The role of digital technologies in global climate negotiations

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A B S T R A C T

Digital technologies are increasingly used in global climate negotiations to enhance interaction and participation. However, global climate negotiations are characterized by paradoxes and tensions that complicate the resolution of the problem. Thus, the use of digital technologies can only be effective if orchestrated with an understanding of underlying global climate negotiations paradoxes. The objective of this paper is to identify research needs related to the intersection of global climate negotiations, paradoxes, and the use of digital technologies. We propose a research agenda based on paradoxes of global climate negotiations at different levels of online interaction. Two streams of research inform our research agenda: paradox theory and research on online communities. We illustrate our reasoning by discussing digital support for the United Nation's Conference of the Parties (COP) meetings for climate negotiations. The research agenda contributes to the digital governance field by sensitizing the community of the underlying paradoxes in global governance. The combination of online communities research and paradox theory offer novel guidance on complexity and potential challenges when applying digital technologies in global climate negotiations. Our research agenda can be used to develop appropriate response strategies as it highlights challenges in need of attention.

1. Introduction

Could the future of our world be decided online? We are facing critical challenges of global nature. The climate crisis is a useful example of such a global challenge where the resolution also needs to be global and governed at the global level. Global governance represents widespread reorientations from a hierarchical state level governmental system to a more fragmented subnational or global governance level (Rosenau, 2000). Moreover, global governance encompass the activities of governments as well as a multiplicity of stakeholders influencing how goals are framed and politics issued (Rosenau, 1995). Our example of global climate negotiations illustrates such a complex context with multiple actors advocating for different, and often conflicting, opinions. Implementing digital governance efforts in this setting, brings both possibilities and challenges.

Digital governance utilizes digital technologies to support governance processes, structures and objectives (Engvall and Flak, 2022a). Digital technologies offer new venues for political discussions and interaction between stakeholders (Engvall et al., 2022). In a global governance context, digital technologies are increasingly used in policy making and diplomatic efforts, i.e., digital diplomacy (Al-Muftah et al., 2018). Digital diplomacy refers to the use of digital technologies by

governments and non-governmental organizations to interact with foreign actors and advance foreign policy and diplomatic objectives (Atad et al., 2023). Negotiations, which we focus on here, is one of the areas of diplomacy in which digital technologies have been used (Almuftah et al., 2016).

Digital technologies are means for communication that can play an important role in building trust and credibility and legitimize ambitious, but possibly not popular, efforts to mitigate a worsening of a crisis (Lerouge et al., 2023). However, digital technologies can also have 'dark' sides, possibly leading to destructive outcomes (Edelmann, 2022). It is a powerful means for shaping narratives that support a political orientation (Atad et al., 2023). Disinformation and fake news are used to influence political beliefs, widely spread by social media (Stachofsky et al., 2023), which are also argued to increase polarization (Kushwaha et al., 2022). National interests and stakeholder views are influenced and shaped by information and digital technologies are powerful instruments for sharing information and thus also for shaping public opinion (Mindel, Mathiassen and Rai, 2018). Restricting disclosure of information from governments can also be a means to propagate a certain political orientation (DePaula, 2023). Therefore, central information should be accessible to the public. However, to stimulate the use of open government information and meaningful action, proactive work

with potential users is needed to create conditions for effective information use (Reggi and Dawes, 2022).

We draw on research on online communities (OC) to illustrate the complexity of introducing digital support in global climate negotiations. OC consist of people with shared interests using online tools to manage their membership within the community (Sæbø et al., 2020) and is explored by organizations for sharing information, cooperating on knowledge generation, or producing collective actions (Shirky, 2008). International organizations, such as the United Nations, orchestrate OC related to global negotiations. OC makes it possible to expand the inclusion of people within these meetings, as well as to change the character of interaction, bringing us to the issue of *how to provide digital support to global climate negotiation processes?* OC has enabled various organizations and communities to move online and to extend their reach by including more stakeholders (Leong et al., 2019). However, OC activities primarily consist of sharing information, while often falling short in achieving constructive collective action. Different levels of online interaction also imply different levels of complexity.

To concretize our reasoning, we use the United Nations′ (UN) global climate negotiations as an illustration. The UN is central to the conduct of global governance (Rosenau, 1995) and has championed the climate problem for decades, but the organization is facing challenges in orchestrating a global response (Rosenau, 2017). The UN advocates the benefits of utilizing digital technologies in addressing these challenges (United Nations, 2020). During the Covid-19 pandemic more of the climate negotiation processes were undertaken online, resulting in both new possibilities and new concerns of how to apply digital technologies (Klein et al., 2021).

The UN Conference of the Parties (COP) meetings are the global decision-making arena for climate change governance (UNFCCC, 2022b). Part of the complexity within such global climate negotiations is that global decisions are made by delegates who also represent national interests, and there is a myriad of stakeholders with contradictory interests who aim to influence the negotiations. The challenge of climate change is embedded in various processes of production and consumption (Bulkeley and Newell, 2015), and requires action and mobilization of many actors. Moreover, there are many facets to the implications of climate change and how people and nature are affected, raising questions on procedures for policy development, inclusion of stakeholders and democratic practices.

While we consider OC to have considerable and un-realized potential related to global climate negotiations, we also argue that fundamental paradoxes need to be understood. A paradox is *"contradictory yet interrelated elements that exist simultaneously and persist over time"* (Smith and Lewis, 2011, p. 382). Negotiations are typically necessary when opposing or contradictory interests need to be resolved. We here apply paradox theory to understand and address contradictory and conflicting priorities (Pinto, 2019) within our area of interest.

Our objective is to explore knowledge gaps related to the roles of OC in addressing the paradoxes of global climate negotiations. Specifically, the research objectives are to 1) identify relevant conceptual elements for the study of digital global climate negotiations; 2) connect identified concepts and theoretical perspectives; and 3) suggest a research agenda with suggestions of relevant research themes and issues based on the conceptual foundation.

The paper is structured as follows: First, we introduce global climate negotiations to understand its challenges. Next, we outline our research approach followed by our theoretical lenses, namely paradox theory and online communities as our basis for identifying research challenges related to digital global climate negotiations.

2. Context: Global climate negotiations

International agreements on climate change have been negotiated and adopted within the United Nations system since the Rio Summit in 1992, when the UNFCCC was adopted (UNFCCC, 1992). The UNFCCC secretariat was established to support global climate governance (UNFCCC, 2022a) with the Conference of the Parties (COP) being the supreme decision-making body that oversees the implementation of the Convention and makes legitimate decisions. COP follows up on progress, reviews the obligations of countries, facilitates exchange of information and coordination of measures, refines guidelines and methodologies, and provides further recommendations (UNFCCC, 1992). COP meetings are held once a year, with government representatives as well as a vast number of stakeholders attend (UNFCCC, 2022b). We introduce UN's COP meetings here to exemplify and reflect on the role of digital technologies within global climate negotiations.

Governments have acknowledged the importance of engaging stakeholders in the climate transition and coordinate this with government actions, which is why two high-level climate champions have been assigned to mobilize climate action among stakeholders (UNFCCC, 2022g). During COP meetings there are many parallel sessions held by various types of actors, and it is a forum for interaction, discussion, and to build partnerships and coalitions. COP27, held in Sharm el-Sheikh 2022, gathered 45,000 participants (UNFCCC, 2022c). Obergassel et al. (2022) illustrate stakeholder participation at top-level climate conferences as a layered structure with different degrees of participation (see Fig. 1).

The innermost circle represents the UNFCCC negotiations and decision-making and includes the COP (for the Climate Convention), CMA (for the Paris Agreement), and subsidiary bodies. This circle has the most restricted participation. In the second circle, the blue zone, various side events occur, and this is an important meeting space for conversations and advocacy. Admitted participants have access to this zone. The third layer, the green zone, includes various side events that are open to the public, and is also an important arena for global media attention (Obergassel et al., 2022).

Fig. 1 illustrates different degrees of participation, linked to different activities. The UNFCCC secretariat distinguishes between three categories of participants at the UNFCCC meetings and conferences: representatives of Parties to the Convention and Observer States, representatives of observer organizations, and press and media (UNFCCC, 2022e). Observer organizations include UN Agencies, intergovernmental organizations, and non-governmental organizations. To register at COP-meetings as an observer, the organization must be approved by COP for observer status. Non-governmental organizations include various actors, such as environmental organizations, businesses, indigenous populations, youth organizations, local governments, research, and academic institutes, i.e., stakeholders from both public, private, and civil society domains (UNFCCC, 2022f). The concepts of the blue and green zones are also used in UNFCCC material to explain the level of access participants are admitted to (UNFCCC, 2022d).

During the Covid pandemic, digital technologies were increasingly used to support COP negotiations. Some sessions (some preparatory meetings and negotiations, and the Subsidiary Bodies session in May–June 2021) were negotiated fully online while others were hybrid. Egypt further organized an African hub where delegates could participate remotely (Klein et al., 2021). While some perceive the online format to be a possibility to re-design COP processes to be more inclusive, there are also concerns that power inequalities will be further strengthened, that it will be more vulnerable to sabotage, and that informal conversations, which are important means to find solutions to common problems, are difficult to match in the online context (Klein et al., 2021). Generally, in the feasibility study of online climate negotiations, some activities were considered by respondents to be more appropriate to have online, such as side events, technical dialogues, and thematic workshops, while activities such as decision making were considered more appropriate to have in-person (Klein et al., 2021). COP sessions have been broadcast online for the public to watch. However, some stakeholders experienced that the online format made it more difficult to have meaningful interaction with delegates, and journalists found it to be more difficult to gather information and arrange

Fig. 1. Illustration of UN climate conferences (Obergassel et al., 2022, p. 3).

interviews (Klein et al., 2021). Online digital support can thus be either an enabler or inhibit constructive outcomes of COP meetings. The underlying problem is the tensions in global climate negotiations, which are blocking the progress and action that is needed. According to the Intergovernmental Panel on Climate Change (IPCCC), there is a strong urgency to change course immediately if the severe effects of climate change are to be prevented (IPCC, 2021).

3. Method

This is a conceptual paper based on a hermeneutic approach. A conceptual paper focuses on integrating and suggesting new relationships among constructs by connecting theoretical perspectives to offer novel perspectives. Unlike a review paper, a conceptual paper does not need to review extant literature, but rather proposes new links and relationships between selected theoretical constructs in selected literature (Gilson and Goldberg, 2015).

In our conceptualization, we rely on reasoning and creative imagination (Bacharach, 1989; Rivard, 2014), supported by the literature streams of paradox theory and OC. Based on a qualitative, hermeneutic research approach (Klein and Myers, 1999), we identified and analyzed relevant literature using the hermeneutic methodology suggested by Boell and Cecez-Kecmanovic (2014). By systematically and analytically reading scientific papers on a chosen topic, researchers can identify key concepts, relevant theories, findings, and contributions within a body of literature.

Literature reviews can be characterized on a continuum from systematically structured to adaptive, hermeneutic processes (Boell and Cecez-Kecmanovic, 2014; Boell and Cezec-Kecmanovic, 2011). While systematic approaches may yield less biased results, they are less suitable for combining current findings from previously disparate research streams (Vom Brocke et al., 2015) - such as paradox theory and OC- due to their methodological inflexibility (Kitchenham and Charters, 2007). Hermeneutic reviews are common in conceptual papers in the fields of information systems (IS) and digital governance (cf, e.g., Lindgren et al.,

2021; Hofmann et al., 2019; Stendal et al., 2016).

The hermeneutic methodology acknowledges that researchers have accumulated knowledge and experience that serve as a starting point for a subjective and interpretative process through which researchers gain a deeper understanding of a subject over time by iterating two hermeneutic circles: (1) search and acquisition and (2) analysis and interpretation of the literature (Boell and Cecez-Kecmanovic, 2014). The starting point was our previous knowledge in the fields of paradox theory and OC. We searched for literature iteratively and approached the topics that we considered first in isolation and later in combination (Alvesson and Sköldberg, 2009; Klein and Myers, 1999).

4. Conceptual approach

As previously introduced, we argue that paradox theory represents a promising lens to identify underlying tensions that can lead to global governance challenges. Paradox theory can further facilitate understanding of the complexity of tensions in global climate negotiations and sensitize attributes of appropriate response strategies. Meanwhile, current knowledge on digital governance and OC provides a foundation for discussing the role of digital technologies within global climate negotiations. Next, these conceptual approaches will be introduced.

4.1. Paradox theory

Paradox theory was developed to understand how organizations deal with contradictory and conflicting priorities, and tensions that arise in the pursuance of multiple objectives (Pinto, 2019). Paradox is defined as.

> "contradictory yet interrelated elements that exist simultaneously and persist over time"
>
> (Smith and Lewis, 2011, p. 382)

A paradox implies that there are underlying tensions between elements that individually seem logical, but inconsistent when juxtaposed

(Smith and Lewis, 2011). Tensions can be latent but surface under certain circumstances. Scarcity, plurality, and change are environmental conditions that make tensions more salient (Pinto, 2019; Smith and Tracey, 2016). Tensions increase when demands or pressure are rising (Lewis and Smith, 2014). Paradoxes are inherent in organizations and persist over time. Organizing creates tensions when establishing structures, roles, responsibilities, goals, and strategies. For instance, this may generate tensions between local/global structures, differentiation/integration, and individual/collective dimensions (Smith and Lewis, 2011). An organization also faces demands from both internal and external stakeholders with different interests (Smith and Lewis, 2011). Global climate negotiations implies that both national interests and the global common good are present as global policy making is negotiated by national government delegations. Global challenges require global collaboration, but at the same time, global solutions can be contradictory to national interests. Moreover, decision makers encounter demands from a myriad of actors with contradictory interests that they have interdependencies with. The use of digital technologies adds additional complexity to the tensions in global climate negotiations.

In our context, characterized by tensions between global and national objectives, and a plurality of stakeholder interests, paradox theory may provide guidance on how to approach this complexity. According to paradox theory, tensions emerge when actors encounter contradictory and interrelated demands (Keegan et al., 2019). Depending on how tensions are managed, the outcome can be either reinforcing vicious cycles, or a dynamic ground for transformation and creative solutions (Pinto, 2019).

Negative cycles occur when contradictions are handled as either/or options to simplify and avoid uncomfortable stress, leading to polarization (Keegan et al., 2019). A paradox approach is about going beyond either-or solutions, exploring both-and avenues (Lewis, 2000), and taking a holistic perspective (Lewis and Smith, 2014). Paradox theory advocates that instead of letting a few dominating stakeholders´ interests dictate, organizations should simultaneously embrace multiple perspectives when they set their goals and strategies (Pinto, 2019). The goal is not to solve conflicts, but rather to manage them and find paths to coexistence. A paradox approach can help in moving beyond polarization and foster sustainability (Lewis, 2000). It is particularly appropriate in times of transformation, which tends to increase tensions (Jules and Good, 2014).

Paradox theory has primarily been applied in a corporate context, but it is applicable to a governance context as well. Just as tensions occur when a company encounter demands from different stakeholders and stockholders (Pinto, 2019), the global climate negotiations context implies various tensions with contradictory and interrelated demands from different governance levels and stakeholders. What serves national interests may have negative implications at a global level. For instance, an industry that provides high economic profit at national level may also include high levels of CO2 emissions, which affects climate change and thus has global implications. Moreover, climate negotiations engage a variety of stakeholders, from environmental movements that aim to reduce CO2 emissions as rapidly as possible, to industries that have strong economic interests in maintaining businesses that generate emissions, along with entrepreneurs that invent solutions to drive the climate transition, investors, cities, municipalities, and more. Additionally, citizens have different views and interests that elected politicians respond to. We suggest that with the tensions characterizing climate negotiations, paradox theory may provide pathways for creative solutions instead of increasing polarization and conflict.

4.2. Online communities

OC are persistent collections of people that share common or complementary interests (Ren et al., 2012), and is explored for a variety of purposes, including managing relations with customers and partners (Dellarocas, 2006; Leidner et al., 2010), cooperating on knowledge generation (Faraj et al., 2011; Majchrzak et al., 2013a), or sharing information of public interest (Wasko and Faraj, 2005). Unlike traditional communities, pre-existing social ties are limited in online groups (Butler et al., 2002), allowing broader dynamic online sharing (Majchrzak et al., 2013b) to become more flexible and fluid than in traditional communities (Faraj et al., 2011). In this paper, our understanding of OC in the context of global negotiations departs from digital governance initiatives organized by international organizations such as the UN. Thus, even though multiple communities, groups and organizations are active around global negotiations, we suggest that what connects such actors is the act of global negotiation. However, as was illustrated in the previous section, different actors have different levels of access to the negotiations, as well as different roles. We therefore suggest that OC related to global negotiations can have different layers that different actors have access to.

Shirky (2008) provides a classification by proposing a three-step ladder of group compilation. *Information sharing* represents the easiest of group compilation, in which everyone is invited to share online. *Cooperation* involves changing behavior to synchronize with others (Ostrom, 2000), where the product is a result of collaborative production, and where members need to negotiate to make collective decisions. *Collective action* represents the more advanced kind of OC efforts. Here, shared responsibility is of critical importance to link individual user identity with the identity of the group, which holds the power in making group decisions which are binding for all individual members. For a group to take collective action, it must have some shared vision strong enough to bind the group together, despite periodic decisions that may displease some individual members (Shirky, 2008). Hence, collective action is more difficult to arrange than information sharing or cooperation. It implies that individuals with common interests and objectives, and with a shared understanding of the community being better off with that objective being achieved, logically will work together to achieve that purpose (Olson, 2009).

The management of OC may be influenced by complexity regarding size, diversity and the type of work being created. Groups focusing on non-work- activities such as political causes (Braccini et al., 2019; Sæbø et al., 2020) often share a common purpose and are likely to behave differently than online groups organized around work- related topics (Butler et al., 2002).

In this article, we use Shirky (2008) classification of three levels of online interaction as a framework to understand different ambition levels on utilizing digital technologies, and what challenges to consider at each level, in a digital global climate negotiation context.

4.3. Digital governance in a paradoxical context

Digital governance is the use of digital technologies ingrained in governance structures and processes, which also have a reciprocal relationship with governance objectives and values. Furthermore, digital governance includes a change of structures, procedures, and normative values (Engvall and Flak, 2022b). In this article, the digital governance aspect relates to the use of digital technologies to support interaction during global negotiations. Digital technologies enable us to share information, exchange ideas, and coordinate action across geographical locations, and for more actors to participate in global debates. However, it also tends to increase polarization and can make consensus forming more difficult (Westcott, 2008). Digital technologies are powerful means for influence (Atad et al., 2023), and disinformation can be disseminated effectively through social media (Stachofsky et al., 2023). When introducing digital technologies in global negotiations, we propose that it is imperative to understand both the nature of the tensions in global negotiations as well as potential implications of digital technologies in this setting.

Related to the belonging paradox and tensions between the global and national interests, digital technologies may have implications on normative values. OC may introduce new norms and perspectives that

go beyond the polarization between national and global interests. For instance, through improved means to inform decision makers on alternative pathways that are beneficial from both a global and a national perspective. In a feasibility study of online climate negotiations, respondents suggested that digital technologies could be applied to reform the climate negotiation process, particularly since the process onwards will focus on implementation of decisions (Klein et al., 2021). In that context, OC may facilitate new forms for collaboration, share good examples, and show new action possibilities, thus changing the foundation for how belongings, identities and values are shaped in global climate governance. However, there is also a risk that OC further increases polarization between different perspectives (Faraj et al., 2011).

Related to the performing paradox, digital diplomacy can be applied to introduce new means for interaction between stakeholders, raising the issue of potential conflicting stakeholder interests in a digital context. Research in the digital governance field suggests that success of digital governance initiatives depends on strategic work with stakeholders and adaptation of interests between organization and stakeholders (Tan et al., 2003). Digital technologies enable the inclusion of more actors, which can lead to an increased stakeholder interaction (Shiang, 2009). In such a context it is imperative to have response strategies to manage tensions. We further suggest that the complexity of tensions increase by the various levels of interaction within OC (information sharing, cooperation, and collective action).

Next, to illustrate our reasoning, we will first outline two major paradoxes in global climate negotiations. Then we discuss how these paradoxes manifest at the three levels of online interaction (information sharing, cooperation, and collective action), which is then the foundation for our generic research agenda on online interaction in global climate negotiations.

5. Paradoxes in global climate negotiations

Turning to our example of global climate negotiations, fundamental paradoxes can explain and help us understand what challenges to respond to in climate negotiations. As noted, paradox theory is applied by scholars to understand and address contradictory and conflicting priorities (Pinto, 2019). While paradoxes may be relatively easily articulated, a common challenge is accumulation of apparently different but potentially identical concepts (Smith and Lewis, 2011). We seek to avoid this challenge by using already defined paradoxes to illustrate our logic. Smith and Lewis (2011) posit that four archetypes of organizational paradoxes exist: belonging, performing, organizing, and learning. Due to space limitations to adequately address all four paradoxes we decided to explore the two paradoxes most befitting our research context, namely *belonging,* and *performing.* These constitute our basis for establishing a robust, conceptual foundation for our reasoning. The belonging and performing paradoxes are focused on goals and identity, and thus how actors relate to the topic and each other. We argue that knowledge on these two paradoxes is important when addressing the other two paradoxes (organizing and learning), such as how to organize digital processes and structures, and how to work with learning and innovation with different stakeholders.

The *belonging paradox* is understood as the tensions of identity and roles (Smith and Lewis, 2011). In our context, this manifests in tensions between national and global interests in global climate negotiations. On the one hand, global interdependency drives the need for global cooperation to solve common problems (Kaul, 2010), but there is also a risk that countries pursue their own interests, leading to the tragedy of the commons (Zürn, 2018). What is good from a global perspective may not be good from a national perspective and activities that are beneficial at the national level may have negative effects on the global common good. There are numerous examples of how this paradox manifests in tensions between nations, e.g., related to transition towards renewable energy, changes in consumption, and financial and technology transfer between developed and less developed countries. The delegates are faced with

the formidable task of reaching global consensus on issues that will likely violate the mandates the delegates have from their own power base – their electorate. Negotiations are thus likely to struggle with tensions between global good and national interests. The belonging paradox serves as an important reminder of the complexity and difficulty associated with addressing much needed global governance of climate issues.

Our other example, the *performing paradox*, relates to the tensions between conflicting stakeholder demands, which may result in competing strategies and goals (Smith and Lewis, 2011). Global governance is characterized by involvement of multiple actors (Finkelstein, 1995; Rosenau, 2017). There is also a vast plurality of stakeholders participating at COP meetings (Obergassel et al., 2022), where some want a rapid transition to zero emissions, which others rather aim to counteract. Related to the previously mentioned belonging paradox, different stakeholders appeal to the global versus national objectives, and may also have different levels of influence on government delegates. Because of the complexity of climate change and its implications, different stakeholders are concerned about different aspects of the topic. This raises questions on whose priorities and views are listened to. The Paris Agreement further has goals related to both mitigation and adaptation measures (United Nations, 2015), which manifests the performing paradox in priorities between short-term and long-term strategies.

The paradoxes offer a useful illustration of global climate negotiations challenges, which highlights the complexity of the context of multiple stakeholders with contradictory interests, and government delegates with loyalties to both the global and national governance arenas. This is imperative to understand in the development of digital global governance solutions.

6. Research agenda

In this section we outline a research agenda for digital global climate negotiations. The research agenda departs from the belonging and performing paradoxes and the three levels of online interaction within OC (information sharing, cooperation, and collective action), and addresses both possibilities and challenges of OC at each interaction level. Based on this, key research questions are identified related to each interaction level. The relationship between the conceptual elements of our research agenda is illustrated in Fig. 2.

Fig. 2 is an abstraction of the core elements in our paper. Our central argument is that climate negotiations have underlying paradoxes that influence the dynamics of the negotiations. This is in essence why such negotiations are severely challenging. We have also argued that online communities can play a more significant role in the negotiation process than what we have seen so far. In our reasoning, this is however contingent on OCs being orchestrated with a clear understanding of the underlying paradoxes of the negotiation process. In summary, Fig. 2 suggests that this novel understanding of a problem, in this case climate negotiations, based on its underlying paradoxes and the possibilities of online communities offers added value to the body of literature on digital governance (Bannister and Connolly, 2012; Charalabidis et al., 2022; Dawes, 2009; Janssen et al., 2009). Moreover, it illustrates how it, in some global contexts, can be fruitful to move from traditional digital governance towards a paradox sensitive digital governance. A central objective of paradox theory is to move beyond polarization, which digital technologies tend to increase (Kushwaha et al., 2022). A paradox sensitive approach can thus be part of a digital governance strategy to develop forms for dialogue that increase the legitimacy for actions required to mitigate worsening of a crisis (Lerouge et al., 2023), and facilitate cooperation and collective action.

The research agenda, presented below, invites explorations related to the constructs and relationships in Fig. 2. Our agenda departs from the belonging and performing paradoxes and outlines key aspects to investigate in further detail at the three levels of online interaction: sharing, cooperation and collective action.
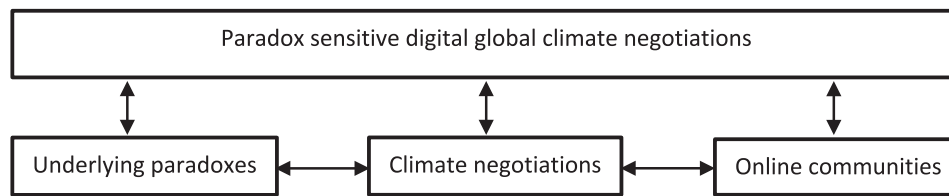
Fig. 2. Theoretical elements of our research agenda for digital global climate negotiations.

6.1. Belonging paradox

The belonging paradox is understood as the tensions of identity and roles (Smith and Lewis, 2011). In the context of global governance, it manifests as the tensions between national and global interests. Government delegates have loyalties to the global agenda but also to their national mandates. What is good for the global agenda may not be good at the national level, and activities that are beneficial at a national level may have negative effects on the global common good. Such tension may influence the potential role of OC for various reasons.

First, we posit that information sharing activities are influenced by this paradox. On the one hand, countries may not want to share information that makes them look bad in a global context, but at the same time not perceived as counter-productive to national interests. Information may intentionally not be disclosed because of political reasons (DePaula, 2023). On the other hand, the achievement of global climate negotiations depends on the aggregation of information from countries, which are obliged to report on their emissions and measures to the UNFCCC (United Nations, 2015). Hence there is a risk of inaccurate information being provided by national states championing their national interests in favor of global interests. Procedures for verification of reports intend to ensure reliability of the information (UNFCCC, 2018), and digital technologies can be used to control their accuracy (Engvall and Flak, 2022a). Public sharing of government reports makes emissions and measures transparent, where various stakeholders can view, discuss, and elaborate on the information.

Information sharing activities (such as further re-use and discussions of reports) within a broader OC context, including a large group of stakeholders with limited hierarchical order, may be at risk of being manipulated. Disinformation can be disseminated to support political interests (Tucker et al., 2018). Digital technologies and information are effective means for shaping and disseminating political narratives and may be used to either build trust (Lerouge et al., 2023) or create polarization (Kushwaha et al., 2022). More positively, OC may represent a transparent system where stakeholders are provided the opportunity to share, comment, and elaborate based on information sharing (Sæbø et al., 2020).

Research questions to explore at the information sharing level include:

- How to create trust among governments to share uncomfortable information?
- What are the roles of digital technologies, standards, and procedures, to verify information and ensure its reliability in an OC context?

The next level of online interaction in OC is cooperation. At the cooperation level, the tension between the global and national levels involves issues related to, for instance, who should bear the cost for different measures. The Paris Agreement states that countries can include measures in other countries as part of their strategy to achieve their national commitments, and there should also be a financial and technological contribution to developing countries (United Nations, 2015). If the global agenda suggests that wealthier countries should provide financial and technological resources to developing countries, there may be a conflict of interest between the national level and the global perspective. Moreover, in general, multistakeholder arrangements are encouraged in implementation of sustainability goals (United Nations Department of Economic and Social Affairs, 2023). In cooperation between different types of actors, such as governments, corporations and civil society movements, there could be unclear responsibilities and diverging interests between a global perspective and individual interests.

The OC environment has the advantage of connecting actors and facilitating communication and cooperation across regular borders (Faraj et al., 2011; Majchrzak et al., 2013a). However, this also means that building trust in a multicultural context requires more explicit measures. In an OC context, there is further a risk for communicative misunderstandings, which can generate conflicts or stalemates (Faraj et al., 2011). On the positive side, digital technologies can be a means to build trust and legitimacy for actions necessary to mitigate worsening of a crisis (Lerouge et al., 2023), and inform actors of possibilities that are beneficial from both a national and global perspective.

Key research questions related to the cooperation level include:

- How to show and inspire alternative pathways for action through cooperation, that have synergies between the global and national level, in an OC context?
- What regulatory, technological, social, and organizational means are required to foster a collaborative solution-oriented OC environment that generates positive results?

The third level, collective action, will reflect the tensions between the global and national interests in decision making. Tensions between global and national concerns may lead to countries blocking decisions that go against their national interests. The collective action level requires a common vision that is strong enough to motivate actors to follow common decisions that go against their interests (Shirky, 2008). Dialogues between government delegates and other stakeholders intend to provide input to negotiations. This level therefore has two arenas to consider, formal negotiations and dialogues with stakeholders to inform decision making.

Risks of online negotiations include cyber-attacks, and actors using technology to sabotage and thereby stall progress (Klein et al., 2021). In an OC context, there may be a risk of strong lobbyism for national interests that counteract global concerns, but it may also be a possibility for diverse actors to raise their voice. Information and social opinions can spread fast in an OC environment, which can have both positive and negative effects. Based on the first level of information sharing, fact-based information can inform decision making and give more confidence to decision makers.

Central research questions related to the level of collective action include:

- How to provide digital support during negotiations?
- How to orchestrate OC dialogues to inform decision making?

6.2. Performing paradox

The performing paradox relates to the tensions between conflicting stakeholder demands, which may result in competing strategies and goals (Smith and Lewis, 2011). In the context of global governance, it manifests as tensions when encountering conflicting stakeholder

demands. A high plurality of stakeholders intensifies the performing paradox. The performing paradox also includes tensions in priorities between short-term and long-term objectives (Dodd and Favaro, 2006).

We suggest that this paradox may influence information sharing. In a context of various stakeholders with conflicting interests, strong opinions can make it uncomfortable or unfavorable to share certain information. Governments may also be dependent on certain actors to maintain their power. There is a risk of power imbalances and that opinions from strong stakeholders dominate other actors (Edelmann, 2022) and that digital technologies become means for lobbyism of certain interests. However, the OC environment can be used to seek external support on a topic, and not just favor salient stakeholders. It may also create a transparent system that is open to public scrutiny. The risk of bad reputation, which can go fast in an online environment, can nudge governments to work for the common good. Moreover, information sharing activities may trigger conflicts in a context of varied and sometimes conflicting stakeholder interests and views. In the context of open government data (OGD), the key to meaningful use of the information is further proactive collaboration with potential users (Reggi and Dawes, 2022). In a setting characterized by tensions, this is even more important.

Research questions that respond to the performing paradox and the information sharing level include:

- How to encounter strong opinions and uncomfortableness in an intense digital context?
- How to orchestrate communication and interaction among stakeholders in the online context to mitigate polarization and conflict?
- How would sector-specific interaction strategies in global climate negotiations look like?
- How to build stakeholder skills for constructive interaction?

At the next level of interaction, cooperation, this paradox can generate tensions if actors for instance have diverging interests and expectations of outcomes. This can be the case in cooperation between governments, where both governments and other stakeholders may have strong opinions on objectives and outcomes, or if they should be conducted at all. Different stakeholders may also have very unequal access to resources, creating different conditions to participate. With the digital divide such differences could be further strengthened (Klein et al., 2021). In cooperation between different types of actors, such as governments, corporations and civil society, tensions between objectives and interests may generate conflicts or stall progress. This paradox may also generate power differences where certain stakeholders dominate over others. Although digital technologies can facilitate cooperation, there is also a risk that it further strengthens power differences, conflicts, and leads to destruction of values (Edelmann, 2022). Different perspectives of different stakeholders are also a risk for misunderstandings and thus conflicts and polarization. However, there is also a possibility that through OC different perspectives and multiple values can be integrated. For instance, economic and environmental concerns may be communicated and discussed by stakeholders. The OC environment has potential in connecting actors with common interests and create a ground for cooperation, but there is also a risk for conflict between opposing interests.

Research questions concerning the performing paradox at the cooperation level include:

- How to provide digital support to facilitate cooperation among actors with common objectives and achieve constructive outcomes?
- How to allocate sufficient resources to actors that have more limited access to resources?
- What functions are needed to facilitate cooperation in an OC context, such as rules, procedures, skills, organizational support, and socio-cultural aspects?

- How to ensure legitimacy of stakeholder co-creations, and transparency and accountability of stakeholder actions in online cooperation?

At the collective action level, the performing paradox manifests in conflicting demands from different stakeholders on governance objectives and decisions. The plurality of stakeholders and contradictory demands makes it challenging to achieve adequate decisions.

Digital channels can be used to both include and exclude actors from sharing their views. In the online environment, it is more controlled who is allowed to speak and who is invited to meetings (Klein et al., 2021). There is a risk that only salient stakeholders are heard and have access to dialogues with government delegates. Moreover, the digital environment is vulnerable to sabotage through cyber-attacks (Antwi-Boateng and Mazrouei, 2021), internet breakdowns or loss of electricity (Klein et al., 2021). Stakeholder opinions can also be disseminated and go viral in the online context, which may have a strong influence on the negotiations. On the positive side, the OC environment enables us to organize dialogues and sharing of views to inform decision making.

Research questions that address this paradox at the collective action level include:

- How would structures and processes that draw on OC to inform collective action be designed?
- How to mitigate dominance of stakeholders that aim to sabotage?
- How to respond to conflicting demands while also maintaining integrity and trustworthiness?
- How to use digital technologies to synthesize a large volume of stakeholder views and inform decision making?

Table 1 summarizes the research agenda based on the discussions of the belonging and performing paradoxes.

7. Discussion and conclusion

The main objective for this work has been to identify research needs for effective use of digital technologies in global climate negotiations by 1) identifying relevant conceptual elements for the study of digital global climate negotiations; 2) connecting identified concepts and theoretical perspectives; and 3) suggesting a research agenda with suggestions of relevant research themes and issues based on the conceptual foundation and the example of the (UN) global climate negotiations. Below we summarize our contributions accordingly and reflect on the implications of our work.

First, we identified *the conceptual elements of paradox theory and OC* as a promising lens to uncover research needs within this area. To achieve constructive outcomes in a paradoxical context, it is imperative to develop response strategies (Smith and Lewis, 2011). We propose that our research agenda can be used to develop such response strategies as it highlights challenges to address.

Global governance negotiations involve many actors with various interests, complex processes, and a lack of an overarching, legitimate authority to decide on behalf of others (Zürn, 2010). In our example, focusing on UN's global climate negotiations, successful results depend on the opportunity to reach consensus among actors with only limited opportunities to enforce decisions to be implemented at the national level. Paradox theory helps us to understand and manage contradictory and conflicting interests and tensions within complex organizational situations, which is in accordance with the characteristics and nature of global climate negotiations. Knowledge from the field of OC allows us to reflect on the various roles and degrees of complexity when introducing digital technologies for the involvement of multiple stakeholders.

Second, we *connected the concepts and theoretical perspectives of paradox theory and OC*. Paradox theory is fruitful in elucidating underlying tensions that affect the implications of the use of digital technologies, while research on OC provides insights on the complexity of

Table 1
Research agenda for digital global climate negotiations.

Level of interaction within OC	Research opportunity
Information sharing	• How to create trust to share uncomfortable information? • What are the roles of digital technologies, standards, and procedures, to verify information and ensure its reliability? • How to manage strong opinions and uncomfortableness in an intense digital context? • How to orchestrate communication and interaction among stakeholders in the online context to mitigate polarization and conflict? • How would sector-specific interaction strategies related to global climate negotiations look like? • How to build stakeholder skills for constructive interaction?
Collaboration	• How to show alternative pathways for action, and synergies between global and national benefits? • How to provide digital support to form cooperation with common objectives and achieve generative outcomes? • How to allocate sufficient resources to actors who have more limited access to resources? • What functions are needed to facilitate cooperation, such as rules, procedures, skills, and cultural aspects? • How to ensure legitimacy of stakeholder co-creations? • How to ensure transparency and accountability of stakeholder intentions and actions in online cooperations?
Collective action	• How to provide digital support in negotiation processes to promote decisions that adequately respond to the climate challenge? • How to design channels for stakeholder interaction that include constructive perspectives and mitigate dominance of stakeholders that aim to sabotage? • How to respond to conflicting demands while also maintaining integrity and trustworthiness? • How to use digital technologies to synthesize a large volume of stakeholder views and inform decision making? • How would the structural elements be designed, in terms of technology, rules, procedures, objectives and vision, to facilitate collective action which results in adequate outcomes?

introducing digital technologies to support interactions. Successful use of digital technologies requires an understanding of the complex processes and the potential and limitations of introducing digital tools for various purposes. Digital technologies increase the risks of disinformation and polarization (Stachofsky et al., 2023), while also providing possibilities for communication to build trust and strengthen legitimacy for actions to mitigate a crisis (Lerouge et al., 2023), which in the example of climate change is very much needed. Moreover, as Reggi and Dawes (2022) has explained, working proactively with users of government information is key to stimulating meaningful use of open government information. This will be crucial to consider, for climate governance to evolve from transparency to climate action. The combination of the perspectives of paradoxes and OC gives grounds for discussing good and bad consequences of digital support in global governance negotiations.

Finally, we combined Shirky (2008) framework of three levels of online interaction; information sharing, cooperation, and collective action, with paradox theory to *suggest a research agenda* outlining knowledge gaps related to digital global governance negotiations. Although each paradox allowed us to identify specific opportunities for research, we argue that these represent more general research problems that can be paraphrased to a research agenda that covers all the three stages of online interaction. We concretize this agenda by highlighting how the belonging paradox (as tensions between global and national interests) and performing paradox (as tensions between stakeholder interests) materializes in global climate negotiations and potential implications of OC in this setting.

We further suggest for future research and planning, that Fig. 1 in this article, illustrating different activities and levels of stakeholder participation at UNFCCC meetings and conferences, is useful when considering the level of interaction and how to include OC as part of these processes.

7.1. Implications

The research agenda initiates a discourse on how to address global negotiations issues within the digital governance community. The combination of OC and paradox theory is a novel theoretical approach that contributes with conceptual depth to the digital governance field. The research agenda can inform the discussions on digital diplomacy (Al-Muftah et al., 2018; Atad et al., 2023), risks of disinformation (Stachofsky et al., 2023) and polarization (Kushwaha et al., 2022), and development of constructive means for communication (Lerouge et al., 2023), to address a critical societal problem. We suggest that the theoretical framework that combines paradox theory and OC research is not just applicable to climate governance, but to other governance settings as well. Activities of information sharing, cooperation, and collective action may also be relevant to other global governance issues, although it will differ what actors are involved and how the information is managed, and activities orchestrated. The research agenda highlights the complexity of introducing digital technologies in a setting characterized by tensions, but simultaneously having an urgent need to solve common problems. We encourage further research on response strategies for paradoxes in a digital global climate negotiation context.

The research agenda can guide policy making in developing response strategies to paradoxes in digital global negotiations. It points towards challenges that ought to be addressed at different levels of interaction. The research agenda further provides a framework for different ambition levels of interaction, which can guide digitalization strategies in international organizations.

Author statement

We, the authors, hereby state that the manuscript, or parts of it, have not been and will not be submitted elsewhere for publication.

Declaration of Competing Interest

The authors hereby declare that there are no conflict of interests related to this paper.

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