Towards ecosystems for responsible AI

Expectations on sociotechnical systems, agendas and networks in EU documents

Matti Minkkinen[1][0000-0002-6406-8093], Markus Philipp Zimmer[1][0000-0003-1499-5427] and Matti Mäntymäki[1][0000-0002-1981-566X]

[1] University of Turku, 20014 Turku, Finland
matti.minkkinen@utu.fi

Abstract. Governing artificial intelligence (AI) requires multi-actor cooperation, but what form could this cooperation take? In recent years, the European Union (EU) has made significant efforts to become a key player in establishing responsible AI. In its strategy documents on AI, the EU has formulated expectations and visions concerning ecosystems for responsible AI. This paper analyzes expectations on potential responsible AI ecosystems in five key EU documents on AI. To analyze these documents, we draw on the sociology of expectations and synthesize a framework comprising cognitive and normative expectations on sociotechnical systems, agendas and networks. We found that the EU documents on responsible AI feature four interconnected themes, which occupy different positions in our framework: 1) trust as the foundation of responsible AI (cognitive–sociotechnical systems), 2) ethics and competitiveness as complementary (normative–sociotechnical systems), 3) European value-based approach (normative–agendas), and 4) Europe as global leader in responsible AI (normative–networks). Our framework thus provides a mapping tool for researchers and practitioners to navigate expectations in early ecosystem development and help decide what to do in response to articulated expectations. The analysis also suggests that expectations on emerging responsible AI ecosystems have a layered structure, where network building relies on expectations about sociotechnical systems and agendas.

Keywords: artificial intelligence, artificial intelligence governance, AI, AI governance, ecosystems.

1 Introduction: responsible artificial intelligence

Reaping the opportunities of artificial intelligence (AI) requires that the various stakeholders involved in AI-based or AI-assisted decision-making can trust the decisions and actions taken by the algorithms [1]. Thus, at an organizational level, socially responsible use of AI requires ethical guidelines and governance approaches [2, 3]. At the same time, however, governance of AI and the promotion of its socially responsible development and use are large-scale challenges that transcend beyond organizational boundaries. Therefore, it is likely that a broad network of diverse actors is required for

promoting responsible development and use of AI [1, cf. 4]. We argue that this calls for ecosystems for responsible AI [5]. While previous authors have studied systemic approaches to regulation [6], the ethics of algorithmic systems and assemblages [7, 8] and multi-actor approaches to operationalizing AI ethics [9], the concept of ecosystems for responsible AI is a novel contribution to the literature on AI governance in multi-actor networks [4, 9, 10].

Despite the academic, policy and popular interest in the topic, responsible AI has not yet consolidated into a fully-fledged market or multi-actor ecosystem. The reasons for this can only be hypothesized at this point. One possibility is that the business value of responsible AI is still relatively diffuse. There may also be differing views on the roles of actors, and different answers to the question *who* should ensure responsible use of AI and *how*. Nevertheless, this paper starts from the premise that at present, ecosystems for responsible AI exist in *expectations,* i.e., actors' ideas, beliefs and statements about possible future opportunities, issues and networks.

Based on the number of recent high-profile strategies, events and statements, as well as the proposed Artificial Intelligence Act published on April 21, 2021, the European Union (EU) is clearly a key actor in establishing a network for responsible AI [11–13]. There is a strong policy push within the EU for articulating coherent AI policy and regulation and to operate within a field of global actors [cf. 14] that promote trustworthy AI and the governance of AI. Therefore, it is particularly important to study the views of EU decision-makers and experts.

Against this backdrop, the purpose of this paper is to *analyze the expectations on potential responsible AI ecosystems inscribed in key EU strategy documents on AI.* We conducted a qualitative analysis of five key EU documents on AI strategy. First, our study shows that the EU approach to responsible AI comprises four complementary themes: 1) trust as the foundation of responsible AI, 2) ethics and competitiveness as complementary, 3) European value-based approach, and 4) Europe as global leader in responsible AI. Second, we categorize and position these themes as different kinds of expectations. To this end, we introduce a framework differentiating between normative and cognitive expectations on sociotechnical systems, agendas and networks. This framework offers researchers and ecosystem stakeholders a mapping tool to dissect, comprehend and act upon expectations regarding emerging ecosystems of responsible AI. Further, beyond identifying themes within the EU documents, it foregrounds the normative and cognitive expectations that shape the ecosystems' emergence.

2 Expectations and ecosystems

2.1 Ecosystem for responsible AI

The conceptualization of a responsible AI network as an *ecosystem* requires some justification. In recent years, there has been rising scholarly interest in the theme of ecosystems, which are generally identified as somewhat organically developing network structures with some degree of coordination as opposed to purely horizontal networks of peers. In the scholarly literature, numerous literature streams on ecosystems have been identified, and different categorizations have been suggested [15, cf. 16].

Jacobides, Cennamo and Gawer [5] propose a core of three streams: business ecosystems, innovation ecosystems and platform ecosystems. Aarikka-Stenroos and Ritala [17] add entrepreneurial/start-up ecosystems and service ecosystems to the list. Tsujimoto, Kajikawa, Tomita and Matsumoto [18], in turn, add the industrial ecology perspective and the multi-actor network to the streams of business ecosystems and platforms. The multi-actor network perspective emphasizes the heterogeneity of actors with different operating logics as well as dynamic and complex interlinkages.

The multi-actor network perspective fits best to the current state of the responsible AI landscape. While large technology companies may orchestrate subsystems and organizations such as the EU institutions may be aspiring orchestrators, no single firm or public organization orchestrates the responsible AI landscape. Centering the ecosystem around a particular product/service system [18] may be premature as the activities and innovations around responsible AI are still emerging. However, the notion of ecosystems centered around a core *value proposition* is a valuable addition to the multi-actor view [5, 19]. According to this perspective, an ecosystem strives to produce something valuable, from a business perspective or societal perspective, or both.

2.2 Expectations on sociotechnical systems, agendas and networks

While AI ecosystems have been discussed [20] and AI ethics involves networked practices [21], at present ecosystems for responsible AI are emerging and mostly exist in expectations. Expectations can be defined as "the images actors form as they consider future states of the world, the way they visualize causal relations, and the ways they perceive their actions influencing outcomes" [22]. In innovation studies, expectations are seen as performative, i.e., they influence action, and they are seen to play a key role in agenda-building and mobilizing resources in innovation networks [23]. Expectations may have a factual basis, but under conditions of uncertainty, they include elements of invention and they are sustained by a storyline, which enables actors to behave as if those expectations were real [22]. Understood as cognitive framings, expectations may be relatively transitory and situation-specific. However, expectations are also externalized as material representations: in documents and material objects [23, 24]. These 'embedded expectations' may be fruitfully studied using document analysis [25, 26].

We analyze EU documents to unpack expectations on sociotechnical systems, agendas and networks related to responsible AI. In the early development stage of an emerging ecosystem, expectations lay out a more or less articulated vision or blueprint for the networks that actors aim to establish.

In the analysis, we combine two analytical frameworks. Firstly, the framework presented by van Merkerk and Robinson [27] highlights the importance of expectations, agendas and networks in the emergence of sociotechnical paths. These three categories capture essential elements for understanding how expectations lead towards agenda-setting and network formation. Expectations are shared beliefs on prospective entities and positions in a network which does not yet exist [27]. Agendas are sets of priorities that guide actors, thus moving from beliefs towards action [27]. Finally, networks may mean emerging patterns of networking, but more importantly, in this context they mean beliefs about current and coming network dynamics [27]. We modify this framework

by focusing the first category specifically on sociotechnical systems, because we interpret 'expectations' as the top-level concept, and expectations may concern sociotechnical systems, agendas and networks.

Secondly, we utilize the differentiation between cognitive and normative ideas presented in Vivien Schmidt's "discursive institutionalism" [28]. This distinction is useful, because responsible AI carries strong ethical and social norm components, and because expectations are often "moralized", i.e., connected to widely shared values to aid adoption [29]. According to Schmidt, there are cognitive and normative ideas embedded in policies and programs. Cognitive ideas offer solutions, define problems and link to more generic principles. Normative ideas, in turn, relate to how policies and programs meet aspirations, ideals and norms [28]. This combination of frameworks is operationalized in the next section as a heuristic framework for categorizing expectation statements. We argue that placing expectation statements into distinct categories helps researchers as well as stakeholders involved in building the responsible AI ecosystem to navigate the "sea of expectations" [30] coming from regulators. Ultimately, it can help stakeholders to decide what to do, and what not to do, in response to these expectations.

3 Material and methods: categorizing expectation statements

To identify and categorize expectations toward responsible AI, we analyze documents published by the EU on its AI strategy. The EU publishes reports, white papers and blueprints for AI ecosystems founded on "European values" which are often thought to include human dignity and privacy protection [1, 31]. This renders the EU and its documents on its envisioned AI approach a relevant case to identify expectations on sociotechnical systems, agendas, and networks related to responsible AI.

3.1 Empirical material: Documents on the EU approach to responsible AI

When 25 European countries, on April 10, 2018, signed a Declaration of Cooperation on Artificial Intelligence, a coordinated EU approach to AI took flight. The declaration emphasizes cross-border cooperation to ensure Europe's competitiveness in research and deployment of AI, to profit from AI's business opportunities, and to consider societal, ethical and legal questions.[1] With this declaration, and the many documents that followed it, the EU aspires to be a key player in defining rules related to digitalized societies. On this backdrop, we collected five key AI strategy documents which the European Commission published in 2018–2020. These documents are: 1. *Artificial intelligence for Europe (2018), 2. Coordinated plan on artificial intelligence (2018), 3. Ethics guidelines for trustworthy AI (2019), 4. Building trust in human-centric artificial intelligence (2019), 5. White paper on artificial intelligence (2020).*

[1] https://ec.europa.eu/digital-single-market/en/news/eu-member-states-sign-cooperate-artificial-intelligence

The selected documents externalize the EU institutions and related experts' (the High-Level Expert Group) expectations on sociotechnical systems, agendas and networks related to responsible AI. These documents present naturally occurring data that was produced in the context of the ongoing EU strategy process on AI. As such, they lay out the vision and blueprint for the European approach to responsible AI and thus, offer invaluable insights into potential multi-actor networks of responsible AI.

3.2 Analysis

Analyzing the documents, we started from the six categories outlined in the analytical framework comprising cognitive and normative statements on sociotechnical systems, agendas and networks (**Table 1**). This framework served as a tool to select relevant statements from the documents, which we then categorized under one of the six categories. Next, we condensed each category's excerpts to identify themes. These themes summarize the material and present condensed meaning units [32] which are close to the original wording. For example, we coded the statement "Like the steam engine or electricity in the past, AI is transforming our world, our society and our industry" [33] as 'Transformative potential of AI', and "The EU will continue to cooperate with like-minded countries, but also with global players, on AI, based on an approach based on EU rules and values" [1] as 'Value-based cooperation'.

Table 1. Analytical framework

	Sociotechnical systems	**Agendas**	**Networks**
Cognitive expectations	Beliefs about responsible AI and future developments	Statements on how the EU intends to approach and tackle issues	Beliefs about current and future networks on AI
Normative expectations	Normatively evaluated beliefs and connections to ideals, aspirations and values	Evaluative agenda statements and connections to ideals, aspirations and values	Evaluative statements on networks and connections to ideals, aspirations and values

We followed an abductive approach in the analysis [34], continuously making sense of the statements using the analytical framework in **Fig. 1**. Therefore, the map of the findings should be read as a sensemaking device that illustrates views expressed in the documents [cf. 35]. The positioning of the themes within the categories is equally important as the themes themselves. We limited our analysis to statements about sociotechnical systems, agendas and networks and excluded statements of specific plans and activities, because they are on a different level of analysis.

4 Results

The analysis of the selected EU documents reveals expectations that revolve around four key themes (see **Fig. 1**): 1) trust as the foundation of responsible AI, 2) ethics and competitiveness as complementary, 3) a European value-based approach, and 4) Europe as global leader in responsible AI. The results are presented through these four key themes and in relation to their position within our analytical framework.

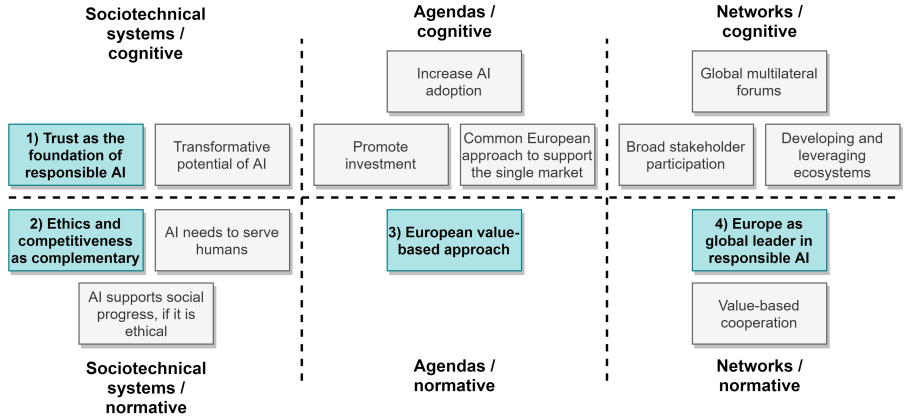

Fig. 1. Map of the themes in the analyzed EU documents, key themes are in bold and numbered

4.1 Cognitive expectations on sociotechnical systems: Trust as the foundation of responsible AI

Trust and trustworthiness are central themes in the documents, and they contain beliefs about how trust operates in complex systems. In the documents trust is connected to many other topics. The documents mention trust as a prerequisite for the uptake of digital technology [1], for the development, deployment and use of AI systems [12] and for a human-centric approach to AI [37]. The uptake of AI is seen as particularly important, with one document arguing for "the broadest possible uptake of AI in the economy, in particular by start-ups and small and medium-sized enterprises" [38]. In turn, trust in AI is fostered by a clear regulatory framework [1], evaluation by auditors [12], explainability [33], responsible data management [1] and an ethical approach to AI [37]. Trustworthiness is seen to require a holistic approach that takes into account the entire sociotechnical context, actors and processes [12], also expressed in the idea of an "ecosystem of trust" [1] or "environment of trust and accountability" [33].

Trust ties into the theme of developing and leveraging ecosystems, placed under 'networks/cognitive' in **Fig. 1**. Europe's "world-leading AI research community", deep-tech startups [33] and the General Data Protection Regulation (GDPR) as an "anchor of trust" [38] provide a basis for creating synergies between research centers and developing a "lighthouse center" to coordinate efforts [1]. From the ecosystem perspective, trust between actors is an established theme in research [e.g. 18].

The cognitive expectations on trust build the basis for the transformative potential of AI to be realized in Europe and for AI to support social progress, including achieving sustainable development goals, tackling inequality and promoting social rights. The documents position AI as supporting desirable outcomes, if it is trustworthy and ethical. As a cognitive expectation, the trust theme underpins the normative expectations on sociotechnical systems as well as the agenda and network statements.

4.2 Normative expectations on sociotechnical systems: Ethics and competitiveness as complementary

The second central theme is the normative idea that ethics and competitiveness support each other. The concept of "responsible competitiveness" summarizes this idea well [12]. The "Building trust in human-centric artificial intelligence" document states the expectations around ethical AI in particularly clear terms:

> *"Ethical AI is a win-win proposition. Guaranteeing the respect for fundamental values and rights is not only essential in itself, it also facilitates acceptance by the public and increases the competitive advantage of European AI companies by establishing a brand of human-centric, trustworthy AI known for ethical and secure products."* [37]

The document also states that economic competitiveness and societal trust must start from the same fundamental values [37]. Further, the documents argue that the "sustainable approach" to technologies creates a competitive edge for Europe [33]. The European approach aims to promote Europe's innovation capacity while supporting ethical and trustworthy AI [1].

The 'win-win' position essentially claims that strong ethical values create an appealing brand for European businesses. As Floridi [39] puts it, "the EU wants to determine a long-term strategy in which ethics is an innovation enabler that offers a competitive advantage, and which ensures that fundamental rights and values are fostered". This argument makes sense in the context of an initial predominantly negative European Parliament discussion on AI regulation, and the twin strategic EU objectives of protecting citizens and enabling competitiveness [13]. In the background, the documents reveal concern over increasing global competition, which in the literature is often called an "AI race" [36]. The documents depict Europe as falling behind in private investments in AI, and that without major effort, the EU risks missing many of the opportunities offered by AI [38]. The notion of ethics and competitiveness as complementary can be questioned, for instance on the grounds that it may obscure issues of power and conflicts [40]. On the other hand, the importance of trust is widely recognized and trust is also seen to have economic value [36]. Trust could thus be seen as a bridge between ethical and economic concerns.

On an analytical level, the normative expectations on sociotechnical systems represent the foundations of the EU expectations. Compared to cognitive expectations, the normative expectation of ethics and competitiveness brings the evaluative stance and connection to fundamental values. Ethics and competitiveness are not simply believed to go hand in hand, but this union is also based on shared European values.

4.3 Normative expectations on agendas: European value-based approach

The EU documents express a strong sense of seeking a distinct European path or vision to approach AI. A common approach is sought to avoid fragmentation and regulatory uncertainty, but equally important is the emphasis on the ethical foundations of the European approach. Since AI is seen to have major societal impacts and building trust is essential, the preferred European AI approach is seen as grounded in European values, fundamental rights, human dignity and privacy protection [1]. The European approach is framed as human-centric and inclusive. Democracy and rule of law are seen as underpinning AI systems and enabling "responsible competitiveness" [12]. Core societal values are argued to provide a distinctive "trademark for Europe and its industry" in the field of AI [37]. This quest for a European approach rooted in ethics and fundamental rights sets the normative agenda that underpins measures such as public investments and drafting regulatory frameworks.

Turning to the analytical framework, the normative expectations on agendas provide a desired direction of action. While cognitive agendas outline the means, the normative agenda connects the means to a broader value-based project. It could be compared to an organizing vision [41] or a sociotechnical imaginary [42]. However, further theoretical development is beyond the scope of this paper.

4.4 Normative expectations on networks: Europe as global leader in responsible AI

The EU documents frame Europe as a potential global leader in responsible AI. According to the documents, Europe is "well positioned to exercise global leadership in building alliances around shared values" [1], the EU is "well placed to lead this debate on the global stage" [33] and can "be the champion of an approach to AI that benefits people and society as a whole" [33]. Europe is seen to provide a unique contribution to the global debate and to provide a strong regulatory framework that sets the global standard [37]. The strong attachment to values and rule of law and the human-centric approach to AI are seen as core strengths that enable Europe to promote responsible AI on the global stage. According to the High-Level Expert Group, placing the citizen at the heart of endeavors is "written into the very DNA of the European Union through the Treaties upon which it is built", which enables building leadership in innovative AI systems [12].

Cooperation is mentioned particularly with like-minded countries and those willing to share the same values, but also with global players generally [1, 38]. The documents view only global solutions as ultimately sustainable [33], and they mention global forums such as UNESCO, OECD, WTO and the International Telecommunications Union as key arenas [1].

From the ecosystem perspective, the visions promoted by the EU institutions and the High-Level Expert Group place the EU as the leader of the responsible AI ecosystem. Moreover, in order for the ecosystem to be sustainable, the vision of responsible AI needs to be exported globally. This ties into the concept of "normative power Europe",

where the role of the EU is argued to be based on influencing ideas and norms in addition to civilian and military power [43]. However, this raises the question of values from other regions of the world. Smuha [36] notes that regional diversity may be needed in some aspects of regulation, and that global "regulatory co-opetition" may be preferable to global convergence.

The themes in the normative networks category tie the EU documents to the emergence of ecosystems for responsible AI. They envision the networks that can be built based on the statements about sociotechnical systems and agendas. Again, the normative dimension is particularly interesting, because it highlights the ecosystem around *responsible* AI rather than the broader AI ecosystem. In the notion of an "ecosystem of trust" alongside an "ecosystem of excellence" [1], the documents' storyline connects back to the cognitive expectations on the foundational role of trust in the sociotechnical system. EU as a global leader in responsible AI represents the culmination of this storyline, and it requires the achievement of the other themes, such as increasing AI adoption and stimulating investment.

5 Discussion and conclusion

This paper was set out to *analyze the expectations on potential responsible AI ecosystems inscribed in key EU strategy documents on AI*. Responsible AI ecosystems are being configured and planned in sets of expectations. The analysis in this paper reveals that the EU raises building trust, speeding up adoption at home and spreading the word on the global stage as key themes for building responsible AI ecosystems. This resembles a hero narrative. In expectations, AI holds great transformative potential if it is broadly adopted but requires taming to avoid risks and support societal progress. This is where normative expectations on sociotechnical systems and agendas come into the picture. According to the documents, the potential of AI can be unlocked in a responsible way, if a European approach grounded in broadly accepted values, fundamental rights and a human-centric perspective is found. As the hero in this narrative, Europe can export its approach globally and develop appealing AI products and services to global markets. The following sections outline implications of the key findings followed by limitations and future research directions.

5.1 Implications of key findings

We highlight two important implications stemming from our analysis. Firstly, the framework for categorizing statements provides a mapping tool for researchers and practitioners. In the early steps of building an ecosystem, stakeholders have expectations on building and understanding the ecosystem. Our categorization of expectations into cognitive and normative expectations on sociotechnical systems, agendas and networks provides a map to this "sea of expectations" [30]. Positioning themes within this framework, we provide insight into their nature as different kinds of expectations, as well as their positions within a set of expectations. While existing literature on AI regulation [36, 40, 44] has identified similar themes, our framework helps to prioritize and

respond to the inscribed expectations. For example, technology providers may assign more weight to trust when they see its links to normative agendas and network-building on the European and global level. This may mean that these providers invest more effort into ensuring trust in AI technology in design and development work, because it is important for particular solutions' acceptance and for the feasibility of a responsible approach to AI.

Secondly, the analysis suggests that the EU expectations on responsible AI ecosystems have a layered structure. In the first layer, expectations on trust, ethics and the potential of AI provide a shared basis for action. The second layer consists of the envisioned European approach, which provides a normative project or vision and a geographical delimitation. Both of these are required for the final layer, the goal of Europe as a global leader on responsible AI, which extends from Europe as the central actor to global networks and provides a resolution to the storyline. The articulation of an "imagined ecosystem" thus draws on both shared beliefs and a desired normative direction [cf. 41]. This layered structure, drawing on the framework of sociotechnical systems, agendas and networks, could inform ecosystem design [18] and enable ecosystem designers to reflexively consider respective expectations.

5.2 Limitations

Our study is based on qualitative analysis of five key documents, and this approach naturally comes with some limitations. The limited number of documents may not offer a full understanding of the context in which certain questions are raised. On the other hand, contextual investigation could be extended practically without limit, and the documents offer a fruitful starting point. As complementary material, interviews with stakeholders would provide insights to the processes behind policy documents. Our approach also assumes that a coherent storyline can be traced, and subsequent work could look at possible contradictions, especially considering that the High-Level Expert Group on Artificial Intelligence consisted of 52 experts.

5.3 Future research directions

In future research, it is important to study concrete outcomes in terms of networks that promote responsible AI and new business models and service offerings that enable responsible AI practices. The set of expectations articulated by the documents has implications for company business models and emerging products and services that address responsible AI challenges. The responsible AI ecosystem could enable new business models in AI auditing and consulting, for instance, as well as challenging business models that are premised on ethically problematic practices.

The framework proposed in this paper opens new research directions into the role of expectations in ecosystem development. This study provides a snapshot of the EU's discussion on AI, and statements on sociotechnical systems, agendas and networks. The same categories of expectations could be traced in different regions and longitudinally over time for cross-regional or historical comparison. Moreover, the framework could lend itself to other studies of ecosystems emerging around new technological artefacts.

AI use will certainly continue to grow in a variety of domains such as healthcare and transport, but the development of ethical and governance frameworks contains many open questions. The expectations outlined here may be implemented to a different extent by policymakers, companies and others. In future research, the question of plausibility for different stakeholders could be considered. For instance, how do investors view the promise of responsible AI ecosystems? How do managers in different fields approach the promise of uniting ethical and business considerations?

Future directions of responsible AI ecosystems are made in the present, in expectations and actions. Now is the time to ensure a desirable direction for AI use, before path dependencies are set in force and it becomes difficult to change course. Fostering a viable ecosystem for responsible AI is a fundamental question from both economic and ethical perspectives.

References

1. European Commission: WHITE PAPER On Artificial Intelligence - A European approach to excellence and trust. (2020).
2. Dignum, V.: Responsibility and Artificial Intelligence. In: Dubber, M.D., Pasquale, F., and Das, S. (eds.) The Oxford Handbook of Ethics of AI. pp. 213-231. Oxford University Press (2020). https://doi.org/10.1093/oxfordhb/9780190067397.013.12.
3. Jobin, A., Ienca, M., Vayena, E.: The global landscape of AI ethics guidelines. Nat Mach Intell. 1, 389-399 (2019). https://doi.org/10.1038/s42256-019-0088-2.
4. Yeung, K., Howes, A., Pogrebna, G.: AI Governance by Human Rights-Centered Design, Deliberation, and Oversight: An End to Ethics Washing. In: Dubber, M.D., Pasquale, F., and Das, S. (eds.) The Oxford Handbook of Ethics of AI. pp. 75-106. Oxford University Press (2020). https://doi.org/10.1093/oxfordhb/9780190067397.013.5.
5. Jacobides, M.G., Cennamo, C., Gawer, A.: Towards a theory of ecosystems. Strategic Management Journal. 39, 2255-2276 (2018). https://doi.org/10.1002/smj.2904.
6. Kaminski, M.E.: Binary Governance: Lessons from the GDPR's Approach to Algorithmic Accountability. Southern California Law Review. 92, 1529-1616 (2019).
7. Ananny, M., Crawford, K.: Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability. New Media & Society. 20, 973-989 (2018). https://doi.org/10.1177/1461444816676645.
8. Osoba, O.A., Boudreaux, B., Yeung, D.: Steps Towards Value-Aligned Systems. In: Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society. pp. 332-336. ACM, New York NY USA (2020). https://doi.org/10.1145/3375627.3375872.
9. Morley, J., Elhalal, A., Garcia, F., Kinsey, L., Mokander, J., Floridi, L.: Ethics as a service: a pragmatic operationalisation of AI Ethics. Social Science Research Network, Rochester, NY (2021).
10. Gasser, U., Almeida, V.A.F.: A Layered Model for AI Governance. IEEE Internet Comput. 21, 58-62 (2017). https://doi.org/10.1109/MIC.2017.4180835.
11. European Commission: Proposal for a Regulation laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) | Shaping Europe's digital future,

https://digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence-artificial-intelligence, last accessed 2021/05/04.
12. High-Level Expert Group on Artificial Intelligence: Ethics Guidelines for Trustworthy AI, https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=60419, (2019).
13. Renda, A.: Europe: Toward a Policy Framework for Trustworthy AI. In: Dubber, M.D., Pasquale, F., and Das, S. (eds.) The Oxford Handbook of Ethics of AI. pp. 649-666. Oxford University Press, Oxford (2020). https://doi.org/10.1093/oxfordhb/9780190067397.013.41.
14. Butcher, J., Beridze, I.: What is the State of Artificial Intelligence Governance Globally? The RUSI Journal. 164, 88-96 (2019). https://doi.org/10.1080/03071847.2019.1694260.
15. Mäntymäki, M., Salmela, H.: In search for the core of the business ecosystem concept: a conceptual comparison of business ecosystem, industry, cluster, and inter organizational network. In: Proceedings of the 9th International Workshop on Software Ecosystems, CEUR-WS. pp. 103-113 (2017).
16. Hyrynsalmi, S., Mäntymäki, M.: Is Ecosystem Health a Useful Metaphor? Towards a Research Agenda for Ecosystem Health Research. In: Al-Sharhan, S.A., Simintiras, A.C., Dwivedi, Y.K., Janssen, M., Mäntymäki, M., Tahat, L., Moughrabi, I., Ali, T.M., and Rana, N.P. (eds.) Challenges and Opportunities in the Digital Era. pp. 141-149. Springer International Publishing, Cham (2018). https://doi.org/10.1007/978-3-030-02131-3_14.
17. Aarikka-Stenroos, L., Ritala, P.: Network management in the era of ecosystems: Systematic review and management framework. Industrial Marketing Management. 67, 23-36 (2017). https://doi.org/10.1016/j.indmarman.2017.08.010.
18. Tsujimoto, M., Kajikawa, Y., Tomita, J., Matsumoto, Y.: A review of the ecosystem concept – Towards coherent ecosystem design. Technological Forecasting and Social Change. 136, 49-58 (2018). https://doi.org/10.1016/j.techfore.2017.06.032.
19. Adner, R.: Ecosystem as Structure: An Actionable Construct for Strategy. Journal of Management. 43, 39-58 (2017). https://doi.org/10.1177/0149206316678451.
20. Quan, X.I., Sanderson, J.: Understanding the Artificial Intelligence Business Ecosystem. IEEE Engineering Management Review. 46, 22-25 (2018). https://doi.org/10.1109/EMR.2018.2882430.
21. Orr, W., Davis, J.L.: Attributions of ethical responsibility by Artificial Intelligence practitioners. Information, Communication & Society. 23, 719-735 (2020). https://doi.org/10.1080/1369118X.2020.1713842.
22. Beckert, J.: Imagined Futures: Fictional Expectations and Capitalist Dynamics. Harvard University Press, Cambridge, Massachusetts (2016).
23. Borup, M., Brown, N., Konrad, K., Lente, H.V.: The Sociology of Expectations in Science and Technology. Technology Analysis & Strategic Management. 18, 285-298 (2006). https://doi.org/10.1080/09537320600777002.
24. Mische, A.: Measuring futures in action: projective grammars in the Rio + 20 debates. Theory and Society. 43, 437-464 (2014). https://doi.org/10.1007/s11186-014-9226-3.
25. Linders, A.: Documents, texts, and archives in constructionist research. In: Holstein, J.A. and Gubrium, J.F. (eds.) Handbook of Constructionist Research. pp. 467-490. Guilford Press, New York (2008).
26. Prior, L.: Repositioning Documents in Social Research. Sociology. 42, 821-836 (2008). https://doi.org/10.1177/0038038508094564.

27. van Merkerk, R.O., Robinson, D.K.R.: Characterizing the emergence of a technological field: Expectations, agendas and networks in Lab-on-a-chip technologies. Technology Analysis & Strategic Management. 18, 411-428 (2006). https://doi.org/10.1080/09537320600777184.
28. Schmidt, V.A.: Discursive institutionalism: the explanatory power of ideas and discourse. Annual Review of Political Science. 11, 303-326 (2008). https://doi.org/10.1146/annurev.polisci.11.060606.135342.
29. Berkhout, F.: Normative expectations in systems innovation. Technology Analysis & Strategic Management. 18, 299-311 (2006). https://doi.org/10.1080/09537320600777010.
30. van Lente, H.: Navigating foresight in a sea of expectations: Lessons from the sociology of expectations. Technology Analysis and Strategic Management. 24, 769-782 (2012). https://doi.org/10.1080/09537325.2012.715478.
31. Floridi, L.: On human dignity as a foundation for the right to privacy. Philosophy and Technology. 29, 307-312 (2016). https://doi.org/10.1007/s13347-016-0220-8.
32. Graneheim, U.H., Lundman, B.: Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Education Today. 24, 105-112 (2004). https://doi.org/10.1016/j.nedt.2003.10.001.
33. European Commission: Artificial Intelligence for Europe. (2018).
34. Tavory, I., Timmermans, S.: Abductive analysis: theorizing qualitative research. The University of Chicago Press, Chicago (2014).
35. Ramos, C., Ford, I.D.: Network pictures as a research device: Developing a tool to capture actors' perceptions in organizational networks. Industrial Marketing Management. 40, 447-464 (2011). https://doi.org/10.1016/j.indmarman.2010.07.001.
36. Smuha, N.A.: From a 'race to AI' to a 'race to AI regulation': regulatory competition for artificial intelligence. Law, Innovation and Technology. 13, 57-84 (2021). https://doi.org/10.1080/17579961.2021.1898300.
37. European Commission: Building Trust in Human-Centric Artificial Intelligence. (2019).
38. European Commission: Coordinated Plan on Artificial Intelligence. (2018).
39. Floridi, L.: Establishing the rules for building trustworthy AI. Nature Machine Intelligence. 1, 261-262 (2019). https://doi.org/10.1038/s42256-019-0055-y.
40. Veale, M.: A Critical Take on the Policy Recommendations of the EU High-Level Expert Group on Artificial Intelligence. European Journal of Risk Regulation. 1-10 (2020). https://doi.org/10.1017/err.2019.65.
41. Burton Swanson, E., Ramiller, N.C.: The Organizing Vision in Information Systems Innovation. Organization Science. 8, 458-474 (1997). https://doi.org/10.1287/orsc.8.5.458.
42. Jasanoff, S.: Future Imperfect: Science, Technology, and the Imaginations of Modernity. In: Jasanoff, S. and Kim, S.-H. (eds.) Dreamscapes of Modernity. pp. 1-33. University of Chicago Press, Chicago (2015).
43. Manners, I.: Normative Power Europe: A Contradiction in Terms? JCMS: Journal of Common Market Studies. 40, 235-258 (2002). https://doi.org/10.1111/1468-5965.00353.
44. Jabłonowska, A., Kuziemski, M., Nowak, A.M., Micklitz, H.-W., Palka, P., Sartor, G.: Consumer law and artificial intelligence : challenges to the EU consumer law and policy stemming from the business' use of artificial intelligence : final report of the ARTSY project. (2018).