

COGNITION AND ACTION IN CONSTRUCTION PROJECT ORGANIZING

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ABSTRACT: This chapter considers the central role of uncertainty for cognition and action in construction project organizing with a focus on how project practitioners think about the future. It takes a cognitive approach to uncertainty in the context of a broader information processing approach to decision making in organizations. The chapter's main concern is the failure of this approach to connect cognition through to action. The chapter presents the UnCoCoH (Un-Certain Complex Complicated Hidden) model as a tool to assist in recognizing the transition from individual cognition to collective action. It also highlights the role of narratives for stabilizing uncertainty through this transition. This provides a foundation for working towards the development of a projectivity perspective in construction project organizing and advancing a research agenda for this program of research.

Key words: Information processing, uncertainty, cognitive perspective, leadership, projectivity.

3.1 INTRODUCTION

In this chapter we consider the central role of uncertainty for cognition and action in construction project organizing - specifically how project practitioners think about the future. We take a cognitive approach to uncertainty (Winch and Maytorena, 2011) in the context of a broader information processing approach to decision making in organizations inspired by the Carnegie School (Winch, 2015). In doing so, we identify the failure of this approach to connect cognition through to action as one of its limitations and hence the main concern of this chapter. We present the UnCoCoH model to recognize the transition from individual cognition to collective action – where action is future orientated and proactive – and identify the role of narratives for stabilizing uncertainty through this transition. Our concern with the relationship between cognition and action is inspired by Schütz (1967) and recent developments in relational sociology (Mische, 2011). This then provides the foundations for working towards the development of a projectivity perspective in construction project organizing and advancing a research agenda for this program of research.

To do this we begin by defining construction as a problem in information (Winch, 2015) and revisit the Carnegie School of thought of organization theory, which places information at the heart of organizing (Gavetti et al., 2007; 2012). A key contribution of this work is the focus on how individuals and organizations make decisions under conditions of uncertainty and ambiguity; conceptual ideas which are still relevant today. We therefore move on to explore expected utility theory as the dominant paradigm of decision-making and identify its non-cognitive approach as a limitation. The Carnegie

School's interest in cognitive processes to explain individual and organizational mechanisms of decision making which influence action provide the foundation for research in Managerial and Organizational Cognition (Eden and Spender, 1998), on which we draw on to develop our cognitive perspective. By taking a *cognitive perspective on project uncertainty* (Winch and Maytorena, 2011) we present the value of the concepts of *resolvable* and *radical* uncertainty to construction project organizing and explore conceptualizations of uncertainty. However, cognition is not enough, so we move on to focus on action in the context of project leadership. We then present the UnCoCoH model as an action-orientated model. As cognition and action entwine, project leadership can stabilize perceptions of the future through the effective use of narratives. So, we explore the role of narratives in construction project organizing. All this paves the way for discussing some theoretical implications drawing on the New York School of relational sociology and outlining a research agenda for a projectivity perspective on construction project organizing.

3.2 CONSTRUCTION AS A PROBLEM IN INFORMATION

Research in project organizing generally and construction project organizing in particular has evolved over the last 60 years in four main strands with relatively little overlap between them (Winch et al, 2023). These strands are:

- *Projects-as-coordination* through matrix structures (Morris, 1973) and temporary organizing (Bryman et al., 1988) to address the fundamental organizational problem of co-ordination (Puranam, 2018).
- *Projects-as-systems* drawing on concepts of complexity, life-cycles, and homeostasis (Cleland and King, 1968; Ramasesh and Browning, 2014).
- *Projects-as-contracts* focusing on the commercial interface between the owner and its suppliers (Barnes, 1983; Winch 2001), and the importance of collaborative working (Pryke, 2020).
- *Projects-as-planning* developing the tools and techniques (Morris, 1994) of project organizing, including the Barnes triangle (Barnes, 1988), schedule and risk management tools, and cost-benefit analysis (Flyvberg and Bester, 2021).

There have been attempts to bridge across these separate streams, such as in the theory of the temporary organization bridging the coordination through temporary organizing and systems life-cycle concepts (Lundin and Söderholm, 1995), or the three domains model (Winch, 2014) bridging contracts and coordination through matrix organization concepts. However, we suggest that the concepts of construction as a problem in information can help to make further progress in bringing these streams of research together. For instance, information is at the heart of decision-making and organizing, and

information processing is the basis for matrix concepts (Galbraith, 1977), transaction cost economics (Williamson, 1975) and systems thinking more generally.

The Carnegie School made significant contributions to our understanding of management and organizations (Gavetti et al., 2007; 2012; Bromiley et al., 2019; Wilden et al., 2019). In particular, they established the information processing approach to organizations based on the contention that the fundamental problem in organizing is co-ordination between organizational units through information flows between them (Puranam, 2018). Thus, March and Simon (1993: 2) argue that, fundamentally, “organizations process and channel information” while Galbraith (1977: 36) further argues that the basic proposition is that “the greater the uncertainty of the task, the greater the amount of information that has to be processed.” Effective organizations therefore handle uncertainty by processing information through the most appropriate channels. Hence, the Carnegie School’s conceptual ideas related to managing and organizing such as decision-making, behaviours, motivations and their interest in the interaction between the individual and organization have been enormously influential and are still relevant today (Bromiley et al., 2019; Wilden et al., 2019). For example, their interest in cognitive processes to explain individual and organizational mechanisms of decision-making that influence action provided the foundation for research in the field of managerial and organizational cognition (Eden and Spender, 1998 cited in Bromiley et al., 2019).

However, research following this tradition has been broad rather than deep. In their reviews, Gavetti et al (2007, 2012), Wilden et al (2019) and Bromiley et al (2019) identify areas of focus which are relevant for researchers in construction project organizing and therefore this chapter. Gavetti and colleagues (2007; 2012) call for revisiting the Carnegie School’s foundations to focus on the neglected elements of decision-making in organizations by incorporating recent developments in individual cognition. Wilden et al. (2019) suggest extending March and Simon’s ideas and focus on two aspects. First, focus on new forms of organizations, such as ecosystems, and recognize the importance of systems integration (Hobday et al., 2005) by looking at the relationship between structures and decision-making. Second, focus on a multi-level analysis to connect micro-level (individual) and meso-level (organizations) to understand further the way in which these new structures may influence individuals in their information gathering, processing, decision-making and action. Bromiley et al. (2019) put forward the idea of looking more closely at the concept of ‘uncertainty absorption’ for its potential to link individual cognition and communication.

These recent reviews present opportunities for research in construction project organizing with a focus on decision-making in organizations, and the cognitive processes which influence decision-making and actions under conditions of uncertainty and complexity. Recent work in construction project management has applied these insights from the Carnegie School to temporary construction project

organizations by conceptualizing the project organization as an information processing system (Winch, 2010) and project organizing as a 'problem' in information (Winch, 2015). While Winch and Maytorena (2011) focus on the cognitive aspects of uncertainty in information processing within the context of project risk management routines. It is to this perspective that we now turn but first we need to discuss a dominant paradigm in decision-making.

3.3 DOMINANT DECISION-MAKING PARADIGM: EXPECTED UTILITY THEORY (EUT)

An economic perspective has dominated the subject of decision-making and judgement for the past seven decades: Expected Utility Theory (EUT) has been the dominant paradigm for research into decision-making (Schoemaker, 1982). This theory assumes that rational decision makers act to maximize utility with complete information. However, research has highlighted a number of limitations of EUT's capacity to explain how individuals make decisions, which has driven a growing interest in understanding of the cognitive processes involved in the process of decision-making. These include studies on memory, attention, perception and information processing (Greenwood, 1999; Oppenheimer and Kelso 2015).

The purpose of decision theory is the study of individual's choices between alternatives. The area of decision-making under conditions of uncertainty at its centre. In the 17th century, Blaise Pascal introduced the notion of expected value with his wager on the existence of God, and later in the 18th century Daniel Bernoulli laid the foundations of probability theory and decision-making science with his work on expected utility. This work, largely based on games of chance, argued that decision makers should act to maximize expected utility. This approach helped to explain why different individuals assigned different value to the same choices but reduced the ability to predict decision-making behaviour. Expected Utility Theory (EUT) (von Neumann and Morgenstern, 1944) attempts to address this limitation. This argues that rational individuals act to maximize utility, and act with complete information, where the expected utility of an option is a function of the probability of that option occurring and the expected benefit of that option should it occur. However, this assumes knowledge about objective probabilities for each outcome and in most decision-making situations in construction project organizing this is not possible. Savage (1954) complemented this theory with his work on Subjective Expected Utility (SEU), introducing subjective aspects to the theory of rational decision-making. Savage argued that probabilities of outcomes are personal or subjective rather than objective, and makes clear that probability estimation rests in the mind of the individual and not the state of the world. Later, research by Kahneman and Tversky (1979) found that when decision makers were presented with identically logical decision choices, different behaviours resulted if these were described as losses rather than gains. From this they developed Prospect Theory which has been influential in the area of behavioural economics. Kahneman and Tversky's research also found that the

elicitation of subjective probabilities suffered from both cognitive biases (Kahneman, et al., 1982; Gilovich, et al., 2002) and noise (Kahneman et al., 2021). This experimental research showed that individuals use heuristics in many intuitive judgements, which can lead to distinctive biases in decision-making (Gilovich et al., 2002).

This body of work is at the centre of behavioural decision theory (BDT), but it is limited, as the experimental work focuses on outcomes of individual judgements and decision-making behaviour with respect to objective probabilities and comparing them to normative decision models derived from EUT. It therefore fails to consider the inherent subjectivity of our perceptions of future events. In other words, it is non-cognitive because it does not look at knowledge structures or processes (Walsh, 1995; Eden and Spender, 1998). More recently Oppenheimer and Kelso (2015) argue that increased attention to cognitive processes involved in decision-making is needed and present the idea of decision-making as information processing. This allows us to connect the mesostructural (Puranam, 2018) contribution of the Carnegie School to the micro-behavioural level of cognition and decision-making, as argued in section 3.2. However, the continued focus on choice between alternatives to develop the information processing models is a limitation. A cognitive perspective that recognizes the actuality of decision-making in uncertain situations is needed (Alvarez and Porac, 2020) in which 'choice' emerges in the mind of the managers, not between alternatives in the world.

3.4 A COGNITIVE PERSPECTIVE

Our cognitive perspective on managing projects under uncertainty is influenced by research in the area of Managerial and Organizational Cognition (MOC) (Eden and Spender, 1998; Lant and Shapira, 2001; Huff et al., 2016; Galavan et al., 2017; Galavan and Sund, 2021). MOC seeks to understand how individuals in organizations make sense of their world, how they model reality, and how this influences behaviour with the aim of improving organizational performance. Specific to the interest of managing projects under uncertainty is the understanding of this field's development – Eden and Spender (1998) provide a comprehensive introduction. Research in this field has been influenced by two perspectives of organizations: organizations as "information processing systems" (March and Simon, 1958), and organizations as "interpretation systems" (Neale et al., 2006). Organizations as "information processing systems" builds on Simon's bounded rationality concept, as well as the developments made by the Carnegie School (Cyert and March, 1963; March and Simon, 1993) on decision-making in organizations (see section 3.2). Organizations as "interpretation systems" build on the work of Weick (1979) and Gioia and colleagues (1991) on sensemaking, sense-giving and enactment. The focus is on how meaning is shaped by the context and how subsequent actions in turn shape the context. In essence, MOC is concerned with managers' knowledge acquisition processes and the understanding gained through their interactions with their organizational context.

MOC therefore starts from the premise that individuals have limited information processing capacity and that decisions are made under conditions of uncertainty. It dismisses the idea that managerial decisions can be analyzed by rational notions of complete information availability and ‘logical choice processes’ which are the premises of expected utility theory (section 3.3). Furthermore, it argues that individual decision makers create ‘personal models’ of the decision situation, different from normative or deterministic models of decision-making.

MOC extends the BDT notions of decision-making by recognizing that decision makers make decisions with limited, sometimes ambiguous information, in an organizational context with varying levels of uncertainty and conflict. MOC views decision-making as a continual process, one that is reflected upon, learned and socially constructed, and where cognition and action are intertwined. It is from this perspective that we develop our understanding of managing construction projects under uncertainty. The interest in uncertainty is what distinguishes the MOC field from the traditional managerial decision-making body of work, which treats uncertainty as the quantifiable probability distribution around an identified risk (Aven and Renn, 2009; Chapman and Ward, 2011). Therefore, the distinction between the concepts of risk and uncertainty become important for both managerial theory and practice.

3.5 A COGNITIVE PERSPECTIVE ON MANAGING PROJECTS UNDER UNCERTAINTY

The importance of understanding the concept of uncertainty in management research and business context has been the subject of recent debates. For example, Kay and King (2020) introduce the concepts of ‘radical’ and ‘resolvable’ uncertainty by drawing on Knight (1921) and Keynes’ (1937) distinction between risk and uncertainty. ‘Resolvable uncertainty’ is uncertainty that can be captured by a probability distribution of outcomes and ‘radical uncertainty’ is uncertainty that cannot be characterized in terms of probabilities. Kay and King present and discuss the implications of ‘radical uncertainty’ for decision-making in financial, economic, policy, organizational and individual situations. Within the management theory field, the implications of ‘Knightian’ uncertainty in managerial situations have been the subject of recent attention with a call to provide more coherence and focus to the construct of uncertainty (Alvarez and Porac, 2020; Griffin, 2020; Packard and Clark, 2020; Rindova and Courtney, 2020; Arian et al., 2020; Lampert, et al., 2020; Winch 2023a).

Drawing on the work of Keynes (1937) and Knight (1921) and the theoretical distinction between risk and uncertainty several researchers have attempted to develop typologies of risk and uncertainty along a continuum that elaborates the dichotomy further in an attempt to develop models linking cognition and action (Daniel and Daniel, 2018). We summarize the most relevant for construction project organizing in table 3.1 taking the resolvable–radical dichotomy from Kay and King (2020) to provide a conceptualization of the uncertainty continuum.

Table 3.1 Conceptualizing uncertainty

Authors	Resolvable uncertainty ←-----→ Radical uncertainty			
	Courtney et al., 1997	A clear enough future , where traditional strategic planning tools are effective.	Alternate futures , where discrete scenarios can be identified and analyzed using game theory and real options type tools.	A range of futures , where discrete scenarios cannot be identified and scenario planning type tools are most appropriate.
DeMeyer et al., 2002	Variability , where projects are affected by a number of deviations from plan which can cumulatively affect the achievement of project objectives.	Foreseen uncertainty , where events are foreseen which could have a large impact on the project and require contingency planning.	Unforeseen uncertainty , or unknowns, where events are either completely unforeseen or considered so unlikely that no contingency planning is done.	Chaos , where assumptions of the nature of the project are unstable.
Snowden and Boone, 2007	Simple domain, an ordered system is characterized by clear cause and effect relationships with repeating pattern of activity, it is predictable and can be determined in advanced.	Complicated domain, also considered an ordered system is characterized by cause and effect relationships that require an analytical approach or expert diagnosis.	Complex domain, is characterized by flux and unpredictability where there is no right answer, cause and effect relationships are emergent.	Chaotic domain, is characterized by high turbulence and much is unknowable and hence cause and effect relationships cannot be identified.
Winch and Maytorena, 2011	Known-known (risk): where we can identify a possible future event and we can make quantitative inferences from historical data.	Known-unknown where we can identify a possible future event but there is no reliable data from which to make quantitative inferences.	Unknown-Known where a possible future event has been identified by someone but has not yet been revealed to the decision maker.	Unknown-Unknown where a possible future event has not been identified and the decision maker is in a state of ignorance.

Courtney and colleagues criticize the tendency of strategic managers to “view uncertainty in a binary way – to assume that the world is either certain, and therefore open to precise predictions about the future, or uncertain, and therefore completely unpredictable” (1997: 68). Drawing on case studies of strategic decision-making in larger firms, they encourage managers to think about the business environments they face in more creative ways, and move beyond the certainty/uncertainty dichotomy. They propose that business environments are characterized by one of either *a clear enough future*, *alternate future*, *a range of futures*, or *true ambiguity*. Courtney and colleagues apparently treat each

of these as discrete states of the world for a particular business environment (e.g. entry into the Indian market), although the examples they give suggest more fluidity than the formal model suggests.

DeMeyer and colleagues (2002; Loch et al. 2006) explicitly address project risk management issues, drawing on cases of larger-scale projects across a number of sectors. For example, in their exploration of the Circored project they identify the limitations and impact of adopting standard project risk management approaches in one-off, unique projects (Loch et al., 2006). They suggest shifting from risk management to “uncertainty-based management” as a function of the types of uncertainties it is “subject to” characterized by: *variability, foreseen uncertainty, unforeseen uncertainty, or chaos*. The “uncertainty profile” of the project is then the project team’s subjective assessment of the relative importance of each type of uncertainty for their project.

Snowden and colleagues (Kurtz and Snowden, 2003; Snowden and Boone, 2007) developed the *Cynefin* framework as a knowledge management perspective. The framework is a sensemaking model which identifies four different uncertainty domains defined by the nature of the “relationship between cause and effect” in that domain, which can be: *simple, complicated, complex, chaotic*. Simple and complicated domains assume an ordered world, while complex and chaotic domains assume an un-ordered world. The “un” in un-ordered does not mean disorderly but it is used to express a “paradox, connoting two things that are different but, in another sense, the same” (Kurtz and Snowden, 2003:465). The framework allows the decision maker to consider the different situations and their dynamics; the range of perceptions and perspectives; and changes to enable the development of a shared understanding and “decision-making under uncertainty” (Kurtz and Snowden, 2003:468).

A common feature of these frameworks is that they are realist: uncertainty is conceptualized as states of nature rather than states of mind. That is to say, it is treated as an epistemological problem rather than an ontological problem (Winch 2023a). In contrast, Winch and Maytorena’s (2011) cognitive approach to uncertainty on projects combines Savage’s fundamental insight regarding the inherently subjective nature of probability and risk, with Knight/Keynes distinction between uncertainty and risk (figure 3.1) and the existence of radical uncertainty. In addition, it introduces an interesting insight from Stephens (2003) regarding unknown-knowns: somebody knows, but is not telling you. The y axis of certainty and impossibility comes from Keynes (1921), while the x axis is developed from Galbraith’s (1977) definition of uncertainty to the effect that the greater the uncertainty, the greater the information processing required to gain confidence (Keynes, 1921) in that information. We use this framing as the foundation for our cognitive perspective on uncertainty. However, one of the limitations is that it does not connect through to action.

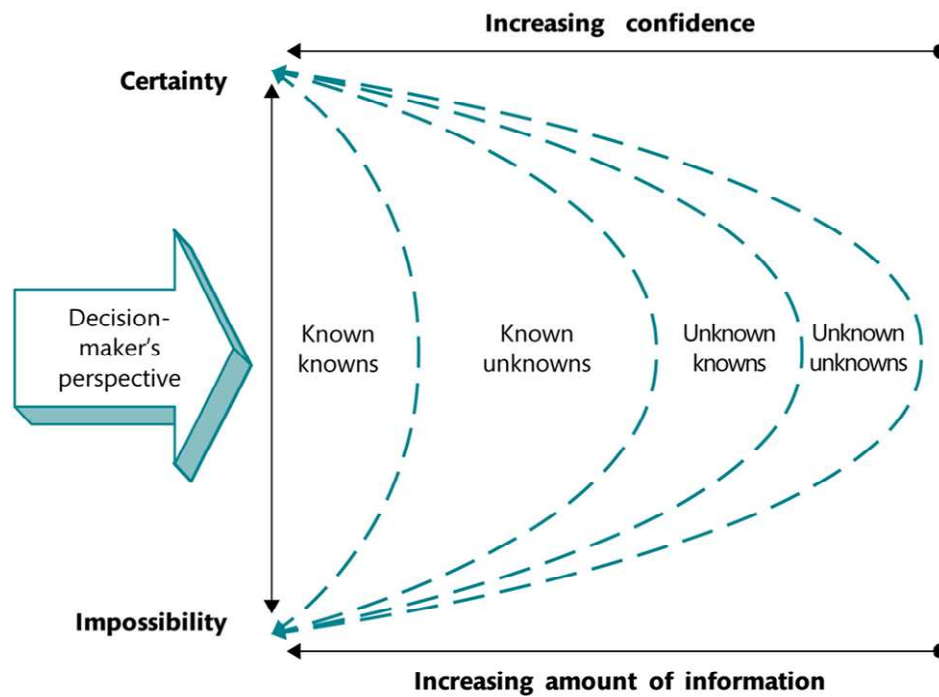


Figure 3.1 A cognitive model of uncertainty (Source: Winch et al 2022; figure 2.5)

3.6 FROM A COGNITIVE TO AN ACTION PERSPECTIVE

How do these framings shape organizational action? We distinguish action as proactive and hence future-orientated from behaviour which is reactive and hence present or past-orientated (Schutz, 1967; Winch and Sergeeva, 2022). Much of the literature on the psychological bases of organizational action is derived from pragmatist psychology, particularly the work of William James. Neither of the main traditions in organization theory identified earlier, which draw on pragmatist psychology, sees the need to provide a categorization of cognitive states. The information processing approach associated with the Carnegie School stresses the fundamental importance of uncertainty, defined as lack of information required for a decision and associated bounded rationality as behaviour under uncertainty. The interpretative approach associated with constructivism (Weick and associates) emphasizes equivocality or ambiguity as cognitive states where there is too much unstructured information rather than uncertainty, but uncertainty is the trigger for sensemaking (Weick, 1995). However, there is a tradition within the organizational behaviour literature of associating differing organizational behaviours with perceptions of threats and opportunities (e.g. Staw et al., 1981). There is much in this literature of relevance to the challenge of managing under uncertainty, but here we will restrict ourselves to reviewing the contributions of those who have attempted to link differing frameworks for understanding risk and uncertainty from table 3.1 with recommendations for organizational action (table 3.2).

Table 3.2 Recommendations for organizational action under conditions of uncertainty

AUTHORS	<i>Managerial and leadership behaviours</i>			
Courtney et al, 1997	<i>A clear enough future</i> , adapt to the future.	<i>Alternate futures</i> , shape the future.	<i>A range of futures</i> , reserve the right to play.	<i>True ambiguity</i> , shape the future and reserve the right to play.
DeMeyer et al., 2002	<i>Variability</i> , project managers are <i>trouble-shooters and expeditors</i> .	<i>Foreseen uncertainty</i> , project managers are <i>consolidators</i> .	<i>Unforeseen uncertainty</i> , project managers are <i>flexible orchestrators and networkers</i> .	<i>Chaos</i> , project managers are <i>entrepreneurs</i> .
Snowden and Boone, 2007	<i>Simple</i> domain, sense-categorise and respond.	<i>Complicated</i> domain, sense-analyse and respond.	<i>Complex</i> domain, probe-sense-respond.	<i>Chaotic</i> domain, act-sense and respond.

Courtney and colleagues (1997) identify three strategic postures as responses to different levels of uncertainty:

- ‘*shape the future*’ through playing a leadership role in the industry, which is the preferred strategy when alternate and a range of futures can be identified, but also under true ambiguity, supported by reserving the right to play;
- ‘*adapt to the future*’ through speed, flexibility and agility which is the preferred strategy when the future is clear enough but also when adapting to a range of futures;
- ‘*reserve the right to play*’ by keeping options open is preferred under a range of futures, and under ambiguity.

DeMeyer and colleagues (2002) have developed a typology of managerial style to respond to differing states of uncertainty:

- under *variability*, project managers are *trouble-shooters and expeditors*, using traditional project management approaches to achieve the project objectives;
- under *foreseen uncertainty*, project managers are *consolidators* who emphasize risk management techniques, sensitivity to environmental changes and communicating with stakeholders;
- under *unforeseen uncertainty*, project managers are *flexible orchestrators and networkers*, planning iteratively and working with partners through strong, flexible relationships;
- under *chaos*, project managers are *entrepreneurs*, continually redefining the project while building long-term relationships with stakeholders and others to sense market developments.

Snowden and Boone's (2007) *Cynefin* framework is richest in its recognition for managerial action because it not only proposes appropriate behaviours by the organizational leader, but also identifies some of the dangers of those behaviours if deployed non-reflexively. The leader's job, therefore is to:

- *sense, categorise and respond* when facing simple contexts using best practice routines, but there is the risk of complacency and failure to spot contexts shifting to another state which can be mitigated by good communication channels;
- *sense, analyse and respond* when facing complicated contexts using evidence-based management, but there is a danger of paralysis by analysis which can be mitigated by engaging with outside experts;
- *probe, sense and respond* when facing complex contexts using pattern-based management fostering creativity, but there is a danger of impatience and reverting to categorization and analysis too early;
- *act, sense and respond* when facing chaotic contexts by providing decisive action to create order while avoiding the danger of the cult of the (successful) leader and ceasing to listen to what is happening.

The cognitive perspective presented in figure 3.1 lacks an associated action dimension, so we develop one here. All three typologies presented in table 3.2 place considerable emphasis upon the role of leadership. However, research on leading in project organizing has largely addressed who leaders are by focusing on either traits (e.g. Müller and Turner, 2010), or biographies (e.g. Drouin et al., 2021). This approach tends to have the effect of removing leaders from their organizational context. So, we prefer a functional model (Edmondson and Harvey, 2017) that focuses on what leaders do, which we capture in the Project Leadership Model (PLM) (Winch et al., 2022) developed from the work of Ancona and colleagues (Ancona, et al., 2007) which argues that:

- Leadership is pervasive – it is not merely the activity of the Project Director at the most senior level of the project but leading takes place at all levels of the project organization;
- Leadership is personal and developmental as we learn by doing – we all have our own leadership “signature” rooted in our capabilities as matured through experience;
- Leadership is incomplete – no one person can excel at all aspects of leadership; each leader has a preferred style and needs a strong team to complement their weaknesses.
- Within the PLM there are four distinctive and mutually reinforcing leadership processes which all effective leaders deploy: *Projecting, creating, sensemaking and relating*.

By combining the ideas above, we can generate the Un-Certain, Complex, Complicated, Hidden (UNCoCoH) model (figure 3.2). The axes reflect Winch and Maytorena's (2011) cognitive approach

(figure 3.1) and categorizations of uncertainty. These in turn identify a range of decision situations: complicated, complex, hidden and Un-Certain inspired by Snowden and Boone’s (2007) domains. We characterize the cognitive state of unknown-unknowns as *Un-Certain*. This formulation is inspired by the middle English word “undead” meaning “not quite dead but not fully alive, dead-and-alive” (Oxford English Dictionary). We adopt it here to characterize the paradox (Kurtz and Snowden, 2003) of knowing and not knowing that pervades our knowledge of the future. Like the “Un-Dead” of Stoker’s Dracula (Stoker, 1897) who are neither dead nor alive but in a state of unfortunate limbo, the future can be neither true nor false because we can only know the future when it arrives (Aristotle, 1975). But within each situation we can still identify a useful range of tools, warning signs and predominant leadership processes that can help. The tools and warning signs are derived from the *Cynefin* framework, Browning and Ramasesh (2015) and some that we have found valuable in developing project leaders. These include project pre-mortems (Klein, 2007), causal mapping (Eden and Ackermann, 1998), rich pictures (Checkland, 2001) and stakeholder management (Ackermann and Eden, 2011).

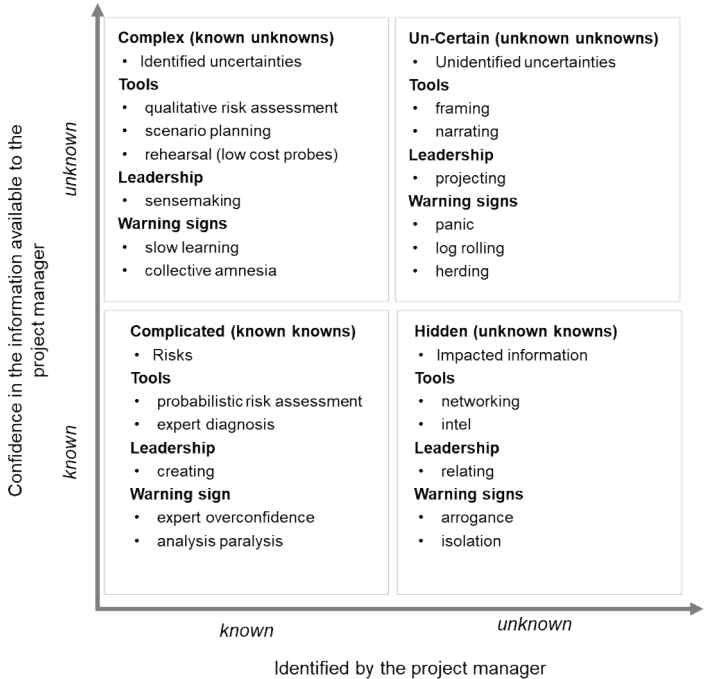


Figure 3.2 UnCoCoH model

Since the UnCoCoH model helps practitioners focus on action, let’s look at the predominant leadership processes within each situation. *Sensemaking* is particularly important for project leaders because of the dynamic and complex (known-unknown) nature of projects. Sensemaking is about how we understand and interpret the world around us. Sensemaking is the ongoing, retrospective, social process by which individuals give meaning to their collective experiences (Weick, 1995; Weick et

al.,2005). Words and language are a central component of sensemaking and therefore are highly relevant for the other leadership processes. Uncertainty triggers sensemaking, thereby discerning patterns from ambiguity to enable action. It is an active process throughout project life-cycle. In the context of 'radical uncertainty' asking 'what is going on here?' is a key question for facilitating the exploration of the situation (Kay and King, 2020).

Relating is about building and maintaining trusting relationships within and outside the project organization, and it is one of the most important activities of the project leader, critical for project shaping, delivery, and in hidden (unknown-known) situations. Relating is both formal through structured communication and formal processes and informal through social networking. According to Ancona et al. (2007), there are three ways to do this: inquiring, advocating and connecting. The relating dimension of sensemaking is "sense-giving", directed at external parties whose perceptions are held to be important, and hence worth influencing (Weick et al., 2005). Therefore, it is process by which individuals attempt to shape the sensemaking processes of others (Gioia and Chittipeddi, 1991; Maitlis, 2007). For example, project leaders make sense of the environment (sensemaking) and then communicate to others to gain support (sense-giving). Sensemaking is connected to sense-giving in that sensemakers are shaped by "saying", oriented towards a specific audience and sensemaking is incomplete without sense-giving, as target audiences may affect sensemakers. Both sensemaking and sense-giving are important processes of relating under conditions of uncertainty.

While *sensemaking* and *relating* are the enabling processes of the PLM; *projecting* and *creating* are the action processes of the PLM. An important part of leading is the process of projecting (Defoe, 1697) - imagining how a project will be developed, progressed and delivered, and how private and public benefit will be realized through future value. It is at the earlier phases of a project life-cycle when project leaders with others are *projecting* the desired future of a project. Project leaders tend to think strategically, and have a vision for a completion of a project. *Projecting* involves creating compelling images of the future; it produces a map of what could be done, what a leader wants the future to be and it is an ongoing process. Project leaders skilled in *projecting* use stories and narratives to project the desired future. This becomes even more important when in an Un-Certain (unknown-unknown) situation. *Projecting* therefore is about narrating a future (Sergeeva and Winch, 2021). Narratives can be understood as a discursive construction that project leaders use to shape their own individual (sensemaking) and others' understanding (sense-giving), and an outcome of the collective construction of meaning (Brown et al., 2008).

Project leaders use *sensemaking* and *relating* as the enabling processes for *projecting* the project mission and then *creating* how that mission will be delivered. The project narrative therefore ties together the *projecting* and *creating* processes of the PLM (Winch et al., 2022). Creating in the PLM

has two dimensions: designing how the project organization will deliver the outputs and innovating which is increasingly recognized as an important activity for project leaders and their teams do. Hence a predominant leadership process in a complicated (known-known) situation. Designing is the process of crafting a temporary project organization (project team, project structure, project DNA, project identity) which is then communicated internally with the team with the aim of creating a common vision for delivering the owner's mission. Innovating is about problem-solving whether by setting out to advance technology or by combining existing technologies in a novel way to deliver the owner's project mission. Innovating is a step change in best practice that could be a product, process and service new to the specific context, not necessarily to the world, which could have economic, environmental, or societal benefits for the owner and its stakeholders. Innovating is usually achieved collaboratively across organizations by the people within them, and orchestrating such collaboration is one of the great challenges and opportunities of construction project organizing. Collaborating between various individuals, teams, and organizations (owners, project-based firms in the supply chain and advisors) is the way to innovating (Winch et al., 2022).

The PLM model focuses on the four processes of what project leaders do, but who they are and how they think impacts on how and what they do as situation-action leaders. We therefore place *judging* at the heart of the PLM and integrate it across all situations in the UnCoCoH model. *Judging* in broad terms is about framing, psychology, and experience (Winch et al., 2022). The first is the decision-making frames that shape judgment – models of what good decision-making looks like on which there is a large literature (e.g. Kahneman et al., 2021) and can be summarized as Dr Optimizer and Dr Skeptic (Klein and Meckling, 1958). The second is the psychological traits capturing both the leader's psychological profile in terms of the Big 5 (Judge et al., 2002), and the leaders' ability to empathize with others – emotional intelligence (Mayer et al., 2008). The third captures the leader's experience and ability to draw on that experience to make the most appropriate decisions (Klein, 2017). Project leaders are *judging* on many aspects of the project throughout the project life-cycle based on their sensemaking with others. Hence, *judging* is closely connected with *sensemaking* and *relating*. Project leaders are *judging* what to do and how to do and are cognizant that their decisions and actions have important implications for the future decisions and actions. Hence, the project leader has a learner mindset. Project leaders' *judging* impacts the project's DNA and the image of the project. *Judging* is hence also connected with the *projecting* and *creating* dimensions of the PLM.

The UnCoCoH model, inevitably is, a highly synthetic model, and some points should be borne in mind:

- Particular project teams may have differing cognitive states around different situations of the project – the model can either be used to these situations individually, or it may be used to characterize the predominant “state-of-mind” on the project and or decision situation.

- Projects that are perceived to be in an Un-Certain state are unlikely to go ahead – more typically they descend into such a state as unk-unks turn into realities as on the Cicored project (Loch et al. 2006).
- The leadership styles specified in each category indicate emphasis, rather than suggesting that, for instance, relating is not required for complex project situations.
- There is merit in the project team considering what their project might look like from each of the situations identified (“what if we were a complex project situation?”) along the lines suggested by Winter and Szczepanek (2009).
- The cognitive condition of unknown-unknown is not co-extensive with the condition of *unknowable*, although it includes it. Our framework is cognitive, and therefore it takes the perspective of the project manager as decision-maker. It merely describes the condition where the project manager has no conception of the possibility of an event occurring. However, it is also possible that the decision maker could have known – the condition of “predictable surprises” (Bazerman and Watkins, 2004).
- It is unclear how this framework relates to Taleb’s analysis of “black swans”. To take the metaphor literally, the existence of black swans was unknowable to people in Europe until they had discovered Australia, so it is an unknown-unknown in our framework. However, Taleb (2008) appears to use the concept as representing the extreme end of the probability spectrum in terms of occurrence with unpredictable impact, a known-unknown in our framework. We prefer to describe black swans as unk-unks with attitude!
- There is often more data around than is used, and so with a little effort possible events can be moved from the known-unknown to the known-known category – for instance probabilistic data on O-ring failure for the launch of NASA Shuttles was available but had not been analyzed (Vaughan, 1996).

The UnCoCoH model provides a focus for research and supporting practical action. Through the development of the model we reconnect with the Carnegie School’s interest in cognition, decision making and action in uncertain situations by transitioning cognition – individual perceptions of possible future events through to future-orientated action. It takes into consideration aspects of cognition by: recognizing an individual’s *perception* of situations, enabling the individual’s *attention* to be directed at what is known and what might not be known, and encouraging the individual’s *sensemaking* (Weick, 1979) and *sense-giving* (Gioia and Chittipeddi, 1991) through engaging in a process of *inquiry* (Schein, 2013; Garvin and Roberto, 2001). The transition to proactive action considers that in all the decision situations that project leaders encounter they will need to find ways to stabilize uncertainty, and one important way of doing this is through narratives (Kay and King, 2020; Winch and Sergeeva, 2022).

3.7 NARRATIVES AND NARRATING IN CONSTRUCTION PROJECT ORGANIZING

One of the two processes of the action axis of the PLM is *projecting* – a term we take from Defoe (1697). The principal facets of *projecting* are narrating and storytelling (Winch et al., 2022). We focus here on narrating. Narratives play an enormously important role in *projecting* by connecting the present with the future, and are the essential means for maintaining or reproducing stability and promoting or resisting change in and around organizations (Vaara et al., 2016) and are therefore essential for decision-making under uncertainty (Kay and King, 2020). They are performative as words that do things (Austin, 1962) and therefore intendedly persuasive in nature. They are used by project leaders to convince stakeholders during project shaping and to mobilize resources during project delivery (Sergeeva and Winch, 2021).

When stabilizing uncertainty, project leaders craft and communicate a project shaping narrative that inspires employees, excites partners, attracts customers and engages influencers and, perhaps most importantly, investors. The project shaping narrative is used to explain why the project exists and what makes it unique, the value and relationships it creates, and communicates these to both internal project team members and external stakeholders – in sum an image for the project (Sergeeva and Winch, 2021). The image shaping narrative generates a project mission as a compelling why statement for the project. Project narratives are communicated in spoken (e.g., talks, presentations), written (e.g., reports, business cases) and visual (e.g., videos, pictures, PowerPoint packs) forms to various internal and external stakeholders. The project narrative is also (re)iterated and restated in many different ways throughout the project life-cycle to serve various purposes and audiences.

We can distinguish different types of narratives (e.g. project narrative about mission, innovation, sustainability, value creation), and each have important implications for project organizing, shaping, delivery and outcomes. Ante-narratives (Boje et al., 2016) are what come before a coherent and persuasive project narrative, and, in effect, form alternative future possibilities of our world that can be created by *projecting*. Ante-narratives or “before-narratives” are narratives that are not yet fully formed as project narratives and are still competing for the attention of stakeholders (Winch et al., 2022). Ante-narratives are often presented in speeches and talks, or published in reports, newspaper articles and social media blogs as well as being the stuff of internal strategy debates within the organization before the coherent reference narrative is formed about the project and the project mission becomes succinctly stated.

There are always counter-narratives to the project narrative, often mobilized by external stakeholders, to the dominant project narrative and ongoing interactions between them. Counter-narratives are “the stories which people tell and live which offer resistance to, either implicitly or explicitly to dominant cultural narratives” (Andrews, 2004). The distinctive characteristics of counter-narratives

are oppositional to the dominant project narrative. As demonstrated by Ninan and Sergeeva (2021) in the case of High Speed 2, there are narratives of the need for a project, there are also counter-narratives that the project is not needed. The promoters are interested in supporting the completion of the megaproject, whilst protesters are interested in derailing the megaproject. They explored the role of labels in the sensemaking process through which these labels are maintained and contested in megaproject settings. The promoters labelled HS2 megaproject as “fast” and “low-carbon”, the protesters labelled it as a “vanity project” and as a project “for the rich”. Focusing on counter-narratives enables us to capture some of the political, economic, social and/or cultural complexities and tensions in projecting and capture the diversity of stakeholder positions in relation to the project narrative. The dynamic interaction between dominant and counter-narratives is part of the power game around project shaping.

Project identity is conveyed internally to the project team and the supply chain whereas project image is projected to external stakeholders such as investors, campaigners, and policymakers. Project identity narratives are about what project leaders tell the team in order to achieve shared understanding and vision; they are about a sense of what the delivery project organization’s purpose is that creates its “DNA” (Ninan et al., 2019; Sergeeva and Winch, 2021). Project leaders communicate a narrative about project identity to the project team. This commitment is based on the connection of the group combined with the emotional value that is attributed to this connection. Project image narratives stimulate stakeholders to commit themselves to the project. Crafting a favourable image is import for gaining legitimacy and support from external stakeholders that in turn affect the delivery of project outputs. Projects require convincing narratives to build strong brand attributes and loyalty. This is why it is important to brand the project with a well-crafted external image from the start and hence crafting a project image narrative as part of project shaping is essential for the successful delivery of projects from an external stakeholder management perspective (Winch et al, 2022).

Project leaders craft and maintain project narratives (about mission, scope, identity, image, innovation, sustainability, health, safety and wellbeing, value) throughout project life-cycle and their general work life experience. They communicate and share their project narratives internally with the team and externally with people outside (through social media, Facebook, LinkedIn, Twitter). Sharing project narratives may have impact on winning new projects, feeling proud of the work completed and making new connections and contacts. There is an ongoing process of narrating and storytelling in different forms in construction project organizing. Here we have shown how project narratives play a role in *projecting* as a way of stabilizing uncertainty by connecting the present with the future.

Narratives and the process of narrating have important implications for the perceptions of the project. For instance, a negative narrative about a project crafted and communicated by external stakeholders

is likely to have a damaging impact on the perceptions of the project held by the wider community. By the same token a positive narrative about the project can give rise to favorable perceptions of the project held by the wider community. Hence narratives and the process of narrating are an important part of transitioning from cognition to action in construction project organizing.

3.8 THEORETICAL IMPLICATIONS

Our concern for the relationship between cognition and action in construction project organizing is rooted in the phenomenology of Schütz (1967b) and his concept of “projecting”. He argues – admittedly misconstruing Heidegger - that an action always has “the nature of a project”, and he uses *Entwurf* (construction drawings) as the noun (rather than *Projekt*) (1967a: 59). So, it is appropriate to turn to the work of the New York School of relational sociology which draws on Schütz to develop the concept of projectivity for the broader theoretical implications for construction project organizing of our argument in this chapter.

The New York School of relational sociology (Mische, 2011) is concerned with how people think about the future and the concept of *projectivity* (Emirbayer and Mische, 1998). Sociology has long been challenged in terms of understanding how people think about the future (Mische, 2014). By extension, we can suggest that this limitation also applies to those areas of management research that draw principally on sociology such as organization theory (Wenzel et al., 2020). Mische (2014) argues that this is because in the Parsonian grand scheme of things, concerns of future orientation were left to economists, while sociologists got on with understanding the present. Economists then responded to this burden by providing us with expected utility theory discussed in section 3.3. However, we may add a more proximate reason rooted in the influence of Giddens on practice theory because he (Giddens, 1979) asserts a temporal conflation of the synchronic and diachronic (Saussure, 1959). In structuration theory, agency and structure are so tightly bonded in their mutual instantiation in space/time that the possibility of structure and agency evolving through different temporal rhythms is occluded and “temporal relations between structure and agency logically cannot be examined” (Archer, 1993: 70). The result is a time-frame that is entirely in the present, rather than the past or future.

The principal theoretical concern of Emirbayer and Mische (1998) is that human agency is fundamentally temporal with a chordal triad of the iterative which reflects on the past, the projective which generates the future, and the evaluative in which experience is contextualized in the present. For researchers in construction project management, the likely concern is the projective, which has a dominant tone of “narrative construction”. We suggest, therefore, that narratives are the principal way in which we imagine the future and hence their crafting is an important aspect of temporal work (Kaplan and Orlikowski, 2013), defined as “addressing tensions (implicitly or explicitly) among different

understandings of the past, present, and future to settle on a strategic account for the organization” (Shipp and Jansen, 2021: 334) – a perspective that aligns closely with Kay and King’s (2020) from the perspective of economics. Projects are then the way in which those narratives are realized (Winch and Sergeeva, 2022)

A further perspective on temporality and the future is attention to the role of anticipation (Tavory and Eliasoph, 2013). They argue that there are three levels of temporal experienced. The first level is the “protentions” that people experience in daily interactions. The second level is the “trajectories” that people move through temporally as they make their way through the social. These trajectories have two elements – narratives and projects. Narratives help people make sense of the future while projects are how they move towards that anticipated future. The final level is the “landscapes” which form the structured temporal elements of life such as progression on an annual rhythm through the education system or the structure of the calendar itself.

Both Emirbayer and Mische (1998), and Tavory and Eliasoph (2013) draw heavily on Schütz (1967) in developing their argument. Schutz develops an ontology that offers much insight for theorists of temporality in project organizing. He argues that all purposive action, as opposed to reactive behaviour, has the nature of a protention or a vision of a completed future state which gives present meaning to that subsequent action which will bring forth that future state. Thus, whilst the protention is cognitive in that it exists as a perceived state, it is qualitatively different from a retention which is inherently a perception about the past. However, because the protention, like a retention, is perceived as completed, “the planned act has the temporal character of pastness” (1967: 61) and is therefore thought of in the future perfect tense. We suggest, therefore that projectivity is a potentially important concept for construction project organizing research, and can be defined (Winch 2032b) from a cognitive perspective as future-perfect thinking (Schütz 1967) and from an action perspective as *projecting*. In turn, research on construction project organizing can inform the projectivity research agenda as the case of the Eden project shows (Winch and Sergeeva, 2022). We further suggest that this research agenda can most effectively be achieved by combining the New York School’s concern with projectivity and a critical realist philosophy of science (Donati 2018; Porpora 2018).

3.9 FUTURE RESEARCH DIRECTIONS ON PROJECTIVITY IN CONSTRUCTION PROJECT ORGANIZING

Some of the ideas set out in this chapter and elsewhere in this book may well prove useful but we have also identified some areas where further research is clearly necessary which constitute a potential research agenda on projectivity in construction project organizing. We highlighted the importance of researching project narratives and narrating in construction project organizing research. Work has started on this agenda (Ninan and Sergeeva, 2021; Sergeeva, 2022; Sergeeva and Winch, 2021), and

merits further investigation. From a projectivity perspective, narratives are about how future-perfect thinking is stabilized enough to mobilize the resources required for projecting. They are, therefore, core to leading construction project organizing (Winch et al., 2022). Project narratives and narrating have impact on the perception of a project from stakeholders, and hence have important implication for wider project organizing aspects such as organizational identity and image. Further research could explore the nature of different project narratives (e.g. about mission and vision, project outputs and outcomes) in project organizing. Research could also start to identify the future visioning narratives in construction project organizing (e.g. narratives about recovery from the pandemic, narratives about health and wellbeing, narratives about work life balance). By deeper understanding of project narratives and narrating, we would better understand construction project organizing and its future vision.

In addition, is the role of the project owner. We have long understood that the owner (client) “charters” the construction project (Boyd and Chinyio, 2006; Cherns and Bryant, 1984) and there is a growing body of research on the importance of owner project capabilities (Hui et al., 2008; Leiringer, 2023; Merrow, 2011; Morris and Hough, 1987; Winch and Leiringer, 2016), but much research remains to be done. From a projectivity perspective cognition and action are linked within the owner domain (Winch, 2014) – that is to say within the owner organization and its broader socio-economic ecosystem (see section 3.2). Present conceptualizations of strategic misrepresentation and optimism bias (Flyvbjerg et al., 2003) leave the development of these linkages as something of an empirical “black box” that we need to get inside because if the future is unknowable, then it logically follows that there is not some correct version of the future from which we are “biased”.

Specifically, within this theme, the issue of the uses and abuses of cost-benefit analysis arises. Few would gainsay the contention that present CBA practice is “broken” in some way (Flyvbjerg and Bester 2021; Self, 1970). The question is whether it can be fixed. The answer turns on whether one holds that uncertainty about the future is an epistemological or ontological problem. If it is the former, then the rigorous application of the technical fixes propounded by its advocates (Flyvbjerg and Bester, 2021; Sunstein, 2018) should be our aspiration; if it is the latter, then CBA can only be considered to be a very important sense-making tool supporting the feasibility criterion (Schütz, 1967) within future-perfect thinking.

These considerations link through to the growing concern in project organizing research more generally around front-end definition (Babaei et al., 2021; Edkins et al., 2013; Williams et al., 2019; Zerjav et al., 2021), yet we still have little empirical research on the processes of project shaping that yields the insights obtainable from the kind of detailed empirical work offered by Hughes (1998), and Cusin and Passebois-Ducros (2015). Research methods drawing on ethnography, history, and political

science would be particularly appropriate here to explore how cognition of a desired future becomes action initiating a project to achieve that desired future.

3.10 CONCLUSIONS

We began by summarizing the contribution of the Carnegie School to our understanding of management and organizations and indicated how their insights are still relevant today. Through this review, we have identified some opportunities for research in construction project organizing. Our focus is on decision-making in organizations, by investigating the cognitive processes that influence decision-making and actions under conditions of uncertainty (Winch, et al., 2022). We provided an overview of the MOC discipline, which provides the theoretical foundations for the exploration of uncertainty and project organizing, which in turn has its foundations in the Carnegie School. We emphasized the importance of taking a cognitive perspective, as this places emphasis on individual processes that are reflected upon, learned and socially constructed to provide an underpinning to actions associated with uncertainty and project organizing. In developing our cognitive approach, we have built on Winch and Maytorena's (2011) cognitive approach to uncertainty on projects, and Kay and King's (2020) notion of 'radical uncertainty'. Our cognitive approach was developed by looking at how the cognitive framings shape organizational action. We consolidated relevant literature that attempted to understand risk and uncertainty and organizational action. The resulting UnCoCoH model links the cognitive approach with knowledge perspectives, leadership processes and behavioural warning signs. This allowed us to reflect on the role of uncertainty in construction project organizing and identified the role of narratives in stabilizing uncertainty through the project lifecycle. Finally, we linked these concerns through to recent research in relational sociology on projectivity and suggested that a projectivity perspective on construction project organizing that combines cognition through future-perfect thinking and action through projecting (Winch, 2023b). We then indicated the sort of research agenda that this projectivity perspective suggests.

Our final comment is that the rather theoretical – and so inherently abstract – concerns explored in this chapter have important practical implications. The principal research contributions to construction project organizing have taken a predominantly subjective perspective on time, seeing project organizing as an emergent process (Winch and Sergeeva, 2022). While these theoretical developments have yielded many important empirical insights, they have lost one of the fundamental attributes of project organizing – its goal-orientation towards a better future. We suggest that as we live through the 4th industrial revolution and its net zero imperative (Winch, 2022), conceptualizing projects as emergent processes is no longer adequate. The United Nations Sustainable Development Goals and the Paris Agreement are nothing if not goal-oriented. We therefore need to move beyond

conceptualizing projects as emergent processes and theoretically re-instate their inherent teleology. A projectivity perspective, we suggest, is one way to do this.

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