
Taking Future-Oriented Sensemaking Online: An Infrastructural Perspective

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Abstract: As organizations increasingly turn to online settings for strategic planning and foresight endeavors, fundamental questions arise of how this affects sensemaking activities: traditional sensemaking perspectives implicitly assume the availability of physical co-presence and its associated affordances. However, when sensemaking ‘moves online’ these taken-for-granted foundations are diminished. Drawing on data from a series of inter-organizational foresight workshops that were held both online and offline, we identify an underlying ‘sensemaking infrastructure’ consisting of three pillars that appear to be fundamental for sensemaking to take place in digital arenas: *cognitive involvement, social engagement and prospective entanglement*. Our study contributes to the literature by extending the sensemaking perspective with an infra-structural lens, shifting the analytical focus from sensemaking processes to the resources and prerequisites necessary for sensemaking to effectively take place in the digital realm. Concurrently, we provide actionable insights and facilitation approaches for building online settings that are conducive to making sense of the future.

Keywords: Forward-Looking Sensemaking, Online Collaboration, Infra-Structure, Workshops.

1 Introduction & Research Objective

The convergence of increasing global uncertainty and rapid digitalization has transformed how organizations engage with their futures (Gümüşay & Reinecke, 2024; Hinds & von Krogh, 2024): contemporary organizations face unprecedented turbulence, from geopolitical tensions (WEF, 2026) and climate change (Calvin et al., 2023) to emerging technologies (Eulaerts, Grabowska & Bergamini, 2025) and socio-political instability (Ghirotto & Vandoren, 2025). Simultaneously, expanding digital affordances have created new possibilities for distributed collaboration (Autio et al., 2018), evolving toward immersive virtual environments (Standaert, Muylle & Basu, 2021). This

intersection means that organizational sensemaking, the process through which people give meaning to collective experiences and enact their environments (Weick, Sutcliffe & Obstfeld, 2005), increasingly takes place in online settings.

Meanwhile, the contemporary sensemaking perspective rests on a largely taken-for-granted assumption of embodied, physical co-presence (Cunliffe & Coupland, 2012) (Cunliffe & Coupland, 2012). In offline settings, sensemaking draws on a rich substrate of material and social resources that physical environments naturally provide: spontaneous face-to-face interactions (Gruber, Hargittai & Nguyen, 2022), spatial and material engagement (Stigliani & Ravasi, 2012), and subtle embodied cues exchanged intersubjectively (De Rond, Holeman & Howard-Grenville, 2019). When organizations move sensemaking online, digital arenas strip away this natural scaffold (Daft, Lengel & Trevino, 1987; Dennis, Fuller & Valacich, 2008), challenging our understanding of how actors collectively engage in these complex, inherently social processes of meaning-making. This challenge is particularly acute for future-oriented activities, where organizational actors collectively notice, interpret, and enact futures that have not yet materialized (Gephart, Topal & Zhang, 2010; Whyte, Comi & Mosca, 2022). While prior research has examined various resources necessary for sensemaking, albeit often in isolation (Mesgari & Okoli, 2019), limited attention has been paid to how those resources need to be structured to enable sensemaking specifically in online settings.

To address this gap, we ask: *'Which infra-structural elements are required for future-oriented sensemaking to take place in digital arenas?'* Drawing on systematic observation of a series of inter-organizational online foresight workshops and interviews with participants and facilitators, we identify three infra-structural pillars: *cognitive involvement, social engagement, and prospective entanglement*. Our study contributes in three ways. First, we extend sensemaking theory by reinforcing decentered perspectives (Hultin & Mähring, 2017; Introna, 2019), shifting analytical focus from sensemaking processes to the infrastructures that enable them. Second, we empirically elaborate infra-structural domains that shape future-oriented sensemaking in digital arenas. Third, we develop actionable design principles and facilitation approaches for organizations seeking to conduct effective online foresight activities.

2 Conceptual Foundation

Resources of Future-Oriented Sensemaking

Sensemaking is the process through which organizational actors construct meaning from ambiguous stimuli, developing plausible accounts that enable action (Maitlis & Christianson, 2014). While retrospective sensemaking works with the raw material of lived experience (Weick, 1995), future-oriented sensemaking must construct meaning from 'fictional expectations' (Beckert, 2021, 2016), considering the probable future impact of actions through projection, simulation, or imagination (Gioia et al., 1994; Peng, 2018). It thus involves not merely predicting but actively constructing plausible futures to enable meaningful action in the present (Stigliani & Ravasi, 2012). Regardless of its temporal orientation, sensemaking draws on a rich but often taken-for-granted set of 'sensemaking

resources' (Gephart, 1993) that are abundantly available in settings of physical co-presence (Whiteman & Cooper, 2011). Consider a typical scenario planning process: participants spread out trend reports and scenario cards, cover walls with timelines and vision boards, and leverage their 'knowledge structures' (Kaplan, 2011; Walsh, 1995) to transform individual insights into shared understanding. Informal exchanges during breaks catalyze breakthrough insights (Fayard & Weeks, 2007; Viererbl, Denner & Koch, 2022), skilled facilitators read body language to monitor engagement (Dufva & Ahlqvist, 2015; Healey, Vuori & Hodgkinson, 2015), and the physical space itself is configured to support both small-group work and collective visioning (Taylor & Spicer, 2007; Wright et al., 2023). This resource-rich scaffold is particularly consequential in the deliberate 'arenas' where future-oriented sensemaking is cultivated like strategy, innovation, and foresight workshops, which traditionally rely on physical co-presence to foster the embodied understanding that emerges through direct interaction (Ala-Laurinaho et al., 2017; Ørngreen & Levinsen, 2017).

Moving Future-Oriented Sensemaking Online

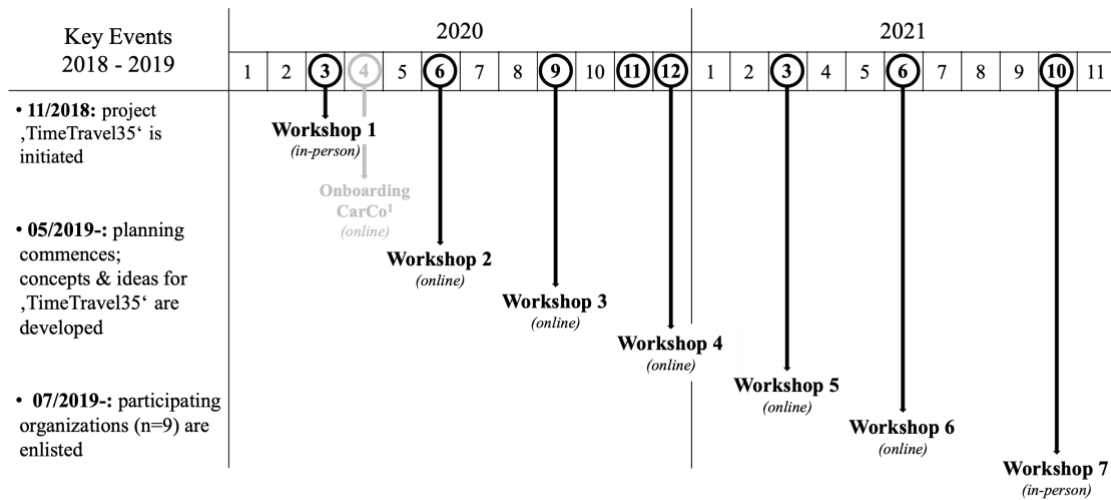
Online workshops have evolved from pandemic-era emergency measures into permanent organizational fixtures (Lim, 2024a), offering genuine advantages: they democratize participation across geographies (Anene & Idiedo, 2023; Becerra et al., 2021), reduce costs and carbon footprints (Hesse-Biber & Griffin, 2013; Ong, Moors & Sivaraman, 2014), enable parallel contributions through digital tools like breakout rooms and collaborative whiteboards (Lim, 2024b), and produce persistent, revisable documentation (Becerra et al., 2021; Singh, 2020). Yet, shifting these workshops online simultaneously compromises the scaffolding that makes sensemaking possible. Three domains of resource loss are particularly salient. First, cognitive capacities become strained through videoconferencing fatigue (Bailenson, 2021; Beyea et al., 2025), information overload (Hantula et al., 2011; Karl, Peluchette & Aghakhani, 2022), and the burden of managing multiple digital tools alongside remote distractions (Lim, 2024b; Mitchell, 2021). Second, social interaction deteriorates as spontaneous exchanges disappear, replaced by scripted interactions that inhibit fluid dialogue (Davies et al., 2021; Fayard & Weeks, 2007), while reduced nonverbal cues impair facilitators' ability to gauge engagement and manage group dynamics (Bailey, Leonardi & Barley, 2012; Bohannon et al., 2013). The ad-hoc conversations that serve as essential venues for testing ideas and building interpersonal connections underpinning collective sensemaking become structurally inaccessible. Third, material and embodied resources are diminished as participants can no longer physically manipulate objects, rotate prototypes, or engage with 'prospection devices' (Comi & Whyte, 2018). This loss of haptic feedback compromises the capacity to process and embody ideas about possible futures (Bruskin & Mikkelsen, 2020; Gatzweiler & Ronzani, 2019), undermining the visceral engagement required to bridge temporal horizons and anchor abstract possibilities in tangible experience (Hernes & Schultz, 2020; Whyte, Comi & Mosca, 2022).

In conclusion, while 'moving online' provides organizations with unique affordances for enhancing sensemaking, they also impair the taken-for-granted resources that allow it to function effectively. This paradox leads us to the challenge of how organizations can engage in the complex, embodied, and inherently social processes of collectively making sense of potential futures when its foundational components have been compromised.

3 Methodology

Case Setting

The backdrop to this research is a series of seven foresight workshops taking place between March 2020 and October 2021, conducted with a group of around 25 participants with different functional backgrounds (e.g., CEOs, innovation managers, domain experts) coming from nine different organizations in the Austria and Germany region as they participated in a technological foresight campaign, dubbed ‘TimeTravel35’. Due to Covid 19 restrictions, five of the seven workshops had to be conducted online, utilizing videoconferencing- and online-collaboration software. Figure 1 illustrates the basic timeline of events.



¹ Due to Covid 19 restrictions one company was not able to attend the first workshop and instead took part at an online-onboarding session initiated by the organizing team.

Figure 1 Basic timeline of events for project ‘TimeTravel35’

Data Collection

We selected a qualitative research design (see e.g., Cunliffe, 2015; Van Maanen, 2011) and followed ‘TimeTravel35’ in its entirety. Data collection included notes taken by the authors throughout the whole project in general, as well notes on participant observations. These field data were underpinned by semi-structured interviews conducted at various points of the foresight initiative, both with actors from the participating firms as well as members of the facilitation team, audio and video recordings of various workshop elements (e.g., feedback rounds, collaborative elements), digital correspondences between the facilitators and the participating firms, as well as documents produced before-, during- and after the workshops. Table 1 gives a detailed overview of the data.

Table 1 Data Sources

Data Category	Description	Amount
Recoding data	Interviews with participants at various points between workshops	n = 40; ~38h (~600 pages of transcript)
	Recordings of workshops during various points of workshops	n = 68; ~20h (~300 pages of transcript)
	Internal meetings with facilitating team	n = 11; ~6h (~100 pages of transcript)
Field data	Personal notes & observations: Starting from early 2019 until after conclusion (11/2021)	~150 pages
	Correspondences with participants: Emails, personal correspondences	~100 correspondences
Documents	Workshop documents: Presentation slides used by facilitation team, schedules, summaries, protocols	~60 documents
	Analog & digital interaction- & collaboration data: Flipcharts and Post-It's, Mural & Miro-boards	~1000+ documented statements
	Internal communications: Notes by facilitation team, correspondence between facilitation team members	~200 pages

Data Analysis & Coding

Data analysis for our study adheres to established qualitative approaches (Bazeley, 2013; Gioia, Corley & Hamilton, 2013; Miles, Huberman & Saldaña, 2014) for interpretative research. In the *first* step, we gathered, organized and temporally bracketed our data to provide us with a comprehensive overview over the extensive and heterogeneous dataset. *Second*, we strategically prioritized data collected in the final round of interviews with participants and the facilitators, conducted approximately one year after the conclusion of the foresight initiative. *Third*, analyzing these prioritized data, we initially created concept codes including detailed analytic memos for each code (Saldaña, 2021), which allowed us to develop a preliminary framework for understanding structural elements necessary for future-oriented sensemaking in digital arenas. *Fourth*, we proceeded with more in-depth content analysis (Krippendorff, 2013) of our strategically selected data subset, building up a comprehensive set of both descriptive codes (i.e., capturing what participants and facilitators were doing) and structural codes (i.e., identifying how these activities related to broader structural requirements for taking sensemaking online). *Finally*, through iterative analysis of these coded interactions, we identified how various workshop elements functioned as structural components for future-oriented sensemaking.

4 Analysis ----- UNDER CONSTRUCTION! -----

“In the online setting, everything needs to be planned so precisely.” – Facilitator A

Following the iterative coding process outlined above, a recurring pattern emerged: online future-oriented sensemaking appeared to be contingent to an underlying architecture of conditions and resources that must be actively curated in digital settings for collective meaning making to occur, be coherent, and productive. We conceptualize this deliberately created scaffolding of interdependent elements that compensate for the consequences of the absence of physical co-presence as sensemaking infrastructure. Unlike with co-located, physical settings, this infrastructure was not naturally available but had to be deliberately constructed and curated. To describe this infrastructure, we first identified discrete practices employed, primarily by the facilitators, throughout the online workshops and clustered these practices into broader building blocks, which we subsequently theorized into three overarching infrastructural pillars of online future-oriented sensemaking: cognitive involvement, social engagement, and prospective entanglement. Additionally, we identified a foundational layer upon which the structure for online sensemaking was built. See Figure 2 for an overview of this structure.

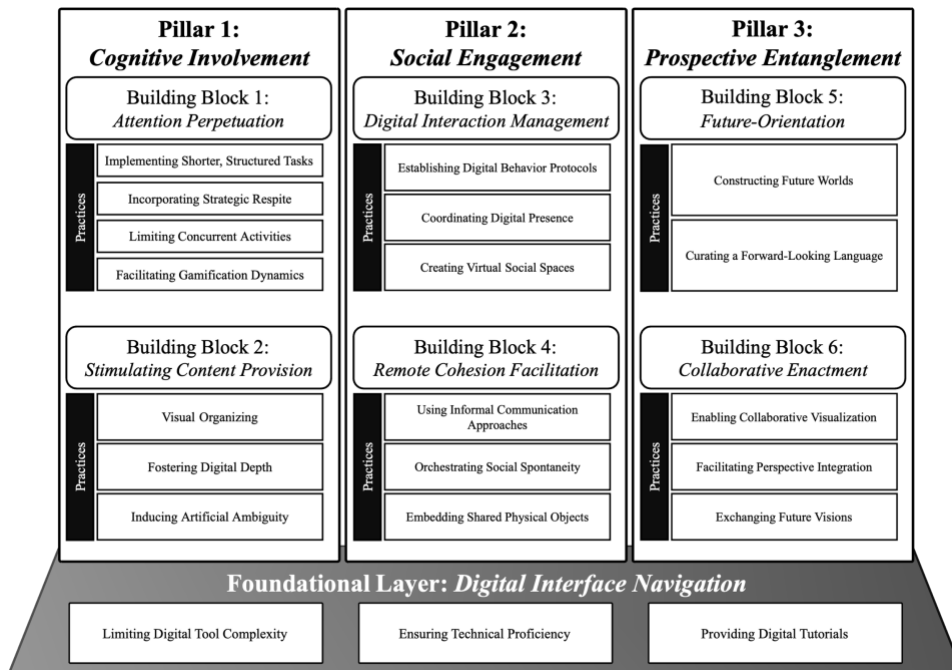


Figure 2 Infra-structural pillars, building blocks & practices for taking future-oriented sensemaking online

Digital Interface Navigation. First, we identify *digital interface navigation* as a foundational layer upon which the structure for online sensemaking is built. It encompasses the practices through which the technological complexity is managed while maximizing collaborative potential in online sensemaking environments. This foundational layer

addresses how combinations of specific practices balance comprehensive digital functionality with accessibility, recognizing that excessive technological complications can undermine actors' capacity for future-oriented sensemaking. The three core practices identified constitute this layer: the deliberate limiting of digital tool complexity, ensuring technical proficiency among participants, and the provision of digital tutorials. Together, these practices establish the baseline conditions of accessibility and functional competence which the three pillars presuppose.

"In my view, it's better to stick to a manageable number of tools—one, two, three. That way, the transitions remain manageable and easy to communicate—which is essential so that everyone has the same information. But if I have five different tools and then say, 'Now let's do a Mentimeter poll, and please go into this virtual space and put on your VR headsets,' then I think it becomes difficult."
– Participant A - Head of Corporate Incubation PlastiCo

Cognitive involvement. Building on this foundation, *cognitive involvement* represents the first critical requirement for collectively making sense of futures in virtual environments as it addresses the fundamental challenge that digital settings place disproportionate demands on participants' cognitive sensemaking resources. It encompasses the cultivation of the necessary cerebral conditions for participants to effectively process complex information, maintain sustained attention, and engage in thinking about potential futures despite the constraints of digital contexts. It is constituted by two primary building blocks: *attention perpetuation* and *stimulating content provision*. The first encompasses practices for sustaining cognitive engagement through deliberate structuring of time and activities which include implementing shorter, structured tasks, incorporating strategic respite into the workshop flow, limiting concurrent activities that participants must simultaneously attend to and facilitating gamification dynamics. The second building block refers to practices that utilize visual collaboration tools as documentation and orientation devices, foster the build-up of shared experiential knowledge, and introduce challenging inputs, like the deliberate induction of artificial ambiguity, to prevent cognitive disengagement.

"We had to accept that mental fatigue would set in. That was the goal: by the end of the four-hour workshop, we wanted to have drawn out every ounce of energy the participants had to give." – Facilitator B

Social engagement. Meanwhile, the second pillar addresses the challenge that virtual environments often reduce the rich social interactions and informal connections that characterize co-located settings. Collective sensemaking depends on participants developing trust, mutual understanding, and a sense of shared purpose. In digital arenas, these interpersonal connections are not given but need to be actively cultivated. We identified two building blocks governing this pillar. *Digital interaction management* addresses the paradox of simultaneous connection and disconnection in digital settings through practices that establish digital behaviour protocols, coordinate digital presence, and create dedicated virtual social spaces. *Remote cohesion facilitation*, meanwhile, focuses on generating collective identification and mutual engagement that substitutes for physical co-presence, primarily through informal communication approaches, the

orchestration of social spontaneity, and the embedding of shared physical objects into a digital environment.

“Most vividly, I remember the thing with the surprise packages during the breaks. That felt like a collective unboxing experience!” – Participant B – Innovation Manager BankCo

Prospective Entanglement. Finally, prospective entanglement addresses the core challenge of online future-oriented sensemaking: enabling participants to collectively imagine, evaluate, and construct meaningful accounts of potential futures despite the constraints of digital mediation. Two building blocks underpin this pillar: *future-orientation* encompasses the construction of future worlds and the curation of a forward-looking language for allowing discourse to establish common reference points and shared temporal horizons. Collaborative enactment encompasses the practices through which these future worlds are built jointly, including enabling collaborative visualization, facilitating the integration of diverse perspectives, and structuring the exchange of future visions among participants.

“It wasn’t just about watching. It was about really letting people work in Miro. When you feel like someone is working next to you, on your idea, on your slide, then you just work along.” – Participant C – Head of Corporate Strategy WeldCo

5 Outlook & Areas for feedback & development

While the above description of our findings presents the pillars as analytically distinct, we are aware that this separation is artificial and that these pillars are interdependent. Tracing and theorizing for instance, how failures in digital interface navigation ripples through into cognitive overload, or how weak social engagement undermines the collective imagination required for prospective entanglement is something that has not been fully fleshed in this abbreviated version. Additionally, the arguments for our analysis as shown here rest predominately on statements made by participants and the facilitation team. We have examined a much broader array of data (see Methodology section for reference) but have not fully incorporated them in our conceptualizations yet. Ultimately, the goal for this research project would be to utilize these data to create a framework that better highlights the interdependencies and more robustly demonstrates the identified concepts and ideas thus fleshing out the infra-structural perspective and in a better way.

Our initial plan would have been to submit this research to a journal open to publish practical and actionable insights. We recognize, however, that the theoretical base of sensemaking would also lend itself to publication in other journals like the reviewer mentioned. Consequentially, we value any form of feedback and/or direction from the reviewers!

Acknowledgements

This work has been supported by the COMET-K2 Center of the Linz Center of Mechatronics (LCM) funded by the Austrian federal government and the federal state of Upper Austria.

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