Public Deliberation in the Digital Age

Platforms, Participation, and Legitimacy

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ISBN: 978-1-032-79900-1 (hbk)
ISBN: 978-1-003-43520-4 (ebk)

First published 2026

4

Harnessing digital tools for democratic deliberation

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The chapter DOI: 10.4324/9781003435204-6

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

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Introduction

> If technology does not stand still, neither should democracy. It reinvents itself or it is destined to perish.
>
> —Kofi A. Annan

In the face of unprecedented environmental challenges and the inadequacy of governmental responses, citizens' assemblies have emerged as vital mechanisms for fostering inclusive and deliberative decision-making in climate governance (Willis et al., 2022). As climate assemblies (CAs) continue to expand across Europe (Paulis et al., 2021; Smith, 2024), bringing together diverse publics to engage with environmental issues, digital tools are increasingly positioned to play a transformative role in their evolution. These technologies offer the potential to optimize information dissemination, transform how participants deliberate, and engage the wider public. More than a mere technological shift, the integration of digital tools within citizens' assemblies signals a deeper commitment to democratizing climate discourse and amplifying civic agency.

The integration of digital tools into CAs – and deliberative mini-publics more broadly – has therefore become a crucial area of inquiry. Although this research domain is not entirely new, it has gained renewed urgency during the COVID-19 pandemic, which forced several CAs to transition to fully online (Dean et al., 2022) or hybrid formats (Elstub et al., 2021; Verhasselt et al., 2024). These adaptations demonstrate the resilience of deliberative practices in times of crisis, albeit not without notable challenges (Elstub et al., 2021). Scholars and practitioners have increasingly explored the interplay between online and offline deliberative modes (Itten & Mouter, 2022), as well as the effects of digital tools on deliberation quality (Grönlund et al., 2009; Kies, 2022; Mikhaylovskaya, 2024; Shortall et al., 2022). Nevertheless, there is a lack of systematic analysis regarding the use of digital tools within formalized deliberative structures such as citizens' assemblies.

Against this backdrop, this chapter contends that the role of digital tools in CAs must be critically examined, in terms of how the integration of digital tools helps to disseminate information, shapes participation, and broadens access to the wider public. In response, this chapter systematically examines, at the hand of the input,

DOI: 10.4324/9781003435204-6

throughput, and output dimensions, the experiences of 11 CAs across Europe,[1] analyzing how digital tools were used, what functions they served, and how they shaped input, throughput, and output legitimacy. Drawing on official documentation, public reports, and online materials, it identifies both foundational uses – such as information sharing – and more innovative applications aimed at enhancing participation and collaboration, while also identifying key limitations and obstacles. This chapter explores how digital technologies have supported or constrained key deliberative ideals, offering insights into the evolving relationship between digital infrastructure and democratic processes in climate governance.

This chapter unfolds as follows. First, it outlines the rationale for the selected case studies and details the analytical approach. Second, it examines the integration of digital tools in CAs, distinguishing between tools for information dissemination and those for facilitating participation. Third, it assesses how these tools have influenced the input and throughput dimensions, highlighting both opportunities and challenges. Finally, the conclusion synthesizes the findings and reflects on the significant variation in how digital tools are implemented across assemblies and the implications this holds for future deliberative practice.

Case selection

The primary goal of this chapter is to provide a comprehensive overview of how digital tools are incorporated and utilized in CAs, focusing on the diverse applications of these tools in different settings. Accordingly, to ensure comprehensiveness, we focus exclusively on national-level CAs across various European countries, encompassing diverse geographical regions and political systems while excluding the vast array of local initiatives (Lewis et al., 2023). These CAs may be commissioned by political authorities (top-down) or initiated by civil society organizations (bottom-up). Based on the KNOCA database, we have identified 11 cases for analysis (see Table 4.1).

The cases selected for this chapter span fully online, hybrid, and in-person CAs, highlighting the adaptability of digital tools within diverse deliberative settings. The objective here is not to provide an exhaustive empirical analysis of all 11 cases, nor to offer a comprehensive account of each assembly throughout. Rather, the focus is on identifying practical applications of digital tools, allowing for an examination of how digital tools are used across diverse deliberative settings. In other words, this chapter does not aim to evaluate the effectiveness of these tools but instead presents a descriptive and systematic analysis of their integration. This approach provides crucial insights into the evolving role of digital tools in participatory climate governance, offering understandings that may inform the design of future deliberative processes. Essentially, based on publicly available data – including websites, reports, social media platforms, and databases such as KNOCA and Participedia – this chapter considers how these tools influence the flow of information and participation in deliberative processes (Davies & Chandler, 2012; Grönlund et al., 2009; Strandberg & Grönlund, 2018; Manosevitch, 2010; Price, 2009).

Table 4.1 Case selection of CAs

Case		*Country*	*Date*	*Commissioning body*	*Top-down or bottom-up*	*Question*	*Number of participants*	*Duration*	*Process*	*Budget*
1	Citizens' Assembly on Biodiversity Loss (An Tionól Saoránach)	Ireland	2022	Parliament	Top-down	How can the State improve its response to the issue of biodiversity loss?	100 members (99 participants + 1 independent chairperson)	May 2022–January 2023	In-person	/
2	Citizens' Assembly for the Climate (Asamblea ciudadana por el clima)	Spain	2021–2022	Government	Top-down	A safer and fairer Spain in the face of climate change. How do we do it?	100 members	November 2021–May 2022	Hybrid	/
3	Citizens' CA (Klimarat)	Austria	2022	Parliament (but born out of the petition for a referendum on climate change)	Top-down	What do we have to do today in order to live in a climate-healthy future tomorrow?	100 members	January–June 2022	In-person	€2 m
4	Luxembourg's Climate Citizens Council (Klima Biergerrot)	Luxembourg	2022	Government	Top-down	Is Luxembourg able and willing to do more to combat climate change? And, if so, how?	100 members	January–September 2022	Hybrid	± €1 m

(*Continued*)

Table 4.1 (Continued)

Case	*Country*	*Date*	*Commissioning body*	*Top-down or bottom-up*	*Question*	*Number of participants*	*Duration*	*Process*	*Budget*
5 Citizens' Assembly on Climate (Bürgerrat klima)	Germany	2021	Civil society	Bottom-up	How can Germany achieve the goals of the Paris Climate Agreement - considering social, economic, and ecological perspectives?	160 members	April–June 2021	Online	€1.9 m
6 CA (Borgerting på klimaområdet)	Denmark	2020–2021	Government	Top-down	Responsible for debating citizen-level dilemmas associated with the green transition as well as providing input and recommendations to the drafting of the climate action plans.	99 members	October 2020–December 2021	Hybrid	€74 K
7 Citizens' Jury on Climate Actions (Kansalaisraati)	Finland	2021	Government	Top-down	Assess the fairness and impact of the measures to be included in the new Medium-Term Climate Change Policy Plan.	50 members	22, 24 & 25 April 2021	Online	€20 K

(*Continued*)

Table 4.1 (Continued)

Case		*Country*	*Date*	*Commissioning body*	*Top-down or bottom-up*	*Question*	*Number of participants*	*Duration*	*Process*	*Budget*
8	CA	Scotland	2020–2021	Government	Top-down	How should Scotland change to tackle the climate emergency in an effective and fair way?	105 members	November 2020–March 2021	Online	€1.4 m
9	CA UK	United Kingdom	2020	Parliament	Top-down	How should the UK meet its target of net zero greenhouse gas emissions by 2050?	110 members	January–May 2020	Hybrid	£520,000
10	Citizens' Convention on the Climate (La Convention Citoyenne pour Le Climat)	France	2019–2020	Government	Top-down	How to reduce greenhouse gas emissions by at least 40% by 2030, in a spirit of social justice?	190 members	October 2019–June 2020	Hybrid	€5.4 m
11	Citizens' Assembly on Climate (Medborgarråd om klimatet)	Sweden	2024	Civil society	Bottom-up	How should we in Sweden reduce climate emissions?	60 members	March–May 2024	Hybrid	± €3.5 m

Source: KNOCA (https://knoca.eu/national-climate-assemblies/).

To guide this analysis, this chapter draws on the legitimacy model of deliberative democracy (Caluwaerts & Reuchamps, 2015, 2023; Harris, 2019; Suiter & Reuchamps, 2016). This analytical framework offers a valuable lens for examining CAs, particularly because the legitimacy of these bodies is not self-evident. Rather, their potential to enhance the legitimacy of the broader political system depends on their own procedural and democratic robustness. This model distinguishes three dimensions – input, throughput, and output legitimacy – which together offer a structured framework for understanding how digital tools shape deliberative processes. In this chapter, input legitimacy concerns how digital tools influence who participates in shaping the agenda; throughput legitimacy focuses on how digital tools affect participation; and output legitimacy relates to how digital tools facilitate transparency and public engagement, acting as bridges between the internal workings of mini-publics and the external world. Taken together, this legitimacy framework allows us to examine not just the presence of digital tools in CAs, but their normative and functional significance across different stages of the deliberative process.

Integration of digital tools in CAs

Information dissemination and communication

In the age of digital connectivity, CAs have increasingly utilized digital platforms to share information about their activities. Beyond traditional media outlets, digital tools such as websites and social media have become essential channels for reaching wider audiences and promoting transparency.

Websites

A central component of a digital strategy focused on transparency and accessibility is the creation of dedicated websites, which serve as external and internal hubs for information. Internally, these websites often feature a members-only section that provides exclusive access to participants in the CA. For example, the dedicated website of the Irish CA included a members-only area designed to share supplementary materials. This exclusive section offered members access to a comprehensive resource library that contained links to TV and radio programs, documentaries, podcasts, and a curated list of books on Irish wildlife.

Externally, these websites are vital platforms for disseminating information about CAs to the public, journalists, policymakers, and other stakeholders. CA websites typically include essential details about the assembly's structure, discussions, and outcomes. This can encompass information on participant recruitment and selection, governance structures, topics discussed – including meeting materials – and expert contributions, all of which enrich the public's understanding of the assembly's work. These websites also provide access to final reports, recommendations, and, in some cases, additional resources related to specific topics. In other words, they serve as information hubs and public showcases for the assembly, extending

their reach beyond the process and its participants. However, while all examined CAs have dedicated websites, the extent and depth of the information provided vary significantly. Moreover, especially broader educational resources related to climate change are often lacking, except for the French or the British cases.

More specifically, CAs vary significantly in the level of detail, accessibility, and frequency of information shared through their websites, reflecting differing approaches to both how and what information is communicated to the public. For instance, the French, Scottish, Swedish, and UK CAs made extensive documentation publicly available, such as details on participant recruitment and demographics, organizational procedures, expert presentations, briefing materials, and final outcomes – all of which were uploaded in a timely manner. To enhance transparency around expert input, the Swedish CA not only made all expert presentations publicly available but also published a 'knowledge booklet' – a summary document prepared by the consulted experts during the assembly, which was also distributed to its members. The UK CA further reinforced transparency by not only live streaming its sessions but also publishing full transcripts on its website, as well as disclosing cost-related information, contributing to greater openness. Similarly, the Irish CA provided a comprehensive digital archive containing terms of reference, recruitment information, public submissions, detailed agendas, recordings of expert sessions, and Q&A discussions.

Certain assemblies also adopted strategies to maintain public engagement throughout the process. The Austrian CA, for example, regularly published summaries of its work to keep the public informed throughout the process. Additionally, the websites of the Austrian and Scottish CAs featured dedicated sections highlighting media coverage, offering an external perspective on the assemblies' visibility and public reception. Meanwhile, the Spanish CA hosted blogs authored by participants and experts, fostering ongoing dialogue and extending engagement beyond conventional informational updates.

Although the website of the Spanish Citizens' Assembly is relatively comprehensive – providing detailed information about the assembly itself, broader content on the importance of climate action, and references to other assemblies – it is available exclusively in Spanish. This language barrier potentially limits accessibility for non-Spanish speakers, thereby reducing the assembly's international visibility and constraining opportunities for broader knowledge exchange. A similar limitation applies to the Swedish website, which is only available in Swedish. In contrast, the websites of the Austrian, Danish, Finnish, French, and German Citizens' Assemblies provided key information in English, thereby enhancing accessibility, promoting transparency, and supporting wider dissemination of practices across linguistic and national boundaries.

In contrast, some assemblies have a more limited or fragmented online presence. For instance, the Finnish and Danish CAs did not have dedicated websites. While also aimed at information dissemination, this approach can make navigation cumbersome and reduce the assemblies' independent visibility, potentially limiting accessibility for the broader public. The website of the Luxembourgish CA provided minimal information, lacked regular updates, and featured very limited

multimedia content. Notably, the site is no longer accessible, resulting in the permanent loss of valuable digital material. While the website of the Scottish CA is also no longer active, its content remains accessible through an archived version hosted on the national web archive, preserving the assembly's digital footprint. Without a long-term digital archiving strategy, important records and insights from the assembly may be lost, limiting future access for researchers, future assemblies, and the general public. This absence of archived materials could hinder the long-term impact and relevance of the assembly's work.

These examples illustrate the notable variation in how CAs utilize their websites as digital tools for public outreach: some websites function as static repositories, offering minimal updates, whereas others evolve throughout the process, fostering ongoing engagement and serving as virtual connections between the assembly and the wider public. While some assemblies view their websites primarily as a means of providing information, others leverage them to enhance transparency, bolster public trust, and strengthen the legitimacy of the assembly's work. Notably, for some assemblies, digital engagement appears to be a low priority, leading to websites that are incomplete, difficult to navigate, rarely updated, or even removed after some time.

Social media

In addition to their dedicated websites, CAs can strategically use social media as digital tools to inform and engage the broader public and other stakeholders. Unlike many deliberative mini-publics, CAs have recognized the potential of social media platforms, likely due to their widespread popularity. Platforms like X (formerly Twitter), Facebook, TikTok, Instagram, and YouTube provide dynamic channels for real-time updates, engaging visuals, and important highlights, helping to keep the public informed and actively involved in the deliberative process. Nevertheless, as illustrated in Figure 4.1, the use of social media by CAs varies significantly in terms of presence, activity, and engagement (see also Table 4.2).

While some assemblies effectively utilize social media to expand their reach and engage with diverse audiences, others take a more cautious or limited approach. For instance, the Irish CA implemented a robust multi-platform strategy, engaging audiences across X, Facebook, Instagram, TikTok, and YouTube.[2] In addition to uploading session recordings on YouTube (a practice shared by several other assemblies, including the French, UK, Scottish, and Irish CAs, with some opting for live streaming and others for post-event uploads), the Irish CA also collaborated with TikTok influencers to make complex climate issues more accessible to broader audiences. Similarly, the French CA partnered with a Twitch influencer to live-stream sessions with real-time commentary, aiming to further increase its reach and engagement. The UK and Spanish CAs used YouTube not only to share expert presentations but also to post educational videos, thereby broadening public engagement and aiming to inform and educate the wider public. In contrast, some assemblies adopted a more restrained approach. The Luxembourgish CA, for

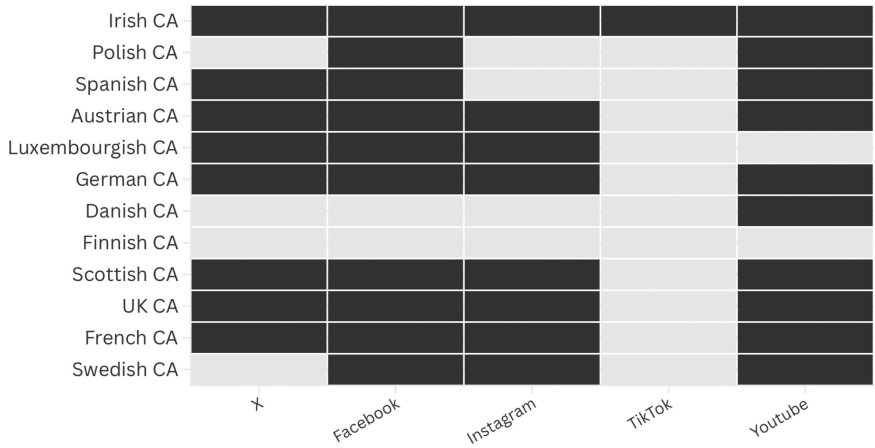

Figure 4.1 CAs' presence on social media.

Note: dark gray = yes; light gray = no.

example, maintained Facebook and Instagram accounts but posted infrequently. The Danish and Finnish CAs took an even more minimal approach, relying on traditional communication channels with little to no social media presence.

In conjunction with Figure 4.1, Table 4.2 provides a detailed view of the CAs' social media activity and engagement. The table highlights significant variations across the assemblies, with these differences likely influenced by factors such as the duration of the process, the scale of the assembly, available financial resources, the chosen communication strategy (e.g., frequency and volume of updates), and the size of the country involved.[3] For example, the Irish and French CAs show higher engagement on platforms like Facebook, Instagram, and YouTube, which reflects their more extensive communication efforts and resources. In contrast, the Luxembourgish and Finnish CAs exhibit more limited social media activity, likely due to their more restrained communication strategy. These variations underscore how digital engagement strategies are shaped by a range of contextual factors, which, in turn, influence the level of public interaction with these tools.

Ultimately, there is a clear divide between assemblies that actively use social media as a tool for transparency and public involvement and those that invest little effort in digital outreach, potentially missing opportunities to enhance their legitimacy and maintain public interest.

Fostering participation through digital tools

In addition to sharing information with participants and the maxi-public, digital tools play a crucial role in actively engaging both groups. More precisely, these tools actively create opportunities for interaction, dialogue, and participation, going beyond the passive consumption of information. That is, digital tools not only inform but also empower.

Table 4.2 CAs' social media activity and engagement

ID	*Case*	*Facebook*		*X*		*Instagram*		*TikTok*		*YouTube*	
		Like	*Followers*	*Followers*	*Posts*	*Followers*	*Posts*	*Subscribers*	*Videos*	*Subscribers*	*Videos*
1	Irish CA			8,000	1,905	903	67	630	18	1,100	616
										No proper account: videos published via one common account for all Irish citizens' assemblies	
2	Polish CA	261	287	–	–	–	–			No proper account: videos published via commissioning civil society organizations (CSO's) account	
3	Spanish CA	587	644	1,982	626					353	89
4	Austrian CA	843	1,000	1,552	161	1,757	113			239	27
6	Luxembourgish CA	206	227	139	6	217	21				
7	German CA	1,400	1,600	4,452	1,606	2,796	295			658	82
8	Danish CA	–	–	–	–	–	–			No proper account: Ministry	
9	Finnish CA	–	–	–	–	–	–			–	–
10	Scottish CA	1,300	1,500	2,672	2,308	721	357			374	207
11	UK CA	1,094	1,000	11,200	2,339	980	52			No proper account: Ministry	
12	French CA	1,9000	19,864	21,336	2,425	20,800	149			No proper account: Ministry	
13	Swedish CA	79	131	-	-	255	26			54	39

Maxi-public consultation

CAs can utilize digital tools to consult and engage with the public at various stages: before the assembly begins, during the formal deliberative process, and even after its conclusion (Itten & Mouter, 2022). However, not all assemblies adopt this approach. Among the 11 cases analyzed, five CAs (Denmark, Finland, Germany, Sweden, and the United Kingdom) did not provide any public engagement mechanisms. The remaining CAs adopted different digital strategies to ensure public participation.

For example, Spain's CA engaged the public through an online survey on its official website before deliberations began, allowing the maxi-public to provide feedback on the relevance of pre-selected topics and propose additional issues. Similarly, Scotland's CA implemented a public pre-engagement exercise using the online platform 'Dialogue'. This platform invited the maxi-public to contribute ideas not only on discussion topics but also on potential expert speakers and climate change solutions. Both processes garnered significant participation from the public, with contributions transparently published on the respective websites, ensuring a broad and inclusive approach to the deliberative process.

Other assemblies facilitated public contributions throughout their processes. The Irish CA, for instance, in preparation for the second and third working weekends, reviewed all public submissions, which remain accessible on its website. To ensure transparency, these submissions were categorized into two groups: those from organizations and those from individuals. Notably, the Austrian CA organized public webinars, involving participants and the facilitation team, to enhance transparency, in combination with the 'Pol.is' platform – a real-time polling system – to gather feedback on interim results.

These examples highlight the commitment of CAs to fostering participation not only from their members but also from the broader public, excelling in using digital tools to create a dynamic, participatory, and transparent process. However, that is not the case for all. For example, while the websites of the French and Luxembourgish CA also served as a portal for public submissions, encouraging active participation throughout the assembly, it remains unclear how the contributions collected were communicated to and considered by the participants. There is also no available information regarding the number of people who participated, nor the volume of contributions submitted.

Ultimately, these examples demonstrate that CAs commonly use digital tools for engagement and consultation both before and during the assembly process, allowing the public to actively contribute suggestions, comments, and feedback on the assembly's design and proceedings.

Participation and deliberation

Besides engaging the maxi-public, digital tools of course play a crucial role in fostering interactive spaces where assembly members can collaborate, discuss, and engage in collective decision-making. Depending on the format of the assembly – whether online, in-person, or hybrid – various digital platforms support

both synchronous and asynchronous participation. Synchronous tools enable real-time interaction, aiming to replicate the immediacy and engagement of in-person assemblies. They are particularly essential for fully online formats, hosting live expert presentations and group discussions. By providing an interactive environment, synchronous platforms promote active participation and immediate feedback, ensuring that deliberations remain dynamic and responsive. Asynchronous tools, conversely, allow participants to engage with content and discussions at their own pace. These platforms support document sharing, threaded discussions, and access to pre-recorded lectures, offering flexibility across all assembly formats. Asynchronous participation is particularly valuable for accommodating diverse schedules, allowing members to contribute thoughtfully and revisit materials as needed (Strandberg & Grönlund, 2018; Friess & Eilders, 2015).

The selected cases demonstrate the diverse ways digital tools are utilized in CAs, as well as highlight the diversity of digital tools. For instance, the Spanish CA employed a rich combination of tools for both synchronous and asynchronous collaboration. Zoom was used for video conferencing, while interactive platforms like Groupmap, Mural, Jamboard, and Miro facilitated real-time interaction. For asynchronous collaboration, the assembly adopted Decidim, an open-source software that enabled members to access materials, share information, and participate in draft recommendation forums. Notably, despite being primarily online, voting was conducted in person to maintain participant engagement, with provisions for remote voting for those unable to attend. Similarly, the fully online German CA relied on Zoom for live deliberations and the Howspace platform for asynchronous collaboration, complemented by Mural for recommendation development. The French CA also used Zoom for live discussions but incorporated the Jenparle platform for asynchronous tasks and ProVote for secure voting.

Hybrid assemblies also successfully integrated digital tools. The Luxembourgish CA used optional online expert sessions alongside in-person weekends and employed Basecamp for asynchronous coordination. In the second phase, which was primarily online, Basecamp facilitated structured communication and collaboration within working groups. The Austrian CA, which was largely in-person, incorporated the asynchronous tool Slack to facilitate communication and information sharing between physical meetings. However, not all CAs utilized a comprehensive suite of digital tools. The Finnish CA, for instance, conducted their deliberations, including voting, fully online via Zoom, but chose not to adopt an asynchronous platform. This decision was intentional and reflected the short-term nature of their assembly (April 22–25, 2021), showcasing that the adoption of digital tools often depends on the specific needs, duration, and logistical considerations of each assembly.

These examples underscore how digital tools are used to enhance communication, collaboration, and voting within CAs (see Deseriis, 2023; Shin et al., 2022 for an overview of digital participatory platforms), while also illustrating the various approaches to integrating digital solutions depending on the assembly's format – online, hybrid, or in-person. A key takeaway is that the selection of digital tools is largely shaped by the specific requirements of the assembly, including its format, duration, and logistical considerations.

Discussion: digital tools and input, throughput, and output

The previous sections highlight that digital tools play an essential role throughout the entire lifecycle of a CA, from the design stage to post-assembly, thereby shaping input, throughput, and output. It also underscores how digital tools are not merely auxiliary; they are integral to the operational effectiveness of the assemblies, including the volume and flow of information, maxi-public engagement, and participation, ultimately aiding the transparency and legitimacy of the deliberative process.

Input

The use of digital tools in CAs enhances input legitimacy by broadening participation and ensuring a more inclusive foundation for the deliberative process. Before the assembly begins, tools like online surveys and digital platforms can facilitate preliminary consultations, allowing the wider public to suggest topics, provide feedback on potential themes and experts, and contribute ideas for solutions. These 'pre-engagement tools' help shape the assembly's agenda by incorporating input from a wide range of people, beyond institutional elites or participants. Notably, this early feedback ensures that the assembly aligns with public concerns and societal priorities, making the process more inclusive and relevant from the outset. By gathering input before deliberations begin, digital tools contribute to developing a representative agenda, which is essential for sustaining public engagement and ensuring the assembly reflects broader societal issues. Put differently, this engagement is crucial to ensure that the process has an impact beyond those directly involved (Wells et al., 2021).

Throughput

Once the assembly process is underway, digital tools remain crucial for maintaining engagement with the maxi-public and relevant stakeholders. Updates through social media or dedicated websites ensure the broader public stays informed about the assembly (Farrell et al., 2019). Building on the previous section, we can categorize the use of digital tools for information dissemination by CAs into two broad approaches:

- Static informational engagement: In this approach, CAs adopt a more restrained approach to websites and/or social media. These tools primarily serve as repositories for factual content, offering access to reference materials and basic information about the assembly's structure, activities, and outcomes. The emphasis tends to be on internal deliberation and the integrity of the process, rather than maximizing external visibility. Characteristics of this approach include limited updates, minimal use of multimedia, and little interaction with the public.
- Dynamic and interactive engagement: In this approach, CAs actively leverage digital tools for transparency, public involvement, and outreach. These

assemblies use websites and/or social media to broaden their audience, foster engagement, build public trust, and allow citizens to interact with and follow the process in real time. This approach aims to maintain momentum and visibility in public discourse. Features of this approach include frequent updates, live-streaming posting event recordings, interactive multimedia content, and collaboration with influencers.

Furthermore, 'consultation tools' play a key role in facilitating ongoing public input, feedback, and engagement throughout the assembly process. These tools are designed to maintain public involvement by allowing citizens to contribute their perspectives on discussions or interim outcomes. By enabling continuous engagement, digital consultation tools help ensure that the assembly remains responsive to public concerns and evolving sentiments. In other words, they create feedback loops that keep the assembly attuned to the needs and priorities of the broader public. Importantly, these tools ensure that the assembly's work remains transparent and accessible, preventing it from becoming a 'black box' (Rummens, 2016, p. 138; Jäske, 2019) and contributing to broader democratic discourse (Hendriks, 2016; Bächtiger et al., 2014; Newton, 2012).

In addition to enhancing public engagement, digital tools also serve as critical mechanisms for facilitating communication, collaboration, and decision-making among assembly members. Consequently, we can categorize the use of digital tools based on their primary functions and how they support the assembly's processes:

- Collaboration tools: Enable real-time or asynchronous collaboration on shared tasks, documents, or brainstorming activities.
- Communication tools: Facilitate real-time and/or delayed communication among participants.
- Decision-making and voting tools: Support voting and collective decision-making processes.

Output

After the assembly concludes, digital tools continue to play a vital role in keeping the public and stakeholders informed about the outcomes of the deliberations. Reports, summaries, and multimedia content are distributed via websites and, in certain cases, social media platforms, ensuring that the assembly's findings and recommendations are widely accessible. Furthermore, digital tools allow for the archiving and public accessibility of all materials related to the assembly, creating a transparent record that future assemblies or other democratic processes can reference. This serves not only as an accountability mechanism but also as a means to enhance the legitimacy of the process by making decision-making fully transparent, thereby strengthening the credibility of the assembly.

Beyond the dissemination of information, digital tools offer opportunities for continued engagement even after the assembly has concluded. For example, online platforms could host post-assembly surveys or discussion forums where the public

can reflect on the assembly's outcomes and provide feedback on the process itself. This continued engagement fosters a sense of ownership and participation in the democratic process, even after the formal deliberations have ended. However, this potential for ongoing engagement is often underutilized, as evidenced by the fact that none of the observed CAs made use of these tools post-process – at least not that we could find. Based on the cases considered in this chapter, it appears that information dissemination and public engagement typically cease once the assembly concludes, limiting the opportunity for sustained dialogue and reflection on the outcomes.

Digital tools and challenges

This chapter has highlighted that, despite considerable variations, digital tools are deeply integrated into CAs, facilitating the flow of information, expanding public engagement, and shaping communication, collaboration, and voting among participants. At the same time, these tools present significant challenges that must be carefully addressed to fully realize their potential.

First, when it comes to the flow of information, striking the right balance between openness and privacy can be difficult, particularly when it comes to publishing details about participants, deliberations, or sensitive topics. CAs choosing a more active and transparent online presence face their own set of challenges. Live-streaming deliberations and making recordings available on platforms enhance accessibility and openness, but they also carry risks. Complex discussions can be misinterpreted, and misleading narratives can arise from decontextualized snippets of debate. This is particularly concerning in politically sensitive or controversial topics, where misinformation can distort public perceptions of the assembly's work. Additionally, CAs often address intricate policy issues, and the necessary simplification of content for websites and/or social media can lead to misunderstandings. In politically charged environments, assemblies may also face backlash or targeted disinformation campaigns that undermine their credibility. Managing these risks requires careful moderation and fact-checking, which can be resource-intensive. Without proper oversight, social media, and even websites, can become a platform for controversy rather than constructive engagement. More practically, some CA websites suffer from poor design, making navigation challenging. Confusing layouts and a lack of translation options can hinder access to important information, deterring public engagement and limiting the reach of the assembly and its findings.

Moreover, the effectiveness of digital outreach also depends on the platforms used and the target audience. For instance, TikTok influencers and Twitch collaborations may prove successful in engaging younger audiences on climate issues, but these strategies might not reach older or less digitally connected citizens. This digital divide poses a challenge for assemblies aiming to engage a diverse public, highlighting the need for a multi-channel communication strategy that blends social media and websites with traditional outreach methods, such as conventional media. Finally, digital engagement typically declines sharply after the assembly process

concludes; updates become infrequent or cease altogether once deliberations end, with some websites/accounts even being deleted. In doing so, CAs may miss out on opportunities to sustain public interest and discussion after they conclude. Essentially, while digital tools are currently perceived as predominantly effective for real-time engagement, their potential for fostering long-term public dialogue and impact remains largely untapped.

Hence, while digital tools can be powerful tools for information dissemination and public engagement, their effectiveness relies on strategic use, safeguards against misinformation, and adequate resources. Indeed, maintaining an effective and transparent online presence requires significant time and resources, which is why certain assemblies prefer to adopt a more passive/restricted approach and intentionally prioritize the deliberative process over digital outreach (Paulis et al., 2024).

Second, while digital tools can significantly enhance public engagement in CAs, their implementation also presents several challenges. One primary challenge in using digital tools for public engagement is ensuring transparency about how public contributions are used and how they influence the assembly's proceedings (Devaney, Brereton et al., 2020; Devaney, Torney et al., 2020). Even if a wealth of feedback is collected, it must be clear how this input is integrated and communicated to assembly members. If the public cannot see how their contributions are being considered or if there is a lack of follow-up on their submissions, the entire process can appear disconnected and superficial, which may diminish trust and participation in future engagements. Furthermore, those who participate in these processes are often self-selecting and may not represent the broader population. While digital platforms have the potential to engage a wide population, they often face issues of digital exclusion. Certain groups, such as older individuals, people from lower socioeconomic backgrounds, and those with limited digital literacy or access to technology, may be left out (Carmi & Yates, 2020; Strandberg & Grönlund, 2018; Grönlund et al., 2009). This exclusion can skew participation, leading to biased outcomes that do not fully encompass the diverse perspectives of the broader public. Moreover, while digital tools can facilitate large-scale engagement, simply reaching a large number of people does not guarantee meaningful participation. Indeed, respondents are frequently not required to engage with evidence before submitting their ideas and feedback.

Third, the integration of digital tools also presents challenges regarding participation. Whereas these challenges vary based on the specific context, namely the tools being used and the assembly's nature, a few challenges and issues are uniform. First, not all assembly members may have equal access to reliable internet connections, digital devices, or the technical skills required to navigate online voting platforms. This digital divide can create barriers to participation, particularly for older members, those in rural areas, or individuals with limited technological proficiency (Carmi & Yates, 2020; Strandberg & Grönlund, 2018; Grönlund et al., 2009). In a similar vein, participants, or even the broader public, may feel that the digital format undermines the legitimacy of the process. This may be especially true for fully online assemblies where the lack of physical presence can make the process seem less authentic or transparent. Furthermore, reliance on digital platforms makes assemblies vulnerable to technical failures, such as platform crashes,

connectivity issues, or slow response times. Moreover, the implementation and maintenance of digital tools, including software subscriptions, training, and technical support, can be costly. Smaller assemblies with limited budgets may find it difficult to invest in the necessary infrastructure or professional support. Finally, digital tools, particularly those that handle voting, may pose risks to confidentiality and security. One of the most significant challenges is ensuring the security and integrity of the voting process. Additionally, verifying the identity of remote voters without breaching privacy poses a challenge, as organizers must strike a balance between security and ease of participation.

Fourth, in the context of using CAs to address climate change, digitalization has faced growing criticism for its environmental drawbacks, particularly in terms of high energy consumption, greenhouse gas emissions, and the toxic disposal of electronic waste (Murugesan, 2008). Moreover, research suggests that electricity consumption itself is a significant contributor to environmental degradation (Asongu et al., 2020; Tamburini et al., 2015).

Conclusion

As this chapter navigated through various European experiences, we unraveled the scope and diversity of digital tools employed in CAs, revealing a dynamic landscape where technology plays a pivotal role in shaping the deliberative processes – both for participants and the wider public. This chapter underscores the versatility of digital tools, finding that although each assembly tailors its digital strategy to align with its unique goals and contextual considerations, including resources, several similarities are found. We put forward that the analyzed CAs employ a variety of online tools to (i) disseminate information to the maxi-public, stakeholders, and participants, (ii) facilitate public engagement and input, and (iii) enhance collaboration, deliberation, and decision-making among participants.

The use of digital tools marks a strategic and innovative approach in the realm of participatory climate governance, with their impact extending beyond the assembly room. By embracing such tools, CAs are breaking down – geographical – barriers, reaching an audience eager to stay informed about climate deliberations. In this sense, these tools play a pivotal role in democratizing access to information and fostering an inclusive dialogue on the urgent challenges of climate change. However, it is essential to acknowledge the importance of striking a balance between technological innovation and the preservation of the core democratic principles that underpin these assemblies. Issues of security and privacy, accessibility, digital literacy, and the potential for exclusionary practices must be carefully addressed to ensure that the benefits of digital tools are realized equitably across diverse communities. Assemblies might explore emerging technologies like artificial intelligence to enhance the efficiency and inclusivity of the assembly (Landemore 2024), as well as explore the potential of augmented reality and virtual reality technologies to enhance engagement and understanding of complex climate-related issues. It is likely that as these technologies continue to develop, we can expect to see more innovative and creative ways to use these technologies to support citizen participation in climate policymaking.

In conclusion, this study offers an inductive and exploratory first step in understanding the role of digital tools in CAs. While it highlights both successes and challenges, it is important to recognize that this chapter is just the beginning. As an initial foray into this area, it sets the stage for future research and deeper investigations into the intersection of digital tools and democratic processes, particularly in the context of citizens' assemblies. We hope this work inspires further inquiry and provides valuable insights for researchers, policymakers, and practitioners looking to explore how digital technologies can shape and enhance the effectiveness of citizens' assemblies.

Notes

1 The selection of these 11 cases is informed by insights and resources from the Knowledge Network on Climate Assemblies (KNOCA).
2 Rather than maintaining a dedicated account, it operated through a shared account used for all citizens' assemblies in the country.
3 Future research could explore these factors in more depth.

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