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# Don't push the wrong button. The concept of microperspective in futures research

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## Abstract

In this paper, we introduce the notion of a microperspective to futures research. Contrary to the more traditional timespans of futures research that are measured in years or decades, a microperspective focuses on shorter timespans that can be measured even in minutes. We point out that the use of a microperspective can provide an understanding of the central issues of futures research from a new angle. These issues involve the difficulties in estimating the future, the entanglement of the future with accounts of it, and the (in)ability to relate to certain futures. We argue that a microperspective can provide an understanding of how patterns shaping the future are created, how people respond to patterns, and how conflicts and misunderstandings shape the future. As an illustrative case, we discuss how the workings of elevators and the development of predictive algorithms in Kone corporation shape the future moment-by-moment in an interaction between the users and the developers. A microperspective shows how the different temporal orientations of the actors and their different interpretations of the environment interact. The case indicates that a microperspective can provide a novel way to study some of the central issues in futures research. The case also indicates that the notion of a microperspective is not merely an academic concept but has practical utility in planning and creating the future.

KEYWORDS

action, microperspective, patterns, temporality, time

## 1 | INTRODUCTION

*Time* is a central notion in futures research. This is not true only because *the future* is a time-oriented notion but because time and temporally structured events and processes shape the future. The notion of *time* and the temporal orientation of futures research with respect to the future and past have been discussed in the literature. For example, Bell (2009 [1997]) discusses the meanings of time and argues that "[u]nderstanding the measurement and meaning of time is absolutely basic to futures thinking" (2009, 162). Inayatullah (1993, 235) discusses the development of an interpretative community and argues that "an ideal theory of the future must be able to problematize time and to negotiate the many meanings of time." More recently, conceptions of time and temporality in futures research have been mapped and discussed by Brier (2005) and Nordlund (2012). Also, Wagner and Matuszek (2022, 11) discuss various temporal structures in functional systems and how differences in temporalities "shape the relations between expectations, decisions and observations of these decisions." Moreover, Bauer (2018,

43) notices that "With the limitation of the future time that is considered, authority and control over the 'content' of the future is exerted, that is, possibilities for particular images of the future and related courses of action are opened up and closed down."

It is both understandable and remarkable that, in futures research, the discourses on time, temporality, and their structure have focused on relatively long timespans, measured in years. The focus is understandable because the practical relevance of futures research depends on its ability to discuss longer timespans, and the theoretical framing in terms of possible, desirable, and alternative futures requires time for changes—the realization of possibilities and achievement of goals require time.[1] The focus on these longer timespans seems to stem from the human-centrality of futures research, that is, on the idea that human cognition, values, and actions shape the future and thus are central to futures research. On the other hand, the focus on longer timespans is remarkable because short timescales can provide important insights into temporality itself and into the core issues in futures studies, such as knowing the future, colliding intentions of different groups, and the relationship between human action and technological environment—or so we argue in this paper.

In this paper, we argue that a focus on relatively short timescales enables futures research to highlight the aspects of reality and temporality that shape human actions and behavior but remain opaque to, and disconnected from, those who act. The short timescales suggest a rather different view on *when* and *where* a future consequence of an action is determined and, therefore, new grounds for rethinking the sources of insight in futures research. It follows that to understand events and processes in one timescale, one must study various timescales. This helps us to understand better the ontological, epistemic, and axiological issues in futures research.

In what follows, we discuss time and temporality from a *microperspective* by focusing on the relationship between human actions and predictive algorithms in elevator use. In this context, the relevant time intervals are measured in minutes, but many important future-related phenomena become visible when carefully analyzed. This deceptively simple and concrete case shows the need to critically engage with conceptions of time and temporality. While it has been already noted in the literature that there are "multiple dynamics of limiting and expanding the future in time," (Bauer, 2018, 37), there has been no expansion of the time horizons of futures research towards the very near future that can occur even minutes away. In this paper, we provide this "expanding by limiting." We argue that a microperspective can shed novel light on core issues of futures research, and therefore, the timespan of futures research can be expanded inwards, that is, towards the very near future, rather than only towards more distant futures.

This paper examines the future, time, and temporality on two interrelated levels:

1. It analyses the connections between timescales and core questions in futures research. By broadening the view of the field to include short timespans, we gain fresh perspective on difficulties in estimating futures, the entanglement of the future with accounts of it, and people's relation to the future.
2. It analyzes how different actors' differing temporal orientations shape the construction of the future through their actions. We argue differing orientations towards time affect how the future unfolds. Understanding micro-level temporal orientations provides insight into longer-term developments they shape through action and interaction between groups.

These two levels are connected. Understanding core issues in futures research requires examining time and action on a small scale. We argue that adopting a microperspective carries the promise of providing novel insights into futures research and provide a case study to indicate this. It affirms how certain core difficulties in the field are related to different actor's different orientations towards time.

We proceed as follows. In Section 2, we discuss how time and temporality have been thought of in futures research and what types of questions the discourse has highlighted and hidden. We point out that temporal distance itself is not constitutive of futures research, but rather, it is related to the central issue of futures research. These issues concern knowledge of the future, the effects of human activity and beliefs on the future, and how futures are found relatable or desirable. In Section 3, we argue that, by contradicting the tradition in futures research, a microperspective on time can shed novel light on these central issues. We provide an outline of how a microperspective can provide insights into the core issues of futures research and be relevant for understanding longer scales. In Section 4, we introduce our case, the use of predictive algorithms in Kone corporation. We argue that the case highlights how a microperspective on time and different temporalities in the making of the future enables us to understand better how the future is constructed and how it is interpreted. The case study indicates that the notion of *a microperspective* is not merely, and academic concept but has practical utility in planning and creating the future. In Section 5, we discuss how a microperspective on human action and thinking highlights broader implications for understanding and managing expectations, reactions, and improvisations in long-term planning and coordination. We discuss how it reveals systemic social-technical gaps and the importance of reconciling immediate experiences with future orientations. In Section 6, we discuss the value of a microperspective in addressing ontological, epistemological, and axiological questions related to desirability and inclusiveness in futures research. In conclusion, we argue that time, temporality, and temporal structures of events require nuanced attention and that there are many ways in which these elements shape the future that go beyond the traditional timeframes of futures research.

## 2 | TIME AND THE THEMATIC OF FUTURES STUDIES

Futures research has focused on relatively long timespans, ranging normally from 5 to 50 years (Nordlund, 2012; see also Bauer, 2018). However, it is unclear why this is so, or has to be so. Why is 5 years from now a future while 5 min is not? The possible answers reflect the history of futures research as well as the goals and nature of the field. First, the historical roots of futures research in national and military planning (Bell, 2009, 19; 28–31) probably contributed to the adoption of specific timeframes that were seen as useful in the domains and that thereby shaped the methodological innovations (Bell, 2009, 30). Second, futures research and futurist have been in the service of clients, and the effect of this is reported by Brier's (2005, 843) survey. Third, there has been a need for academic identity that separates futures research from mere client-oriented foresight (Brier, 2005, 838–840), from those who discuss the near future in media (Brier, 2005, 840), and from other fields of research. This final point, concerning the "scientific" identity, is related to the fourth answer: The basic tenet of futures research is to study possible, probable, and desirable futures are studied (Amara, 1974; Bell, 2009). An essential component in this mapping of futures is the critical study of our own conceptions that different views on the future (Bell, 2009; Inayatullah & Milojevic, 2015; Inayatullah, 1998). Given this, there has to be room for change that could lead to alternative futures. As reported by Brier (2005, 841; see also Bauer, 2018), it has been explicitly stated that, in short periods of time, not enough change can happen, and thus the focus on longer timespans. What futures research studies and what thus separates it from other fields suggest a certain timespan related to the notion of *future*.

While the long timescale is justified in futures research, it would be unfortunate to conclude that futures research is nothing more than the study of what could and should happen in a *long timescale*. This is not the case. Not everything that says things about possible futures belongs to futures research even if the timescale is shared. Rather, futures research focuses on processes and factors that potentially shape the future and on the methodology that tracks these processes and factors.

To see how futures research is connected to what we wish to know, it is insightful to start from the opposite direction and see why futures research does not usually engage with very long timeframes that go beyond 50 years or so. In Brier, (2005; see Bauer, 2018 for similar insight), the following reasons are given. First, the longer timescales are beyond the needs of clients.[2] Second, people cannot relate to futures further away. Third, forecasting becomes more difficult with longer timescales for many reasons. Fourth, the further we go, the more the futures sound like science fiction to audiences. Fifth place, accounts of the future affect the future, and the longer the timescale, the more intertwined these two become. Three of these issues hit the scientific core of futures studies: difficulties in estimating the future, the entanglement of the future with accounts of it, and the (in)ability to relate to certain futures.

First, difficulties in telling the future have been extensively discussed in futures research. Many reasons for these difficulties have been given. They range from metaphysical to methodological to conceptual. For example, Bell (1997, 151) argues, following Amara, that the future is open: "The future is a domain of liberty not simply because we cannot know the future in any certain sense. It is also because the future itself is contingent, not only of our knowing of it." Methodological reasons are discussed, for example, by Gordon (1992, 35). He concludes "Do the methods work? Certainly, under limited conditions and for limited intervals. Will they ever be perfect? Not as long as chance plays a role in determining the future and people can decide to take action." Conceptual reasons are discussed, for example, by Virmajoki (2022), who argues that interesting futures can be beyond what can be conceived.

Second, that accounts of the future affect the future through human behavior have been pointed out already by Popper (1957, 13) and have been taken pretty much for granted. This entanglement is even built into the core of futures research when the field is related to the purposes of emancipation and planning (see Bell, 1997; Marien, 2002). Surely, there has also been a focus on unexpected and unintended consequences (e.g., McDermott, 1993), but this focus is logical only if expected and intended consequences serve as the contrast.

Third, people's ability to relate to certain futures is studied when (i) desirable futures are studied, and also (ii) when the participation of different groups in futures research is discussed (Bell, 1997, 93–95). For example, Sand (2019, 99) discusses different senses in which people might "not have a future" and argues that we should be "aware that there are numerous people, who neither entertain their own vision of a desirable socio-technical future [--], nor do they have the means to strategically position them in the discourse and, thereby, contribute to their realization." The (in)ability of people to work towards a future and find a future relatable, desirable, and familiar are issues that futures research studies.

The three issues discussed above that futures research studies and seeks to understand are related to timescales also when it comes to the sources of insight. As Bauer (2018, 40) notices, "Time horizons are strongly linked to the possibility and methodology of knowing the future." Inayatullah (2008) names *timing the future* as one of the six pillars of futures research. Timing "is the search for the grand patterns of history and the identification of each one of our models of change" (p. 10). In a similar spirit, Wright et al. (2013, 631) argue that one of the main objectives of futures research is "enhancing understanding: of the causal processes, connections and logical sequences underlying events—thus uncovering how a future state of the world may unfold." Timescales are also discussed in Inayatullah (1998b, 381–382), where it is argued that the "Macrohistory through its delineation of the structures of history [--] provides a structure from which to forecast and gain insight into the future. [--Macrohistory] allows us to distinguish between what are mere perturbations and what are genuine historical transformations." What can be asserted about the future depends on the type of patterns and structures that can be found in the past. Different types of patterns, for example, those that describe perturbations or genuine change, are applicable in different timescales and provide different kinds of understanding.

If we wish to understand the epistemic difficulties, the entanglement of the future with our accounts of it, and the ability to relate to the future, we need to understand the patterns that serve as a source of insight. Central and interesting questions are how patterns are constituted, why they sometimes collapse, and what this tells about people's relation to the future. Constitution and collapse are relevant to our knowledge and limits of it. The constitution and collapse also depend on how people respond to the patterns and adapt to them. Finally, the patterns and expectations they create are a tool that enables people to relate to future, and the collapse of the expected patterns creates confusion, frustration, and conflict. Next, we argue that these are issues on which insights can be provided on the basis of what we call *microperspective on time*.

## 3 | MICROPERSPECTIVE AND ISSUES IN FUTURES RESEARCH

Contrary to the more traditional timespans of futures research that are measured in years or decades, a microperspective focuses on shorter timespans that can be measured even in minutes. There are three important interrelated phenomena on which a microperspective can shed light: difficulties in estimating the future, entanglement of the future with the accounts of it, and people's relation to the future. As we saw, these three phenomena are at the core of futures research and, therefore, a microperspective can provide us with a better understanding of futures research as a field.

1. A microperspective on patterns can provide insights into long-scale patterns through ontological and analogical approaches. The ontological approach examines the smaller components and activities that make up a larger pattern to understand factors and interactions causing change. The analogical approach draws parallels between insights from a microperspective and similar long-scale patterns to recognize shared structures and behaviors and apply lessons between scales.

   Both approaches shed light on the difficulties of estimating the future. The ontological perspective reveals complexity and interdependencies underlying long-scale patterns that make future outcomes hard to forecast or control. The analogical perspective shows how short-scale collapses of patterns due to interactions provide analogies for potential long-scale collapses. In our elevator algorithm case (see below), the ontological view shows how individual user actions shape planning in unpredictable ways. The analogical view reveals how human–algorithm interactions create a dynamic relationship influencing behaviors and responses over time.

   Overall, these microperspective approaches demonstrate the interplay between human and algorithm temporal orientations in shaping the future. Humans focus on the future, while algorithms rely on past data. Analyzing these fundamentally different perspectives provides insight into factors driving long-scale patterns and the challenges in estimating future outcomes.
2. A microperspective allows closely examining subtle interactions between individuals' expectations, their environment, and their future-oriented actions. This reveals the complex entanglement between accounts of the future and the future itself. By understanding how predictions shape behaviors, and how these behaviors consequently impact the environment that shapes the future, we gain insight into the relationship between accounts of the future and the future itself. In our elevator case, despite non-transparent operational logic, users try controlling movement to serve their interests. However, different temporal orientations lead to situations where users cannot control their desired elevator movements. Still, by influencing algorithms' predictions and development, their actions shape reality on a broader scale.

   This demonstrates the entanglement between expectations and outcomes. A microperspective helps identify nuances in human behavior that are relevant to the future. In our case study, a microperspective shows how actions impact predictive algorithms and their evolution over time. Thereby, it provides an understanding of the relationship between expectations, reality, and the entanglement of accounts of the future with the actual future across scales.

   Notice that while the microperspective shares some similarities with the sociology of expectations in examining how expectations and visions are not just (re)presentations of the future but also shape the present, it takes a much broader and more holistic view of the socio-technical system (without claiming to be superior by any means—this is just a matter of different perspective and associated goals). The sociology of expectations has highlighted how future-oriented expectations and promises drive and coordinate action in the present (e.g., Borup et al., 2006). Rather than focusing solely on expectations, the microperspective provides an analytical lens for studying the complex real-time interactions, conflicts, and dynamics that constitute the future across multiple dimensions. This includes tracing the impacts of differing temporal orientations among actors, the roles and constraints imposed by technologies like algorithms, contestations over knowledge and rationality, and the materiality of actions, environments, and their consequences. By zooming in on these entanglements as they unfold moment-to-moment in timescales often consisting of minutes or so, the microperspective aims to reveal the emergent patterns, disruptions, and entanglements through which the future is actively constructed and negotiated by humans and non-humans alike. As such, it expands the analysis beyond just expectations to provide a more comprehensive view of the socio-technical dynamics shaping futures. However, a microperspective is not an exclusive conceptual tool. Elements from a field like the sociology of expectations can be used when studies from a microperspective are conducted.
3. A microperspective reveals the presence of conflicts between various groups of actors that cause a lack of coordination in their behavior. Different actors seek to define and shape reality according to their preferences, and this results in unintended consequences that none of them desire. This is interesting, as one respondent in Brier's survey (2005, 841) suggested that the timescale of futures research depends on "the number of years it takes for unintended consequences of today's dominant tendencies to become

themselves the dominant tendencies," Interestingly, this phenomenon can be observed even without a long-term perspective.

Moreover, conflicts between groups can arise even when they share the same overall goal. This highlights the complex nature of human interactions and the challenges in aligning diverse interests and priorities. A microperspective on time enables us to examine how conflicts and desires shape the future. We can see how people relate to and value certain futures, and why they find certain future situations unrelatable.

Interestingly, all three items discussed above tie together with wider perspective of futures research: As Beach (2020) has shown, people develop a "prime narrative" based on their life experiences and understanding of how the world works. They also create "derived narratives," which are simplified versions of the prime narrative used for thinking to oneself and communicating with others. These narratives are related to creation of the future and how people think and relate to the processes shaping the future. How such narratives create patterns, conflicts, and relations to the future are all issues on which new light can be shed from a microperspective, as we see in the next sections. Moreover, the cognitive biases Beach describes, like overconfidence, belief perseverance, and the challenge of changing one's prime narrative in light of new information or failed predictions, tie into the difficulties of estimating the future and indicate the complexity and interdependencies underlying long-scale patterns that make future outcomes challenging to predict. The core of Beach's argument is that individuals' narrative-based thought processes contribute to the unpredictability of larger scale patterns and outcomes. This becomes more visible from a microperspective in various ways.[3]

Table 1. summarizes the differences between a microperspective on time and the more common timeframes of futures research.

Next, we discuss the issues related to a microperspective in terms of the empirical case. We point out how patterns, responses to them, and conflict can be seen when we study predictive algorithms and elevator use from a microperspective. This indicates that fundamental issues in futures research, such as the (in)ability to find patterns and estimate the future, the entanglement of the future with human conceptions of it, and the (in)ability to relate to a future, can be understood when studying processes from a microperspective. We show that a microperspective is not only a theoretical concept to understand core issues in futures research but has consequences in a more practical long-term context such as elevator development. To plan the future, we need to understand what happens in brief moments of time and how conceptions of time shape the future.

## 4 | THE CASE: PREDICTIVE ALGORITHMS IN ELEVATOR USE AND MICROPERSPECTIVE

### 4.1 | Overview of fieldwork

In 2018, we received permission from KONE Corporation, which is one of the world's leading elevator companies, to collect research material for our research group. The goal of our research group was to map the current state-of-the-art and models in use at KONE and study the next-generation predictive algorithms to optimize the movement of elevators. We studied the technological evolution of

**TABLE 1** The difference between microperspective and the timeframes of futures research.

| Aspect | Traditional long-term approach | Microperspective short-term approach |
|---|---|---|
| Timeframe | Typically 5–50 years into the future | Focuses on shorter timespans, even down to minutes |
| Patterns and insights | Identifies long-term patterns and trends | Reveals how patterns are constituted and disrupted in brief moments |
| Human behavior | Often aggregates individual actions into broader trends | Highlights the nuances and impacts of individual human actions and responses |
| Interaction with environment | Emphasizes macro-level drivers and constraints | Emphasizes dynamic micro-level interactions between actors and environment |
| Unintended consequences | Seen as emerging over long timescales | Can manifest even in short-term interactions and conflicts |
| Relationality to futures | Focused on long-term desirability and achievability | Shows how relatability depends on immediate experiences and processes |
| Methodological focus | Looks for macro-level patterns and drivers | Zooms in on micro-level interactions and moment-to-moment dynamics |
| Limitations | May overlook short-term dynamics and granular human factors | May not fully capture broader context and long-term evolution of systems |
| Key applications | Long-range strategic planning and visioning | Illuminating how short-term dynamics shape the future and providing analogies for understanding long-term patterns that are challenging to discern with conventional timeframes |

elevators, conducted fieldwork, and were able to study the elevators in the KONE Corporation. Our article is based on interviews and our ethnographic fieldwork, which permits us to interpret the technological evolution of elevators. Our research took place at three KONE sites: its headquarters in Keilaniemi, Helsinki, its global research and development center, and its elevator production site Hyvinkää in southern Finland. We observed the multinational corporation's (MNC) daily working environment and attended meetings at KONE Corporation headquarters. In addition, we had access to KONE's annual reviews, *Urban Journeys*, and KONE's *People Flow* magazine.

It should be noted that, even though there are approximately 55,000 personnel across 60 countries worldwide, the unit that develops the algorithms to optimize elevator movement is rather small. The core of the team includes top-talent mathematicians, data analytics, and sensor technology experts. The team is called "People flow." The role of the team is very important because elevators move approximately 1 billion people a day.

Our article is based on interviews and our ethnographic fieldwork in 2018–2019, which permits us to interpret the predictive algorithms' functionality in time. We interviewed people with research, development, and innovation expertise to form a holistic picture of the elevator's main operational functionalities. Interviewees were selected based on their expertise and their hierarchical level of organization. The interviewees were experts on the internet of things, big data predictive analysis, group management, people flow analysis, digitalization, and simulator development units. All the interviewed material was recorded and transcribed, with the total amount of transcribed material coming to 67 h.[4]

During the interviews, the researchers asked a variety of questions tailored to the areas of expertise of the interviewees and their roles within the organization. The questions covered themes such as job descriptions, organizational structure, the functioning of elevator group control systems, information structure within these systems, the overall architecture of elevator group control, and the impact of group control on maintenance organization. Other topics included managing individual sensor errors, the use of statistical mathematics or machine learning models, the application of deep learning AI and key performance indicators in optimizing elevator movement, sensor technology used to capture elevator movement data, and the needs of elevator users.

In what follows, we discuss three issues that were brought up at the end of the previous section in light of the case: The constitution of patterns and how a microperspective can illuminate them; the human interpretation and response to patterns; and conflicts that cause a lack of coordination between different groups. We discuss both developers and users together to see the issues more clearly. At the end of Section 4.4, we provide a table that summarized the developers' and users' "perspectives" on different aspects of the system.

## 4.2 | Patterns

We may begin by noting that, in the case of modern elevators, the patterns of human behavior and related environment are constituted by the intentions and behavior of two groups of actors and the consequences of their decisions and behavior: the developers of the predictive algorithms and the users of elevators. The developers intend to optimize the movement of elevators and minimize the users' waiting time for elevators with mathematics. Developers intend to save time and effort in the process that moves people from one place to another.

Developers try to optimize the movement of masses of people, which is a difficult task because the movement of the masses is a random phenomenon and randomness is, obviously, hard to predict. Algorithms only tell the expected waiting time, that is, how many people are waiting for the elevator, in, for example, 15-min intervals.[5] The expected value is obtained by calculating the average of infinitely many numbers produced by the random variable, that is, in mathematics, random phenomena produce averages. It is important to notice that the time span for the elevator's optimal movement is approximately 15-min intervals. In a shorter timespan, Poisson's distribution (discrete probability distribution that expresses the probability of a given number of events occurring in a fixed interval of time and space) doesn't work. Thus, developers cannot take into account only the immediate time just before the movement of an elevator when their intention is to optimize the movement of elevators. Rather, the movement of the elevator is determined by a pattern that is detected to obtain in the previous 15 min. This 15-min pattern thereby affects what can happen in the near future. Through the algorithm, a pattern of a certain type and of a certain duration affects how the future can be.

> "Inbound traffic, out[bound traffic], movement between the floors and total traffic intensity. Four variables in every time span. We can look how much lift moves in five minutes intervals. But the problem is that the random factors in smaller intervals mess the statistics." Head of the people flow optimization

In contrast, the users are not aware of the 15-min pattern and do not care about it. When they use an elevator, the relevant temporal interval is in the immediate future. When the users push the buttons, they want to go to a certain place in the next moment. The users do not care about "historical" time (the previous 15 min) or the general outline of the future of the elevator (15 min away). Yet, their reality is constructed by historical time, and their actions only shape the outline of the future. The users are sometimes frustrated or confused about what happens due to the discrepancy between how they conceive their actions and how the actions, in fact, fit and create a pattern.

There is also a wider feedback loop from the behavior of users to the workings of elevators. The problems created by the discrepancies between human behavior and algorithms are well known by the ones who develop the algorithms.

> "We had big and popular rooftop bar at one high hotel building. The lift arrives to the lobby to collect the

> hotel customers. However, the lift starts going up and down between the lobby and the rooftop bar because is controlled by the algorithms are now trained in that way. This is inconvenient for the hotel customers that call the lifts in other floors because the lift is always full of people going to rooftop bar and out of it."
> Senior Chief Design Engineer

New ways of gathering data (the so-called Smart Lobby, see below) are being developed where these problems can supposedly be mitigated. The users' behavior, therefore, affects the future of elevators on a much greater scale by affecting how the algorithms and data gathering are developed. However, it is unclear whether the fundamental issues, that is, the different temporal orientations of users and algorithms and the opaqueness of surrounding reality to the actors that shape it, can be solved by merely developing more nuanced algorithms and data gathering. The longer-scale development of algorithms also relies on knowledge of the past (about the workings of elevators) that is equally opaque to the users. As we will discuss below, human beings tend to break the rules of such opaque systems. It follows that there are nested patterns and temporalities that shape the future: The minute-by-minute interactions between algorithms, users, and elevators create patterns that are not anticipated by either the users or the developers. These patterns shape what happens in *short timescales* and often frustrate and confuse the users. This creates a problem that is attempted to be solved by further *longer-scale* development of algorithms and data-gathering. These further developments create a novel environment where the users find themselves and where the possible futures are again negotiated through behavior, frustration, confusion, and attempts to react to the novel environment by users and developers. The *longer-scale* developments create the environment for *shorter-scale* patterns, and these *shorter-scale* patterns create the ground for the *longer-scale* developments. A microperspective does not provide insights on immediate future trivially. Rather, we can see how issues revealed in a microperpective shed light on how algorithms can, and are intended to, be developed in longer scales.

To see this from a different angle, notice that the courses of action taken by the elevator algorithm developers and users exhibit distinct characteristics and implications in the short versus long term. In the immediate timeframe of minutes, the users' actions in pressing elevator buttons are aimed at achieving their short-term goal of quickly reaching a desired floor. However, these isolated behaviors aggregated over time can significantly reshape the long-term optimization objectives and algorithmic development by the elevator company. For example, users frequently pressing buttons repeatedly when dissatisfied with elevator responsiveness may be "noise" in the short-run data, but this pattern, when sustained over a longer period like months, force the developers to change the algorithms (and is, in fact, usually automatically removed). Conversely, while the developers design their predictive algorithms to optimize people flow over short time periods using recent historical data, the cumulative impact of the use of the algorithms emerges gradually through shifts in user experiences and behaviors across longer timescales. For example, if users consistently experience elevator cars bypassing their floor due to short-term optimization, this could breed long-term frustration and adaptation behaviors like avoiding certain buildings and services over months. The disconnect between the short-term intents motivating users and developers versus the ramified long-term ecosystem effects resulting from their intersecting actions demands new analytical approaches spanning multiple timescales.

The case supports the idea that micro-perspective on time can provide both ontological and analogical insights into the patterns that shape the future. First, on the ontological level, we can see how the development of algorithms and their possible futures can be better understood by analyzing the temporal discrepancies between the algorithms and users by using a microperspective on minute-by-minute interactions. By zooming in on the fact that algorithms work in historical time while human beings care about their immediate future, we can better understand what types of problems the future of predictive algorithms attempts to answer.

Second, the case suggests, in analogy to what happens in shorter periods of time, that how human beings plan and create future environments are not neat processes that only track and project possible patterns. The processes constantly create novel patterns in human behavior and these novel patterns shape the processes and planning of future environments. An important determinant in these novel patterns is the temporal orientations of humans and their (in) ability to understand the patterns they interact with. We now move on to discuss this theme more closely.

Finally, we need to notice that the case study focuses on an environment that may seem relatively stable in the short and long term. On the other hand, complex systems are naturally able to adapt and change over time.[6] However, the stability is only superficial: The analysis shows how even within the limited context of an elevator system, the interactions between user behaviors, developer algorithms, and advances in technology keep reshaping the environment. As users adjust to and work around the system for their own goals, and developers update algorithms based on user behavior and new technology, the elevator system becomes a small example of the larger relationship between human behavior and technological systems evolving together in complicated and unpredictable ways. While the case study captures a moment of these dynamics playing out, fully understanding how complex systems adapt over the long run requires a more in-depth and longer-term analysis beyond what is covered in this paper.

## 4.3 | Human actions, patterns, and responses

We have already touched the issue of human response to patterns. On the one hand, the users are unaware of the logic of the algorithm that shape the pattern, and their response cannot be understood as an explicit disruption of, or agreement with, a pattern created by the algorithm.

> "People [in office buildings] go to lunch together in groups and only one person calls the lift. The control system unit now tries to estimate the number of people and how many lifts are required and calculate average passenger time per lift call." Head of the People Flow Optimization

On the other hand, people do affect the pattern through their actions because how they act defines how the elevator will work during the next 15 min. Yet, how people think they affect the future differs from how they, in fact, affect the future. The goal of a user is to get to any floor or place with the elevator at any time. They act on the assumption that there is a direct and immediate connection between their actions and what the elevator does at the very next moment.

> You can go to one destination from many different departure floors. The challenge of the destination control system is that the invitation for elevator must be attached immediately. So your call of elevator can be denied, because someone in the other floor pushed the button just before you. You never know, when is your turn to go to the desired destination, because nobody knows how many people are waiting in different floors, the problem is that control system is not able to collect people who wish to go to the same destination from different floors. Head of the People Flow Optimization

However, elevator algorithms are invisible to humans. To put it bluntly, there is nothing except unintended consequences of their actions.

In contrast, when the developers think about how to optimize elevator movement and minimize waiting time, they are solely dependent on the sensor data produced by the elevators. Human activities, human behavior, and especially noteworthy human positions and movement in space are excluded from the developers' systems. When it comes to time, movement and place are basic variables, but the developers always look at the movement and place of an elevator, not people. Complex human activities and mental states (a nervous person can press a button several times) are reduced to data sets about the movement of an elevator.

> Human imagines improving its own level of personal service. They start tapping the destination panel. The system interprets that there are more people. The elevators must be prepared to serve group of people, but there is only one person. Human behavior only breaks the system, but it can be filtered out? Man misuses the system if he can. Head of the People Flow Optimization

Moreover, one individual's pressing of a button by a person, that is, ordering an elevator for themselves here and now, only accumulates sensor data for the calculation of the Poisson distribution. In terms of the whole, one press of a button has little meaning for the algorithm. It has significant meaning for the user only.

The overall pattern that the movement of an elevator takes is, therefore, determined by two different intended patterns: the user's intended pattern, where the elevator simply obeys the user's presses of buttons, and the developers' intended pattern where the movement of elevators is optimized for masses of people. Neither group's intended pattern is realized, as the groups do not have transparent access to each other's activities. The users do not understand, or even care, how the algorithm works and is developed on the basis of the data the users produce.

> The problem for the developers is that control system is not able to collect people who which to go to the same destination from different floors. Head of the People Flow Optimization

The developers do not have access to human activities behind the data thus produced. By using a microperspective on time, we can see how different strategies to create, cope with, and respond to patterns are shaped by different temporal orientations of actors. In our case, the strategy of the developers is based on the use of data from the recent past, and the strategy of the users is based on their immediate concerns and the perceived direct controllability of the elevator. Understanding these types of strategies and how the future is approached by different actors makes it possible to analyze how, and to what extent, patterns work in future-oriented projects and research. For example, understanding how human activities are reduced to data sets for the algorithm and how this is counterproductive for the optimization of the elevators has led KONE to develop "The Smart Lobby" approach. A Smart Lobby responds to real-time data through continued analysis of people's vertical and horizontal movement in the building. Today's Smart Lobby is the reflection of a holistic plan developed to stretch from the building entrance to a visitor's destination. One of the main ideas of the "Smart Lobby" concept is that intelligence technology guides the visitors to the destination. Continual analysis of feedback is supposed to ensure that systems and user experience are optimized. The movement of people on the premises is connected to the security systems and the optimization systems of the buildings.

The opacity of algorithm and the patterns they create alienate humans from the immediate future and makes the future unrelatable. Elevator algorithms are part of modern elevators. The elevator can independently decide which floor a person goes to. For example, in large department stores and parking garages, the elevator currently determines the fastest floor, for example, to pick up one's own car from the parking garage. If the fastest route to the parking garage is through the fourth floor and not through the second floor, then the elevator takes the person to the fourth floor. This is rather strange for the humans themselves if they intended to go to the second floor.

> The elevator is like a smartphone that can make decisions independently, if in a large shopping center, the elevator will choose the fastest route for you to your car in the parking hall. Senior Chief Design Engineer

Human decisions are made by invisible and hidden-layer predictive algorithms. A microperspective on time, then, highlights that the relationship between human actions and patterns is complicated, and the problems this creates are not found only on the macrolevel. Unintended consequences of actions can be found anywhere and on any temporal scale (see Section 2 for a contrast in more traditional understanding in futures research). In fact, a microperspective shows how humans constantly affect different moments of the future than those that they think they affect. Without using a microperspective, this phenomenon that has effects on different timescales due to its very nature (i.e., we may not know when the action has an effect) would be invisible. Moreover, in many cases, the distinction between intended and unintended consequences fails to describe how the future unfolds, as there is nothing but unintended consequences, as when human beings affect the elevator only through an algorithm that they are not aware of. Finally, we can see that what makes a future unrelatable is not dependent on the temporal distance to that future. Rather, it is the mechanism that builds the future that matters for the ability to relate to the future. A microperspective suggests a novel diagnosis for the problem of unrelatable futures.

## 4.4 | Conflict

We have already touched on the issue of conflict between groups in our case. Interestingly, the conflict exists despite the fact that the two groups share the same overall interest, the smooth working of the elevators. However, the notion of *smooth working* is understood on different scales. Users naturally focus on the immediate satisfaction of their interest, while the developers focus on optimizing the movements of masses of people through different moments.

> User never knows, when is his/her turn to go to the desired destination, because nobody knows how many people are waiting in different floors and who has pushed the button first. Senior Chief Design Engineer

This difference is tightly related to the phenomena associated with the different temporal orientations and different strategies to respond to patterns that we discussed in the previous subsections. The conflict is, thereby, not inevitable because the interests of users and developers are not contradictory by their nature. However, the conflict is created through the actions of different groups and especially through the different strategies that the actors use to satisfy their interests.

One major source of the conflict is that the users' strategies appear illogical to the developers. The optimization of elevator movement and time is based on rational and logical-mathematical time series analyses. However, users' behavior is not based on similar logic. For example, a person can go to the bathroom in the middle of everything, even if the person has pressed an elevator button. The elevator deterministically performs the task given to it, but users can change their plans and behavior quickly. The apparent illogicality of the users is based on their inability to understand the algorithm. As an algorithm developer summarized: "*Humans are so stupid that they push the wrong buttons*."

However, equally important is the developers' inability to understand human behavior. Elevator optimization is carried out by highly technically talented engineers. Elevator optimization algorithms are tested in laboratory conditions. They work flawlessly in the absence of human interruption. Human behavior in real situations messes up engineers' calculations.

> From the bar 20 people goes down, up, down, up…to the rooftop restaurant in Tampere the elevator is full…. the elevator cuts across the level of the top and bottom floors, this not suitable for hotel customers. Senior Chief Design Engineer

Of course, this type of development leads to a collision course with human activity in real-life situations and makes human activities look illogical.

The temporal orientations of elevator developers and elevator users differ. Here a microperspective provides an element for "a more sustained engagement with the role of the past in futuring" (Bendor et al., 2021, 10) by revealing how different actors rely on different resources when orienting themselves towards the future. Algorithm developers attempt to use the recent past as an insight into the future. People who use the elevator focus on the immediate future and the present. They attempt to find the means to satisfy their urgent needs. This also means that users' actions are tentative when they interact with the elevator. We could say that the users approach the issue on the basis of scenarios. After pressing the button, a user can still consider, for example, whether to wait for the elevator, whether to change to another elevator, or whether to take the stairs. The user is always oriented toward the near future, while the elevator, in accordance with the plans of the developers, is determined to move in certain ways, given the data and the algorithm.

> Only elevator B goes to pick up hotel customers, there is no solution to advice hotel customers, don't go to elevator C!, which goes intensively up and down because the most popular view restaurant in the city is at the top floor, People always take the first elevator and as a result they are late for the theater show. Senior Chief Design Engineer

The conflicts between the strategies and orientations of the different groups create a situation where no one owns the future.

**TABLE 2** The perspectives of users and developers.

| Aspect | Users' perspective | Developers' perspective | Interaction |
|---|---|---|---|
| Goal | To reach their desired destination quickly and efficiently | To optimize elevator movement and minimize waiting times for all users | Users' individual goals may conflict with developers' "people flow" optimization goals |
| Temporal orientation | Focused on immediate, short-term needs (next few minutes) | Oriented towards historical data (past 15 min) and future optimization | Differing temporal orientations lead to mismatched expectations and behaviors |
| Perception of control | Believe they have direct control over elevator movement through button presses | Rely on algorithms and data to control elevator movement indirectly | Users' perceived control is illusory, leading to frustration when system behaves unexpectedly |
| Understanding of the system | Limited understanding of underlying algorithms and optimization processes | Deep technical understanding of elevator sensor data and optimizing algorithms | Lack of transparency and communication between users and developers contributes to conflicts |
| Adaptability | Able to adapt their behavior and decision-making in real-time based on immediate needs | Constrained by predetermined algorithms and historical data, with limited real-time adaptability | Users' adaptability can disrupt developers' optimization efforts, leading to unintended consequences |
| Emotional response | May experience frustration, confusion, or impatience when elevator behavior does not meet expectations | May view users' behavior as irrational, unpredictable, or disruptive to the system | Emotional responses on both sides can escalate conflicts and hinder effective collaboration |
| Power dynamics and hegemony | Users' behavior is judged and labeled by developers, reinforcing a power imbalance | Developers' claims of user "stupidity" and "irrationality" reflect a hegemonic perspective that privileges technical expertise over user experiences | The hegemonic labeling of users' behavior as "stupid" or "irrational" dismisses their legitimate concerns and experiences, further entrenching the power imbalance between users and developers |
| Long-term implications | Users' ingenuity and adaptability continuously reshape the techno-social environment, challenging developers' long-term plans and assumptions | Developers' inability to fully account for the complexity of human behavior and social dynamics undermines their long-term optimization strategies | The entanglement of users and technology in the long-term techno-social nexus forces a more holistic and adaptive approach to system design and optimization |

The users wish to make the elevator do directly what they require. They want to be in charge of what happens next. When this does not happen (see also Section 3.2), the future appears strange and illogical to the users. The desires of the users collide with the desires of the developers. The developers are not able to optimize the movements, because there currently are no tools to mitigate the effect of human complexity on the system.

> There is no easier way to solve the problem than call the hotel clerk to the place to control traffic and advice to take the another elevator. Senior Chief Design Engineer

As already seen, the behavior of users and the future appear strange and illogical also to the developers. They cannot control the future in the way that they are supposed to. The situation is an echo chamber where the immediate future-oriented actions of the users and the past-facing constructions of the developer do not work as responses to each other, and the gap between the two widens through the interaction.

The conflicts involved in the use and development of elevator algorithms are not visible if they are not analyzed from a micro-perspective. The two groups have the same overall interest and, while it is expected that there always exist problems in the coordination of action between actors, the microperspective shows how the groups are at a distance from each other due to their different strategies for coping with the future and the reality that, in their conceptions, affect the future. The problem is not that there are contingencies in what the actors could do (creating the problem of "double contingency," see Vanderstraeten, 2002]). Rather, the problem is that the different strategies of the groups do not enable a serious interaction to get off the ground, the elevators mediating the unsuccessful attempts to control what happens and what others do. The conflict hits the core of futures research, as it (i) makes the estimating of the future difficult for both groups, (ii) shows how human responses to, or even ignorance of, each other's strategies create further problems in an echo chamber, and (iii) creates a situation where the people are alienated from the future that is the outcome of their actions.

Table 2 summarizes the developers' and users' perspectives, and the interaction between the two, on different aspects of the system.

## 5 | TEMPORAL DYNAMICS IN USER-SYSTEM INTERACTION: BRIDGING MICRO PERSPECTIVES AND LONG-TERM IMPLICATIONS

In this section, we discuss how a microperspective can reveal features of human action and thinking that are also relevant in understanding their long-term actions and plans and reactions. Specifically, we derive conjectures about likely user assumptions, reactions to unmet expectations, and attempts to improvise control from how developers of elevator algorithms interpret perceived irrational behavior. By abstracting insights between short and long timespans, we expose general social-technical gaps that limit collective agency despite shared goals. Our notion of a microperspective reveals coordination breakdowns across scales—yet it also gives clues to reconcile near and long-term orientations.

While we do not have direct interview data from elevator users themselves, the developer interviews provide insights into likely user assumptions, frustrations, and improvisations.

The developers note that users hold expectations of direct control and immediate response when pushing elevator call buttons. Users assume that by pressing a button, they can determine exactly where and when the elevator will arrive to pick them up. There is an expectation that user input via the call panel directly steers the elevator's movement. However, when the elevator's response does not align with these expectations due to the optimizing algorithms, users often experience frustration and confusion. The developers observe occurrences where users press buttons repeatedly when the elevator does not come as quickly as anticipated. There is also dismay when the elevator bypasses the caller's floor due to traffic optimization. These unintended responses negatively impact the user experience. Faced with unmet expectations around elevator response, users attempt to improvise and change behaviors to regain a sense of control. This type of phenomena where the timings in a systemic process affect behavior and outcomes has also been noted in more serious contexts than elevator-use. For example, it has been suggested that climate change scenarios "have relied on research processes that slowed the exchange of information among physical, biological and social scientists" (Moss et al., 2010, 747), and this affects the ability to deal with climate change. The time built in a scientific process leads to a situation where too much room is left for the need to improvise and change behaviors to regain a sense of control when it comes to climate-action.

Moreover, by examining developer perspectives on illogical[7] user behaviors, we can infer key aspects of user psychology related to managing expectations, emotional reactions, and improvised actions when interacting with the elevators. "What is the human influence on group control of elevators? A person finds faults in the system. A person imagines that he is paying for his own personal level of service. People start clicking on the target invitation panel. The system interprets that more people. You have to be prepared to serve. A lot of elevators are needed. There is only one person. Just disrupts the system. Can be filtered out! People abuse the system if they can." (Head of people flow KONE 11.12.2028). Users hold mistaken assumptions, grow frustrated with unintuitive responses, and try unsuccessfully to correct the system. These insights mirror challenges around processing unintended futures in long-term foresight and its relation to time. In general, our ideas about time intertwine with how we try to know futures. For example, forecasts give precise yet uncertain timeframes while scenarios trade specificity for uncertainty. Time and futures knowledge dynamically construct one another (O'Mahony et al., 2023). Like the developers in the elevator case, "futurists work with time, yet we rarely consider the full implications of what this means. It could equally be said that futurists work within time, navigating the cultures and ecologies of time that shape the worlds they seek to enable" (Bussey, 2017, 236). The data in the case KONE indicates that human beings and elevators do not share same orientation towards time, and this affects how elevators are developed in long-term (see the previous and next section). In general, long-term thinking and planning must take into account different conceptions and ecologies of time.

The psychology of elevator users exhibits strong parallels with known issues in long-term forecasting around managing expectations, emotional reactions, and attempts to control outcomes.

In long-term forecasting, there are often mistaken assumptions that current actions will have direct and visible impacts on the future. Projections can fail to account for opaque underlying system dynamics that mediate between input and outcomes over time. Similarly, elevator users hold inaccurate mental models about direct response to their button pressing. As Valkenburg (2023, 442) puts it, "Many things we know, we know in a particular time or timeframe." Our case shows how this presumed "knowledge" can be misleading due to the underlying structural time, such as the one used by elevator algorithms.

Processing unintended futures that do not match expectations is also difficult emotionally across timescales. Forecasters can experience confusion, frustration, even despair when scenarios develop counter to predictions. Likewise, elevator users react negatively when unfamiliar system optimizations generate unintuitive elevator movements unaligned with their calls. The importance of a coordinated understanding of timing has been recognized in futures research. For example, transitioning to renewable energy requires coordinating the different schedules of many groups— energy companies, carmakers, government, banks, and communities. As Hirsch (2020) writes, Scotland had a strategic plan to align these groups. By studying when changes might happen, setting clear timelines and goals, speeding up innovation, supporting community projects focused on the long-term, and adapting rules as needed, Scotland managed a fast, unified shift to clean energy. The key was understanding timing—when do we need to see certain changes? When do different groups need to act? Paying attention to timing helped Scotland smoothly coordinate and accelerate the transition across many sectors. Managing renewable energy change as a timely process is crucial for success. Again, timing and orientations towards time have significant consequences.

Finally, faced with unmet expectations about the future, both forecasters and elevator users attempt to force corrections through somewhat improvised actions. Forecasters might hastily revise models or double down on assumptions. Users press buttons repeatedly or switch between elevator banks trying to somehow gain control. These overcorrections often prove ineffective or counterproductive.

The parallels across elevator operation and long-term forecasting underline fundamental challenges in relating to complex systems across timescales. Assumptions of control break down, unexpected futures cause emotional turmoil, and attempts to impose order fail. When these phenomena are viewed from a microperspective, we have to potential to reveal persistent gaps between user and system perspectives limiting collective orientation toward the future. "Now we are able to prioritize elevator maintenance based on sensor data, but predicting the flow of people with mathematical algorithms is still a big challenge," says the KONE architect. (11.8.2018).

In this way, the micro-analysis reveals three key insights around relating complex systems and unintended futures:

First, the false assumptions users hold about direct control concretely demonstrate the psychology underpinning challenges in relating to counterintuitive futures across contexts. A microperspective reveals in a concrete way the dynamics by which inaccurate mental models obstruct orientation toward unfamiliar outcomes. Second, developers disregarding unexpected user behaviors highlights gaps between system design perspectives and practical realities. A microperspective shows coordination collapses due to clashing temporal orientations and structure interpretations despite common interests. Finally, tracing in minute detail where outcomes diverge from user expectations provides clues toward reconciling near-term experiences with longer-term planning. A microperspective offers a contained environment to investigate and test solutions bridging decentralized mindsets with complex system interdependencies across time horizons.

To sum up, the microperspective makes visible persistent limitations in anticipating, making sense of, and shaping futures within a complex world. It also indicates specific directions to advance collective human capabilities in consciously co-creating systems for collaborative success. In exploring the dynamics between elevator users and developers, our analysis reveals profound implications that a microperspective has for understanding long-term future planning and scenario analysis. The immediate and often emotional reactions of users to elevator system behaviors—ranging from frustration at delayed responses to adaptive strategies like choosing stairs—mirror the broader human responses to future uncertainties in scenarios months or years ahead. Just as users navigate the present system with a mixture of expectations and real-time adjustments, individuals and organizations face similar challenges in long-term foresight when navigating between current trends and future uncertainties. The developers' reliance on past data to inform future elevator movements offers a parallel to how future studies often use historical trends to forecast long-term scenarios. These insights indicate the critical need for incorporating understandings of human psychology and behavior adaptation strategies in the development of future scenarios. We must ensure that they are grounded in realistic models of human interaction with systems over time. And more importantly, we need to understand how this interaction is shaped by differing orientations towards time.

## 6 | A MICROPERSPECTIVE IN FUTURES RESEARCH. ONTOLOGY, EPISTEMOLOGY, AND AXIOLOGY

In this section, we suggest some more further *general* reasons to use a microperspective that relate not only to how people relate to the future psychologically but also to the fundamental questions at the philosophical core of futures research. We divide these insights into three groups: ontological, epistemic, and axiological.

### 6.1 | Ontological

A microperspective reveals how complex patterns are constituted in a domain through interactions between human actions, underlying systems like algorithms, and resulting conflicts. This shows where and when consequences are determined. In the elevator case, users imagine more control than they have, while developers' intended future is disrupted by user responses. Despite shared interests, these conflicts make alignment and success difficult.

Moreover, a microperspective illuminates differing temporal orientations - elevator algorithms and developers oriented to the past, whereas users focused on the immediate future. On longer timescales, these become blurred. There is a fundamental clash between "random" user behaviors and data-oriented elevators. Generally, studying short periods where long-scale culminations occur (like bankruptcies and pandemic outbreaks) or connecting seemingly disparate events retrospectively (like the Renaissance—see Kuukkanen (2015)) relies on cross-scale interplay. A microperspective shows how long-term developments arise from and accumulate in brief events. Thereby it provides ontological insights into constructions of the future and events in time.

### 6.2 | Epistemic

A microperspective enables analyzing constituents of process in themselves rather than just as parts of a wider process. Thereby it reveals novel features, like the underlying reasons for conflicts between algorithms, developers, and users. Such understanding of strategies and orientations is relevant beyond the direct focus of the microperspective for developing solutions. Additionally, a microperspective shows *where and when* futures are made. Often, the futures are made in different *when and where* than where we look at. In the elevator case, users affect the overall system in unpredictable ways but believe they directly control immediate movements.

Moreover, a microperspective can reveal weak signals, i.e., "[a] perception of strategic phenomena detected in the environment or created during interpretation that are distant to the perceiver's frame of reference" (van Veen & Ortt, 2021, Section 5.4) that exist in brief moments of time. For example, the fact that elevator users act in accordance with their immediate intentions is such a signal for the developers. It (i) signals the strategic phenomenon that human beings break the rules assumed by the algorithm, and (ii) is distant from the developers' frame of reference that reduces human activity to data produced by an elevator.

We can also see that a microperspective can illuminate nuances of human activity that are relevant to the future but easily missed otherwise. For example, we have seen how a microperspective in the case of elevator use shows how human ignorance and apathy towards the rules created for them, their impatience, and their relentless search for alternative courses of action affect how they shape the environment, how they perceive the creation of the future, and how they are in conflict with the other groups that attempt to create the future. Again, subsuming the nuances under the labels of "illogicality" or "randomness" does not make justice to the phenomena. As we have seen, the illogicality and randomness are judgments made by other groups on the basis of their own strategies to cope with the future. Using the labels does not solve the problems thus created but only repeats and reinforces the strategy, even a hegemonic one, of one of the groups. A microperspective may guide us to rethink how certain issues are conceptualized in futures research.

## 6.3 | Ethical

A microperspective reveals how overall future desirability depends on the quality of individual moments. Understanding particular events is necessary for evaluating processes leading to broader futures. For example, optimally functioning elevators may alienate users from their intended futures. Also, a microperspective shows how futures become relatable or strange based on the process of creating them, not just temporal distance. When elevator users cannot relate to the outcome due to algorithmic optimization trumping their intended control, this is similar to issues in unrelatable distant futures—the process that creates the future makes it problematic for an actor. Moreover, a microperspective illuminates exclusion in future-making, struggles to create desired futures, and how groups face or devalue others. Elevator users see machines serving immediate needs, while developers view humans as irrational agents misusing the system. Thereby, a microperspective provides ethical insights on how futures take shape through complex power dynamics among different actors and orientations, with implications for broader questions of future desirability, strangeness, and inclusiveness.

Given these ontological, epistemic, and ethical issues, we can already see that a microperspective is not merely about time but also about depth. To see this, we may contrast the kind of depth it produces with the depth that macro and meso futures research[8] generate, using the framework of causal layered analysis (CLA). CLA is a futures research method that examines issues at four levels of increasing depth: litany, social causes, worldview, and myth/metaphor. Each level provides a different perspective on the problem, revealing deeper assumptions and meanings (Inayatullah, 1998; see also Inayatullah, 2008 on *timing the future*.) CLA is useful for the comparison due to its explicit and systematic focus on different levels of depth.

At the litany level, macrofutures research focuses on the most visible trends, events, and issues that surface in public discourse and media over long periods. These are often presented as simple facts without deep analysis of their connections or root causes. Mesofutures research at this level examines specific developments and issues within certain systems or sectors over the medium term, often using quantitative data and expert opinions. In contrast, a microperspective at this level focuses on the immediate experiences, challenges, and conflicts that individuals face when they interact with systems and technologies and that they express through their own words, actions, and emotions.

Moving to the social causes level, macrofutures research investigates the underlying drivers and structures that cause the long-term trends observed at the litany level. This involves exploring the interplay of social, economic, political, and technological forces that shape the future. Mesofutures research at this level examines the social, cultural, and institutional dynamics that influence specific systems and issues over the medium term and identifies points for potential change. On the other hand, a microperspective focuses on temporal orientations, power relations, competing interests, and systemic constraints that affect real-time actions and experiences of people in socio-technical environments.

At the worldview level, macrofutures research examines the deep assumptions, values, and ways of knowing that support societal changes and direct the future. This includes questioning established notions of progress and exploring alternative worldviews. Mesofutures research at this level focuses on the dominant philosophies and ideologies that guide the evolution of particular systems over time and often revealing hidden power imbalances. A microperspective analyzes the implicit ideas, cultural norms, shared expectations, and collective habits of thought (like the one where an elevator, or technology in general, is seen as a direct servant by an individual user) that influence how individuals and groups understand and manage the challenges and opportunities of the present. This involves analyzing how these ideas, norms, expectations, and habits, often unconsciously adopted from the wider social and historical context, enable and limit the future possibilities that can be imagined and realized in the present.

Finally, at the myth/metaphor level, macrofutures research explores the deep narratives and archetypes that define our understanding of long-term change and provide a sense of meaning. This involves examining the foundational metaphors and myths that underpin visions of the future and articulating alternative narratives that inspire change. Mesofutures research looks at the guiding narratives and metaphors that drive specific medium-term developments and shape public discourse. In contrast, a microperspective focuses on the subtle meanings, emotions, and experiences that influence short-term human-technology interactions and on the stories and desires that drive individual behavior (like the labeling of users as "stupid" by the developers).

By engaging with these multiple levels of depth by using CLA, a microperspective offers unique insights into the facts of lived experience, the interaction of social and technological forces, the influence of worldviews, and the symbolic meanings of brief moments and actions within these moments. This depth complements (but does not replace) that of meso and macro perspectives and helps futures research to better understand the challenges and opportunities. This depth is related to the ontological, epistemological, and ethical dimensions of futures research. Ontologically, a microperspective highlights the interactions of human agency, technological possibilities, and structural constraints that shape the future in the present. Epistemologically, it allows us to examine the basic elements of processes, to understand different orientations in time, and to uncover the reasons behind action and conflicts. Ethically, a microperspective explicates issues of power, inclusion, and responsibility in the creation of the future. By exposing the complexity of the present, and the ambiguity in the very notion of the *present*, a microperspective enhances our understanding of how the future is shaped and changed.

## 7 | CONCLUSION

In this paper, we have discussed conceptions of time in futures research and the issues they are connected to—difficulties estimating futures, entanglements between accounts and outcomes, and problematic relations people have with the future. We argued temporal scale alone does not define futures research; rather, these core issues shape its time perspective. However, we proposed the novel conceptual innovation of a microperspective on time can provide insights into these challenges. Our case study illustrated how examining patterns, responses, and conflicts on a small scale reveals how technology and other systems outside individual human agency determine human movement based on past data and other arrangement, while we believe our present actions control the future rather directly. As we have indicated, there are issues relevant to futures research related to time and timing that require closer attention, and the notion of *a microperspective* is one useful tool to analyze these issues.

Moreover, our case study indicates that the microperspective is not just an academic concept but practically relevant for optimizing people flow, as Kone Corporation discovered. By expanding analysis to the broader environment's spatiotemporal dynamics, rather than just isolated elevator data, it enabled a more comprehensive, real-time understanding of collective movement. In the future, the prediction of elevator movements should be viewed as relationships between "micro-times," as indicated by development in KONE. Both material and nonmaterial entities have their own spatiotemporality (time and place). In a system composed of such entities, the data of the self-organizing (learning) predictive algorithm is the "micro-times" of material and nonmaterial objects (see [omitted for review]). Anticipating the future is a dynamic adaptation in "micro-time." This is how the future is built for us in the near future.

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### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from KONE OY. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the author(s) with the permission of KONE OY.

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### ENDNOTES

[1] Of course, the claim is not that all possibilities and desirable states will be realized sooner all later. Rather, the point is that the passage of time is necessary for change that most possibilities and desirable states require. See also Brier (2005) and Bauer (2018) discussed below.

[2] This is also related to the issue that some questions about the future are so urgent that there is no room for taking the openness of the future into consideration to its full extent. For example, Shaw (2022) argues that we should employ short-term criteria when considering how worthy of pursuit some "urgent science" (where a result or outcome is needed in a specified timeframe) is. Moreover, Georghiou and Keenan (2006) point out that effective foresight requires an understanding of the immediate contexts and cycles of the actors, and the ability to adapt to these two elements.

[3] The theory of narrative thought (TNT) elaborates on how personal experiences, memories, and expectations shape one's understanding of the past, present, and future. This framework suggests that the narrative structure of thinking influences decision-making, the perception of possible futures, and the detection and mitigation of threats. By focusing on narratives as a fundamental aspect of human cognition, Beach shows the importance of imagination in envisioning alternative futures and the role of narrative coherence in shaping our expectations and actions in complex and uncertain environments. (Beach, 2020).

[4] Legal issues affected our research, as everyone had to be mindful not to violate the MNC's intellectual properties, such as patents. These intellectual rights are sensitive information and have considerable business value; especially sensitive information regarding algorithms that "optimize" people flows. As such, our research is restricted by an NDA (nondisclosure agreement). Before the individual interview, every worker signed the agreement stating not to harm KONE and that the information they provided could not be used against KONE. According to this agreement, statements expressed during the interviews were purely the interviewees' personal views, not KONE's official statement. Our research was controlled and evaluated by legal and technological specialists in KONE, meaning that it is possible to describe the results only at a general level.

[5] For the sake of simplicity, we shall use the term "15 min" to refer to such intervals. This does not change the argument of the paper at all. It

should be noted that if the interval is less than 5 min, random factors mess up the statistics (see below).

[6] We thank an anonymous referee for pointing this issue out.

[7] See the next section on this notion and its connection to power and its perspective-ladenness.

[8] "Macrofutures" refers to the study of long-term, large-scale patterns, trends, and changes that unfold over *decades or even centuries*, and focuses on broad issues such as technological progress, social transformations, economic shifts, and environmental challenges. "Mesofutures" refers to the study of medium-term developments and changes that occur over a period of *years or decades*, and often focuses on specific systems, institutions, or sectors, such as healthcare, education, or transportation, and factors that shape their development.

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