukünften. Discussion paper no.03/ Dec. 2016. Institut für Technikzukünfte. KIT.

Mackenzie, A. (2017). *Machine learners: Archaeology of a data practice*. The MIT Press.

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.

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. https://doi.org/10.1177/1461444820929321

Meyer, U., & Schulz-Schaeffer, I. (2006). Three Forms of Interpretative Flexibility. *Science, Technology & Innovation Studies*, 2006 (1), 25–40.

Milde, J. (2017). Schlüsseltechnologien in der öffentlichen Kommunikation. In H. Bonfadelli, B. Fähnrich, C. Lüthje, J. Milde, M. Rhomberg, & M. Schäfer (Eds.), *Forschungsfeld Wissenschaftskommunikation* (pp. 373–390). Wiesbaden: Springer.

Mou, Y. (2017). 传播的进化：人工智能将如何重塑人类的交流. Beijing: Tsinghua University Press. Mou, Y. 2020). 从诠释到他异：AI 媒体技术带来的社交与认知变革. 上海师范大学学 *1* (2020)，95-104 National Science Board (2018). *Science and Engineering Indicators 2018*. Washington: NSB. Neverla, I., & Schäfer, M. S. (Eds.) (2012). *Das Medien-Klima*. Wiesbaden: Springer VS.

Natale, S., & Ballatore, A. (2017). Imagining the thinking machine: Technological myths and the rise of artificial intelligence. Convergence: The International Journal of Research into New Media Technologies, 135485651751516. https://doi.org/10.1177/1354856517715164

Science Board (2018). Science and Engineering Indicators 2018. Washington: NSB. Neverla, I., & Schäfer, M. S. (Eds.) (2012). Das Medien-Klima. Wiesbaden: Springer VS.

Olbrich, P., & Witjes, N. (2016). Sociotechnical imaginaries of big data: commercial satellite imagery and its promise of speed and transparency. In: Bunnik A, Cawley A, Mulqueen M, et al. (eds) *Big Data Challenges*. London: Palgrave Macmillan, pp. 115–126.

Ossewaarde, M., & Gulenc, E. (2020). National Varieties of Artificial Intelligence Discourses: Myth, utopianism, and Solutionism in West European policy expectations. *Computer*, *53*(11), 53–61. https://doi.org/10.1109/mc.2020.2992290

Paltieli, G. (2021). The political imaginary of national AI strategies. *AI & SOCIETY*. https://doi.org/10.1007/s00146-021-01258-1

Pinch, T. J., & Bijker, W. E. (1984). The social construction of facts and artefacts: Or how the sociology of science and the sociology of technology might benefit each other. *Social Studies of Science*, 14, 399–441.

Reigeluth, T., & Castelle, M. (2020). What kind of learning is machine learning? *The Cultural Life of Machine Learning*, 79–115. https://doi.org/10.1007/978-3-030-56286-1_3

Rieder, G. (2018). Tracing Big Data Imaginaries through Public Policy: The Case of the European Commission. In A. R. Sætnan, I. Schneider, & N. Green (Eds.), The Politics and Policies of Big Data: Big Data, Big Brother? Routledge. p. 89-109.

Rudek, T. J. (2021). Capturing the invisible. Sociotechnical imaginaries of energy. The Critical Overview. *Science and Public Policy*, *49*(2), 219–245. https://doi.org/10.1093/scipol/scab076

Sadowski, J., & Bendor, R. (2018). Selling smartness: Corporate narratives and the Smart City as a sociotechnical imaginary. *Science, Technology, & Human Values*, *44*(3), 540–563. https://doi.org/10.1177/0162243918806061

Savage, N. (2020). The race to the top among the world's leaders in Artificial Intelligence. *Nature*, *588*(7837). https://doi.org/10.1038/d41586-020-03409-8

Schäfer, M. S. (2007). *Wissenschaft in den Medien. Die Medialisierung naturwissenschaftlicher Themen*. Wiesbaden: Verlag für Sozialwissenschaften.

Schäfer, M. S. (2009). From Public Understanding to Public Engagement: An Empirical Assessment of Changes in Science Coverage. *Science Communication*, *30*(4), 475–505.

Schäfer, M. S. (2015). Digital Public Sphere. In G. Mazzoleni (Ed.), *The International Encyclopedia of Political Communication* (pp. 322–328). London: Wiley-Blackwell.

Simon, J. (2016). Values in design. In *Handbuch Medien-und Informationsethik* (pp. 357–364). Springer.

Suchman, Lucy. 2008. "Feminist STS and the Sciences of the Artificial." In *The Handbook of Science and Technology Studies*, edited by Edward J. Hackett, Olga Amsterdamska, Michael Lynch, and Judy Wajcman, 139-64. Cambridge, MA: MIT Press.

Sun, M., Hu, W., & Wu, Y. (2022). Public perceptions and attitudes towards the application of artificial intelligence in journalism: From a China-based survey. *Journalism Practice*, 1–23. https://doi.org/10.1080/17512786.2022.2055621

Taylor, C. (2003). *Modern social imaginaries*. Durham: Duke University Press.

Taylor, A., Rosner, D., & Wiberg, M. (2021). Ai activism. *Interactions*, *28*(1), 5–5. https://doi.org/10.1145/3442368

United Nations. (2021). (rep.). *United Nations Activities on Artificial Intelligence (AI)*. Geneva, Switzerland: ITU Publications.

Vailionis, I. (2021, September 5). *What's the public's perception of AI: Reshape by Momentive*. Momentive. Retrieved June 30, 2022, from https://www.momentive.ai/en/blog/perception-of-ai/#:~:text=Among%20our%20respo ndents%2C%2039%25%20believe,the%20abilities%20of%20human%20analysts

Van Es, K., & Poell, T. (2020). Platform Imaginaries and Dutch Public Service Media. *Social Media + Society*, *6*(2), 205630512093328. https://doi.org/10.1177/2056305120933289

Vicente, P. N., & Dias-Trindade, S. (2021). Reframing sociotechnical imaginaries: The case of the fourth industrial revolution. *Public Understanding of Science*, *30*(6), 708–723. https://doi.org/10.1177/09636625211013513

Wellner, G., & Rothman, T. (2019). Feminist AI: Can We Expect Our AI Systems to Become Feminist?*Philosophy & Technology,1* (12)*: 1-15.

Whittaker, M., Crawford, K., Dobbe, R., Fried, G., Kaziunas, E., Mathur, V., Myers West, S., Richardson, R., Schultz, J., & Schwartz, O. (2018). (rep.). *AI Now Report 2018*.

Williams, K. C. (2018). Intersections of Technology and Civil Society. K4D Helpdesk Report 448. Brighton, UK: Institute of Development Studies

Winner, L. (2010). *The whale and the reactor: A search for limits in an age of high technology*: University of Chicago Press.

Woolgar, S. (1985). Why not a sociology of machines? The case of sociology and artificial intelligence. Sociology, 19(4), 557-572.

Zeng, J., Chan, C., & Schäfer, M. S. (2022). Contested Chinese Dreams of AI? Public discourse about Artificial intelligence on WeChat and People's Daily Online. Information, Communication & Society, 25(3), 319–340. https://doi.org/10.1080/1369118X.2020.1776372

Zhang, B., & Dafoe, A. (2019). Artificial Intelligence: American attitudes and Trends. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3312874

Zou, J., & Schiebinger, L. (2018). AI can be sexist and racist—it's time to make it fair. *Nature 559* (2018), 324-326.