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Decision Topologies in Functionally Differentiated Societies

- the cases of projects and AI -

Doctoral School of Business and Management

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DOCTORAL DISSERTATION

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1 INTRODUCTION

1.1 My road to social systems theory

The concept of decision, as something that deserves theoretical and empirical attention on its own, first resonated with me when I learned about a book with the title *Essence of Decision – Explaining the Cuban Missile Crisis* (Allison, 1971). This book was brought to my attention by one of my professors during my studies at the State University of Utrecht. If I remember well, the subject of the respective course was public planning and policy. Our professor recommended it as one of the best books written on policy analysis; moreover, according to him, “the book reads as a thriller”. Occupied as we were as students in those days, I believe none of us got to reading the book. Admittedly, during the many years that have passed since, I contemplated numerous times to get hold of the book and finally read it. But that was the case with many other books as well. After all, it had to wait until my PhD thesis work, which is centred around the conception of decision.

I have always looked at the phenomenon of decision and decision-making with a great deal of interest. I often wondered why my superior managers are reluctant to make decisions and can be quite awkward about it, only to recognise it in myself, when I moved into management positions with a lot of responsibility. When I was a project director of an infrastructural megaproject in the Netherlands, I had to manoeuvre in an extremely dense decision-making setting. That is when I judged my performance, whether I had made some particular decisions on the very day. If the answer was no, that was a sign of warning. As project director of a high-profile project, I was regularly invited to talk about how we managed the project. One of my usual points was to highlight the cruciality of making many decisions, probably as many as possible, and if you consider 60% of your decisions to be good ones, the project is cruising. The 60% was met with quite some scepticism by the audience, but then it is difficult for outsiders to realise that the 40% will be recycled into a new decision, of which 60% will come as a good decision, so after one recycling rounds you are at 84% good decisions, after two almost at 95%. Of course, the 5% that cannot be correct are the ones that screw up the project. Moreover, the reader should not be deceived by this simple calculation and remember that at any moment in the overall ratio of good to bad decisions remains at 6:4. Nevertheless, the importance is

to reflect critically and keep the speed in decision-making. A related subject is that of paradoxes. My favourite one was: most of the decisions you take for measures to prevent delay of the project, will actually cause delay. Hovering on the subjects of decision and paradox, it would seem I have almost anchored on the theoretical framework I finally settled for, that of Niklas Luhmann.

That was not the case, however. Another element was needed. It was the concept of autopoiesis that finally led me into the court of social systems theory. As I will discuss this concept in great detail later in this chapter, for now I will suffice with saying that autopoiesis is the notion, or axiom, that systems maintain themselves through self-production, i.e., the elements of a system produce the elements that produce the elements of the system. What struck me was not, in the first instance, this idea of self-production itself, but the existence of an internal autonomy with which it endows the system. It strongly resonated with my experiences during the years I was project director of an infrastructural megaproject in the Netherlands. After that, I soaked up Luhman's work but was equally soaked up by it. The depth and pervasiveness make the road to social systems theory infinitesimally small compared to the many roads within social systems theory. Travelling these roads, I gradually grasped the centrality of the concept of decision, and its organisational and societal significance, which precipitated in the three papers that form the core of my dissertation.

1.2 The concept of decision in organisational theory

1.2.1 Organisations as machines

Decisions are a feature of certain roles only. Managers make decisions, and subordinates follow rules. Also, managers are confined by the scope of decisions, as decisions are mostly based on formal rules, procedures, and policies rather than personal judgment. Moreover, the function of decisions is to ensure balance and stability. The line of authority is used as a channel for communication and decision-making (Morgan, 2006, p. 19). While the machine model is representative of the bureaucratic organisation, several contemporary approaches seek to nuance the concept of bureaucracy. It is argued that formalisation can be designed to enable individuals in organisations; thus, the enabling bureaucracy can be distinguished from the coercive/mechanistic bureaucracy (Adler and

Borys, 1996). This modern concept of bureaucracy hinges on the aspect of decentralisation of operational decision-making power to lower levels in the organisation (Adler, 2012; Clegg, 2012; Thompson and Alvesson, 2005), combined with the idea that bureaucracies also provide freedom in decision-making, because it shields decision-makers from arbitrary or whimsical interventions of higher levels (Du Gay, 2005). Moreover, it is noted that the rules that guide and regulate decision-making are a crucial source of legitimation for decisions, which is particularly relevant for governmental organisations (Byrkjeflot and Du Gay, 2012).

1.2.2 Organisations as organisms

Organisations function as open systems that continuously respond and adapt to their environment. Decisions are a central part of this responding and adaptation process. As change is leading, decisions are to a lesser extent based on rules and regulations. Still, decisions are also needed to maintain internal balance, as in the machine model. The difference is that here, decisions are a response to (potentially) developing instabilities. In this model, the key concept of organisational survival is homeostasis (Amadasun, 2014; O'Connor, 2008; Scott and Davis, 2016). Homeostasis drives decision-making aimed at maintaining coherence, identity, and functioning despite the change that organisations experience as open systems. In open systems, decisions are essentially boundary-spanning operations, as their function is to relate what is inside to what is outside the system (Roberts, 2019). The central decisions in this model are organisation design decisions, as the organisation structure is the prime contributor to achieving goals and responding to the environment (Nadler and Tushman, 1997). A characteristic of the organism model is that structures have replaced the rules and procedures of the machine model. The rules and procedures of the machine model are replaced by structures.

In this organisation model, the notion of decisions as a source of conflict emerges (Morgan, 2006, p. 58). The importance of decisions is downplayed, however, as it is ultimately the environment that selects the survival of the organisation and “even an efficient and successful firm that adapts to its environment is liable to fail as the result of environmental changes that influence the structure of its resource niche” (ibid. p.61). A further relevant aspect of this organisation model is that decisions acquire an inter-organisational quality; in other words, decisions not only regulate the own organisation

but may also have the function of coordination between organisations (Scott and Davis, 2016, p. 116 ff).

1.2.3 Organisations as brains

In this conceptualisation of organisations, the decision is a pivotal element. Organisations operate as information-processing systems and “learn” from their information experiences. Decision-making is equivalent to an organisation collecting, interpreting, and acting on information. This view is closely connected to the works of Simon and March (March and Simon, 1958; Simon, 1947), as well as the seminal work of Cyert and March (1963). A core concept is that of bounded rationality, which states that an organisation cannot be assumed to be fully rational, as the individuals who are involved in making decisions have limited information processing abilities (Morgan, 2006, p. 76). This orients the organisation to an operation mode of ‘satisficing’ rather than ‘maximising’. A novelty of this approach is the concept of redundancy, i.e., there is not a one-on-one relationship between elements. Whereas in the bureaucratic, machine-type model, the ideal configuration is one in which there is a tailored rule or procedure for every situation, the idea of redundancy is that elements should be designed to be capable of dealing with a variety of situations. The notion of redundancy is also reflected in the concept of the decision premise (March and Simon, 1958), which acts as a reference for a related set of decisions. It transpires that in this model, uncertainty is the starting point out of which a course of action has to be derived through decision. This corresponds to the principle of requisite variety (Ashby, 1991). From the perspective of organisational dynamics, organisations are considered to behave as self-organising and learning systems (Morgan, 2006, pp. 81–111). James March has elaborated this further with his concept of exploration and exploitation (March, 1991). March develops an interesting model on how learning affects the quality of knowledge of an organisation. This model assumes that the environment (the reality of the outside world) can be known, in the sense that the better knowledge is the knowledge that is more verifiably correspondent with reality. It assumes that there is an organisational code, representing the knowledge of the organisation, which can be influenced by organisational members whose knowledge is superior to, i.e., more in accordance with reality than that of the code. On the other hand, it assumes that the individuals are prone to accept the knowledge of the code, regardless of how good or bad the quality of the knowledge contained in the code is. March compiled this into a dynamic

mathematical model, which renders the outcome that fast learning results in a lower quality of the code, and that a high propensity of code learning enables high quality of organisational knowledge, provided that members do not learn/socialise fast.

It should be noted that in this approach, decision-making and learning/self-organisation are, although interconnected, essentially separate processes that have their own tracks.

1.2.4 Organisations as cultures

Viewed through the culture lens, the rationality that is generally associated with decision-making is primarily seen as a culturally accepted way of sense-making. Here, organisations rely on “belief systems that emphasize the importance of rationality, and their legitimacy in the public eye usually depends on their ability to demonstrate rationality and objectivity in action” (Morgan, 2006, p. 140). In this organisation model, decisions are a reflection of underlying beliefs, norms, and values. This impacts decision-making in two ways. First, how decisions are made matters as much as what decisions are made. The cultural lens points to rituals, customs, which determine what is an acceptable way to reach a decision. Second, the question of “what is appropriate” also extends to the matter of the decision itself: norms and values play a role in determining what acceptable alternatives are, and what are acceptable outcomes. Geert Hofstede contributed with his seminal research on comparative culture (Hofstede, 2013). Hofstede showed how cultural value systems shape decision styles, such as attitudes toward authority, risk, and participation. He provides a detailed assessment of how the culture dimensions power distance (the different solutions to the basic problem of human inequality), uncertainty avoidance (related to the level of stress in the face of an unknown future), individualism versus collectivism (the level of integration of individuals into primary groups), masculinity versus femininity (related to the division of emotional roles between men and women), and long-term versus short-term orientation (related to the time horizon of efforts) collectively shape fundamental characteristics of decision-making processes. Hofstede argues that decisions are culturally patterned rather than universally rational. Hofstede’s work inspired other research into decision-making in organisations (Yates and De Oliveira, 2016), the ethical aspects of decision-making (Ellestad and Winton, 2023), as well as participation in the decision process (Valverde-Moreno *et al.*, 2021). On the other hand, key conceptual and methodological issues

surrounding the cultural dimensions in Hofstede's work have been pointed out, and approaches that move beyond the Hofstede dimensions have been elaborated (Tung and Verbeke, 2010). As an outspoken culture advocate, Edgar Schein has underlined the role of culture in decision-making. Schein argues that culture contributes to facilitating the building of sufficient common ground and mutual trust. He conceives effective decision-making as a form of dialogue that is built on "talking the same language" (Schein, 1993, p. 47). Schein extends the quality of a decision achieved by dialogue to what follows after the decision as "the more the group has achieved such collective understanding, the easier it becomes to reach a decision, and the more likely it will be that the decision will be implemented in the way that the group meant it" (ibid., p. 47). This principle is confirmed by research on decision-making in product innovation processes (Cooper and Kleinschmidt, 1995).

1.2.5 Organisations as political systems

Where the culture model involves society as a factor in decision-making, in the sense of the ongoing, ambient influence of national culture, the political system model involves society through tangible social actors. The three major actors - owners, managers, and workers - seek to mobilize support outside the firm in order to gain influence on decisions and strengthen their interests inside the firm (Gourevitch and Shinn, 2007). Societal power relations shape organizational decisions, which reproduce class structures, gender norms, professional hierarchies, and global dominance dynamics. In order to be successful, organisations have to gain legitimacy through reproducing institutionalised myths in their decisions (Meyer and Rowan, 1977). Closely related to this is Bourdieu's concept of symbolic power (Bourdieu, 1989), in which power and authority are established through language, symbols, categories, and norms, which constitute reality and in organisations, thus legitimise the power relations they harbour (Pollach and Kerbler, 2011; Srinidhi *et al.*, 2020). Critical theory research has resulted in similar insights (Alvesson, 1996). Research has shown that decisions about technology may be based on managerial control and thus the reproduction of societal power relationships (Noble, 2011; Orlikowski, 1992). Courpasson argues that the modern soft-bureaucracy is as much a coercive, centralised organisation, as is the traditional form (Courpasson, 2000)

Another aspect of organisations as political systems is the influence of internal politics on decision-making. Here, Pettigrew sought to remedy the deficiencies of Cyert and March, which exist in their lack of consideration of the forms of strategic behaviour that are used in mobilizing support for a demand, as well as organisational structure as a limiting factor in this process (Pettigrew, 1973, p. 274). Pettigrew particularly draws attention to the role of controlling access to and the flow of information and shows how power culminates in gatekeeper positions as a result. The concept of the organisation as a political system of conflicting preferences has wide support from studies in the private and public sectors (Eisenhardt and Zbaracki, 1992). Eisenhardt and Zbaracki assert that “(1) organizations are comprised of people with partially conflicting preferences, (2) strategic decision making is ultimately political in the sense that powerful people get what they want, and (3) people engage in political tactics such as cooptation, coalition formation” (p. 27). Furthermore, there is considerable support for the *garbage can* model, which builds on the notion “that decisions are the result of a random confluence of people, problems, solutions, and choice opportunities” (p.28), and likens certain organisations to *organised anarchies*.

1.2.6 Organisations as psychic prisons

The principal notion of this model is that decisions in organisations are influenced by a sphere that is not governed by rationality. Whereas bounded rationality, politics, and culture imply partial, fragile, or biased rationality, these are still largely accessible by a counter rationality; in other words, we can see these as particular selections within a plane of rationality, which are interchangeable, dispute, or reinforce each other.

In contrast, the psychic prison model posits that the contents of the unconscious actively influence decision-making. Two aspects are important in this regard. First, the unconscious is not directly accessible by the rational layer; in other words, there is no direct dialogue or interchange. Second, the influence of the unconscious most often occurs without being aware of it; moreover, it is harder to understand or realize the influence than in the case of bounded rationality or culture. So, we can speak of a hidden layer.

Since organisations are a collective of people, and the psyche is principally that of an individual, it is necessary to establish how the influence of the unconscious on

organisational decision-making is mediated. Two approaches have been developed in this regard.

The dominant approach is that the mediation primarily occurs through the individual. This stream has largely focused on those individuals, to whom, in common understanding, most decision-making influence is attributed. Foremost proponents of this stream are Zaleznik (1989) and Kets de Vries (1980). The authors state that decisions of managers are inevitably framed by unconscious elements, which are reinforced by the positions they occupy or even are the reason why they are in managerial positions. Such unconscious elements often pertain to desire for control, power-related anxieties, and fear of failure. Decision-making can be influenced by psychological defence mechanisms like denial (ignoring information that threatens the psyche), rationalisation (framing an irrational motive into a rational justification), projection (attributing own feelings and impulses to others), and repression (blocking discomfort topics like power, inequality). Zaleznik and Kets de Vries propagate the paradigm that understanding (some of) the psychodynamic forces at work improves the quality of decision-making. Hence, a key contribution of managers ought to be “to transform the theme of conventional rationality and make himself aware of his limitations, given the pressures of inner fears, anxiety, and guilt as well as affiliative, dependency, and aggressive needs. The manager has to come to terms with his own narcissism and thus place limits on potential conflicts between fantasy and reality in his leadership style” (Kets de Vries, 1980, p. 193). If managers actively practice reflection and gain such awareness and insight, they can become true leaders (Zaleznik, 1981, 2010). While challenging the mythos and cult surrounding the CEO (Kets de Vries, 2017), this stream also singles out CEOs and thus may contribute to the mythos rather than dismantling it.

A stream quite aside from the mainstream is built on Jungian principles of collective subconscious contents. Here, the influence of the unconscious on decisions is, in fact, a collective phenomenon. Jung’s concept of archetypes plays a central role in this stream. Archetypes are collectively inherited condensed structures of thought and experience, which are associated with archetypic symbols: “an archetype is the most symbolic, universal psychological image of a character type known to man” (Mitroff, 1983, p. 390), which are, “[u]ntil activated, [...] essentially forms without content, lying dormant in the deepest layer of the unconscious – which Jung (1980) termed the collective unconscious” (Moxnes, 2013, p. 640). Some relevant archetypes that have been identified in

organisational research are those of hero, villain, fool, primal mother and father, messiah or servant. The dynamic that plays out in an organisation is that individuals slip into archetypal roles, and or that archetypal narratives are invoked in a particular situation. In this case, it is not the individual unconscious psyche of a CEO that is the most relevant, but rather the archetypic role or narrative of a CEO that is recognised by other members of the organisation because it appeals to the collective unconscious, and causes these individuals to take up associated archetypic roles for narratives. This is how archetypes then affect the decision dynamic of organisations (Bowles, 1991; Hatch *et al.*, 2009). A longitudinal study dealing with archetypes in organisations concluded, “that organizational norms supporting certain character types leave a psychological fingerprint on individuals in the organization” (Carr, 2002, p. 486). A recent study showed that the information that managers use to reach a decision, as well as their informational luggage they use as reference and heuristic in decision-making situations, is related to archetypical profiles (Araújo, 2019).

1.2.7 Repositioning the concept of decision

The table below (Table 1), summarises the position of the decision concept in the various organisational models that have been discussed so far.

All these six organisational paradigms have resulted in relevant contributions to organisational science. Each of the models managed, using its own particular lens, to magnify aspects of organisational life, so that these aspects became visible, while they would have largely remained covered otherwise.

Nevertheless, when it comes to the study decision-making in particular, these paradigmatic models have significant shortcomings.

Firstly, these models implicitly or explicitly follow the assumption that organisations set rational goals and the organisational configuration represents the means to accomplish these goals. The rationality of organisations is a derivative of societal goals. In section 2.1.3 of this thesis, it will be shown that this assumption is fallible, however (Luhmann, 1973). The problem is that in these models, the rationality of decisions is evaluated accordingly as a goal-means rationality, whereby rationality is judged by how well decisions conform to norms or cultural values, or achieve predefined goals. We can particularly witness this in the political system and prison models. These models suppose

that the organisation, by itself, is following rational goals, but this rationality is distorted, incidentally, by individual factors, such as power and unconscious needs.

Table 1. Concurrent organisation models and their associated decision concepts

Organisational Model	Associated decision concept
Machine	• Rule precedes decision • Rules provide legitimation for decisions • Decisions are confined to the center of the organisation • Decisions are a means of internal control
Organism	• Decisions are boundary-spanning operations • Decisions are directed at internal balance and homeostasis • Structure precedes decisions
Brain	• Decisions are pivotal elements in organisations • Decisions are subject to bounded rationality • Organisational decision knowledge is given by the knowledge of the individuals • Decisions originate in uncertainty, and organisations should aim for redundancy in their decision-making process • Learning and decision-making are interconnected but principally separate processes
Culture	• Decisions are a reflection of underlying values, norms, and beliefs • The “how” matters as much as the “what” • National cultural orientations shape decision-making • Trust is vital for effective decision-making • Common understanding ensures that decisions are implemented in accordance with the intentions
Political system	• Societal actors and interest groups seek influence on organisational decisions • Decisions reproduce social power structures on the local and global level • Decisions are the outcome of internal power struggles and conflicting interests • Decision-making occurs in organised anarchies
Prison	• The unconscious adds a layer to decision-making that is irrational • Managerial decisions are also framed by unconscious needs, often related to power and control • Archetypes can influence decision-making patterns on a collective level

Source: author, after Morgan (2006)

Secondly, connected to the previous point, these paradigmatical models are principally all action models. In other words, in their organisational conceptualisations, individual or

collective actors are making purposeful decisions. Emphasis is placed on actors, intentions, and subjective meaning. The machine and organic models clearly single out higher management as the important decision-making actors. In the machine model, higher management decides on the rules that the employees should adhere to in order to ensure the rational operation of the organisation, which is presupposed to ensure the continuity of the organisation. It has been pointed out that the limited sphere of decision-making in the machine model falls short of explaining how organisations can function in dynamic and complex environments (Burns and Stalker, 1961; Gajduschek, 2003; Merton, 1968; Thompson, 2003; Weick, 1995). Likewise, the organic model operates with a similar limited perspective on decision-making. Here, the higher management does not decide on the rules but on the organisational structures that will provide the agreement with the environment and thus the rationality of its operation. It has been pointed out that the environmental concept of the organic model is too simplistic a basis for decision-making, in the sense that the complexity of the environment does not unequivocally represent itself to the organisation, but is, as a matter of fact, a matter of interpretation by the organisation itself (Luhmann, 2000a; Weick, 2009). The concept that organisations rely on distributed knowledge, which implies distributed relevant decision-making, also contradicts the limitation of relevant decision-making to higher management (Nonaka *et al.*, 2014, 2015). Vis-à-vis the six models, the same limitation can be pointed out that Yolgörmez (2021, 2024) makes about the mainstream sociological analysis of current technology, namely, that it finds its foundations in concepts as intelligence, control, human agency, or social dysfunction. As is the case with contemporary technology, the examination of decision in contemporary contexts may require an abstraction from presupposed rationality and subjective intention.

Action-based organisational models theories conceive organisations as an aggregation of intentions, motives, or choices of individuals, but at the same time fail to explain how this results in the reproduction and persistence of the organisation. In this respect, systemic approaches to organisations offer a superior perspective. Of the six models that were briefly elaborated above, only the organic model offers a systemic approach. As has been pointed out, the systemic approach of the organic model has fundamental flaws, particularly when decision-making is of focal attention. The main criticism is that organisations passively respond to their environments, rather than actively interpreting and selectively responding to them, while at the same time, this model assumes the

environment exists as a given, measurable reality and does not explain how decisions are made inside organisations (Morgan, 2006).

Social systems theory overcomes these shortcomings with two of its fundamental qualities. Its particular conceptualisation of the system–environment relation emphasises the autonomous functioning of organisations, and, it turns decisions into the central constitutive element as it perceives organisations as social systems that are (re)produced through decision communications (Luhmann, 2000a). The important consequence is that, once we have shifted to this perspective, we are able to observe the impact that decision-making has on organisations as an operating whole, rather than exclusively looking at individual decisions as mental events, the organisational impact of which would be, for example, the appointment of a new manager or changing the structure of a department.

A further notable limitation of the six paradigmatical models is found in their ability to account for the relationship between organisation and societal environment. In the brain and psychic prison model, this relationship is neglected. In the machine model, it is reduced to implanting societal norms in organisations, while in the political system model reduces it to the societal actors that manage to mobilise leverage on organisations. Within the organic model stream, Katz and Kahn’s environment concept differentiated between the functional areas of economics, education, science, and politics. Still, their typology was not explicitly based on a distinction between the societal system and organisational system (Katz and Kahn, 1978, p. 124 ff). The cultural model is very explicit about this relationship as it explains that organisations are based on shared values, norms, symbols, and collective identities, which find their origin in national culture. Whilst acknowledging cultural influences, the role of culture is limited on both sides of this relation. On the one hand, organisational culture does not capture the full reality of organisations, while on the other hand, the focus on national culture excludes societal dynamics, such as VUCA, which supersede national culture, and most likely their importance for the reality of organisations as well.

With social system theory, we can overcome this gap as it “combines a decision-based understanding of organization with a modern understanding of society” (Apelt et al., 2017, p. 3). Moreover, social systems theory “allows us to show that in recent transformations, organizations do not simply adopt societal expectations, but translate, respecify, and recombine them.” (Jungmann et al., 2024, p. 1311).

According to social systems theory, modern societies are functionally differentiated societies, which would not be able to exist and develop without organisations, while the evolution of organisations is related to the dynamics of functional differentiation (Besio and Tacke, 2024; Drepper, 2018).

Accordingly, in this thesis, decision-making in organisations is placed in the context of the evolving functionally differentiated society.

Social systems theory, by defining organisations as constituted through decisions, allows us to grasp an additional layer of decision-making that cannot be understood with any of the six paradigmatic organisation models. This layer transcends individual decisions into decision constellations, organised clusters of decisions solving particular issues, structures that represent particular decision paradigms. I will refer to this phenomenon as **decision topologies**. In this thesis, two of such contemporary decision topologies, projects and artificial intelligence (AI), will be addressed. Projects can be conceived as decision topologies, because when organisations revert to a project, they create a decision constellation in the factual, social, and temporal dimensions. While projects can take many shapes, this underlying structure is invariant, and hence we can speak of a topology. The same can be said about AI, where AI applications affect structured groups of decisions (factual), organised in time (temporal), and involving technology-human interactions (social).

In this thesis, I will argue that the decision typologies of project and AI are closely related to the contemporary state of the functionally differentiated society. It will then be investigated what some of the organisational consequences are when organisations domesticate these decision topologies. It will be shown, in line with the principles of social systems theory, that, while these topologies are instrumental, they exert an influence on the organisation as a system on their own behalf.

1.3 Structure of this thesis

The further of this thesis is structured as follows. In chapter 2, I will give a concise overview of the development of Luhmann's theoretical development. Such a perspective is relevant because of the significant change in the thinking of Luhmann in the 1980s, also called the "autopoietic turn". In this chapter, I start by discussing some of the fundamental concepts that form the basis of the social systems theory framework. I will

particularly draw attention to the gradual evolution that we can witness in Luhmann's organisational thinking. Whilst the autopoietic turn was undoubtedly radical, what Luhmann had developed by that time was, in a way, ready to be radicalised. In chapter 3, I will elaborate on the concept of the functional society. Following that, I will develop the argumentation line that relates the emergence of decision topologies to the inherent, progressing dynamic of functionally differentiated societies. Essentially, these decision topologies are conceived as coping mechanisms to deal with increasing decision intensity. The chapter then outlines the research questions and briefly introduces the three published papers. Chapters 4, 5, and 6 contain the three published papers, respectively. In chapter 7, I will provide a summarising overview leading up to the main conclusions that can be drawn. Implications for further theoretical and empirical research will be addressed as well. Finally, the last chapter, an epilogue, will make some critical side notes to Allison's book from the perspective of social system theory. This is somewhat of a personal task, to finally put a check mark next to this work.

2 THE DEVELOPMENT OF LUHMANN'S THEORETICAL THINKING

2.1 The evolution of Luhmann's theorising of organisations

To provide a thorough, comprehensive overview of Luhmann's work, is, of course, well outside the possible scope of this dissertation, not only given the vastness of Luhmann's published production, which is in the proximity of 20,000 pages, but also because of the wide variety of subjects he has written about. Staying therefore somewhat closer to the field of interest of my studies, I will provide an overview of Luhmann's systems theory of organisation by a discussion of the following works: *Formen und Folgen formaler Organisation* (Luhmann, 1964), *Zweckbegriff und Systemrationalität* (Luhmann, 1973), *Legitimation durch Verfahren* (Luhmann, 1983), *Soziale Systeme* (Luhmann, 2021a) and *Die Gesellschaft der Gesellschaft* (Luhmann, 2021b, 2021c). Luhmann laid out his final framework on organisations in *Organisation und Entscheidung* (Luhmann, 2000a), which was only published two years after his death in 1998. It was not his first publication with this title. An article with the same title was published two decades earlier (Luhmann, 1978). Since I often put his earlier work into the perspective of his conclusive work on organisations, I will start this section with an overview of the main points that constitute the theoretical framework of *Organisation und Entscheidung*. An excellent overview of Luhmann's systems theory of organisation (Tacke, 2019) discusses the starting position and the end position of Luhmann's organisational theory; his early 'formal organisation' perspective is contrasted with his later 'decision organisation' perspective. The following overview intends to show how Luhmann gradually shifted from the former perspective to the latter.

2.1.1 *Organisation und Entscheidung – a short overview of the main points*

On a fundamental, epistemological level, it makes a strict distinction between what is happening and the observation of what is happening. Luhmann represents a form of ("operational" as he calls it) constructivism that does not negate the existence of reality, but holds that we cannot perceive this reality from the outside, as we have to inject a distinction into it to be able to observe, whereas in the external world itself, no such distinctions exist. This concept of distinction is taken from Spencer-Brown (Schönwälder

et al., 2004; Spencer-Brown, 1979), who defined this as the ‘form’. For any observation, the observer needs to make a distinction that cleaves any space into two parts: the one part that is intended to be distinguished or marked, and the other part from which the distinguished part is distinguished or separated out. The latter part is an undifferentiated background to the marked part. Essential is that they always exist together. A distinction consists of three inseparable elements: an intention to make a distinction, the distinction or form that separates the marked from the unmarked, and the time-related act of making a distinction. The implication of this is that ontology is not something we should be particularly concerned with, as we cannot observe the distinction itself. This distinction can only be observed by another observation, which is called second-order observation (Von Foerster, 1984), but for which its own distinction is again a blind spot.

An organisation is a particular type of social system. Luhmann methodically employs the concept of distinction on the concept of systems. He defines systems as the distinction between the system and its environment. This is, in the first instance, an operational capacity. Luhmann applies the principle of autopoiesis. This concept was put forward by the biologists Maturana and Varela (1980). They proposed that living organisms are self-producing and self-organising. As such, they are „operationally closed“. Their relationship with the environment exists in selected channels, which are called structural couplings. Luhmann proposes communication as the basic operation of social systems. Therefore, the essence of social systems is that they are established and upheld through communication as an autopoietic operation; that is, communication can only occur within a system. The existence of a social system is equivalent to a network of interlocking, recursive communication. Communication follows on from an earlier communication and paves the way for a following communication. From this follows that as long as communication is ongoing, the system it also upholds and defines the boundary with its environment. Apart from the fact that social systems exist, to observe them, the distinction system/environment is needed, in particular for the social system itself. Social systems are, by their nature, observing systems; their observations are contained in the information that is contained in their communications (this is explained further in the section on Soziale Systeme). Social systems are continuously observing their own communications, and this enables them to establish self-reference. Importantly, social systems can also observe these ongoing operational observations, and this enables them to observe

themselves as a system that is distinct from its environment, in other words, through that it acquires the capacity to distinguish between self-reference and hetero-reference.

The self-reference and hetero-reference are of utmost importance for organisations. This is directly related to the specific nature of the communications that constitute the social system organisation. The basic operation of the autopoiesis of organisations is decision-communication. Luhmann formulates this as follows, “Since decisions that continue the autopoiesis of the system can only be made in the system (and not in the environment), but at the same time create a difference between the system and the environment as operations, every operation of the system forces a coupling of self-reference and hetero-reference - of self-reference in the sense of reference to the network of one's own decisions and of hetero-reference in the sense of the motivation of decisions, which can never lie solely in the fact that decisions have already been made in the system. In other words, by drawing boundaries and operational closure, the system forces itself to constantly oscillate between self-reference and hetero-reference, and the oscillator function is built into the operation of decision-making communication in such a way that it effectively excludes the possibility of the system losing itself to itself or to the environment. Only in this way is it possible to reproduce environmental openness with operational closure” (Luhmann, 2000a, p. 65) (translation by author).

The oscillation between self-reference and hetero-reference needs to be brought to a resolution; otherwise, making a decision could be an overly time-consuming process. In this respect, a second basic feature of organisations as social systems is of key importance: the operation of organisations is autopoietic *and* structure-determined. For decision-making, organisations develop and maintain specific structures, so-called decision premisses. Organisations decide on specific assumptions to be used for specific decision situations. Then, these are assumptions that are no longer tested when they are used, and only the relevance for the problem at hand, but not the truth of the premise, plays a role (ibid., p. 222). In the section on decisions, this will be explained in more detail.

Luhmann argues that any system is in a continuous struggle to reduce complexity – needed externally as well as internally – because neither one-on-one relations with occurrences in the environment, nor between elements within the system, can be maintained by a system. Thus, complexity reduction occurs through selection. As organisations are observing social systems, this is always about observed (reduced)

complexity. Following entropy principles as applied in cybernetics, Luhmann posits that reducing external complexity enabled and enables systems to increase their internal operational complexity, or occasionally, decrease it. A basic measure of the complexity of an organisation system is the amount and diversity of positions, diversity being given by the professional and hierarchical competencies involved (Luhmann, 2000a, pp. 311–312). Complexity is created through and represented in the decision premisses. This leads Luhmann to argue the structural and operational aspect of complexity, whereby operational complexity points to the informational selection made through decision making (ibid., p. 317). Of the three types of decision premisses, communication channels and persons (in positions) primarily determine structural complexity, and decision programmes operative complexity.

System complexity, faced with the impossibility of achieving requisite variety, should somehow be oriented to the complexity of the environment. Luhmann uses the term “adequate complexity” to point to an effective reconstruction of the environment in the system’s operations (ibid., p. 314). This concept is closely related to system rationality. This reconstruction is not a static mapping, as the system can never be certain about its environment. Rationality also implies the ability to set aside rules and be guided by situational contexts (ibid., p. 318), which is favoured by the presence of loose couplings. Tight couplings do not facilitate this rationality and block the adaptive learning that is associated with building complexity (ibid., p. 101). Thus, complexity in organisations is meant to keep things simple. The alternative to complexity is an overload of communications that would obstruct the organisation. The complexity of organisations must be taken as relative to the complexity of their environment. The ultimate question is not about the level of complexity but about the quality of complexity. Complexity is based on selections, which are embodied in decision premisses. Adequate accounting for the environment in these decision premisses is the key issue. This gives an inherent dynamic quality to complexity. We can speak of “temporised complexity” when a system subsequently realises different patterns of complexity (Luhmann, 2009, p. 176). Complexity is related to the number of relations and elements, their diversity, and possibly the frequency of shifts in relational constellations. It seems, therefore, wise to be prudent in talking about more or less complexity (ibid., p. 177).

2.1.2 *Formen und Folgen formaler Organisation*

Formen und Folgen formaler Organisation (further referred to as FFFO) counts as the first major work of Luhmann and should be considered as a standard work in organisational sociology, because it relates to the state of the art in organisational sociology at that time (Tacke, 2019), and it deals with very practical questions of organising while providing fundamental theoretical explanations and descriptions for them. Luhmann intends to explain the actual behaviour of the organisation's members as it results from the organisational logic, in the sense of being shaped in accordance with the formal rules and structures of the organisation, but also in the sense of contradicting, bypassing, and bending the very same rules and structures. Luhmann points out that his emphasis is on conducting functional analysis, that is, to investigate the contribution of a specific element or complex of elements to the continuity of the system. The particular attention to the functionality is present throughout Luhmann's work and is still very dominant in *Die Gesellschaft der Gesellschaft*, in which he completed his theory of the functionally differentiated society, although in his later work, the term functional analysis is no longer used. Luhmann kept FFFO's underlying notion is essentially the concept of bounded rationality as put forward by Herbert Simon (1947). He argues that the rationality of the formal structures of organisation can not be complete as they were created through decisions based on bounded rationality, and, on the process side, the ongoing decision-making inevitably hits the walls of bounded rationality. Now, rather than discarding the concept of the formal organisation, Luhmann demonstrates how this, in fact, can be made to work. The other dominant influence on this work was the systems theory of Talcott Parsons, whom he met personally during his stay at Harvard University in 1960–1961. The distinction inside/outside or system/environment is a central element of the analysis. Already here, Luhmann clearly points out that persons are not elements of social systems, social systems do not consist of persons, but do consist of actions. Following Parsons, in this period, Luhmann's theorising was within the framework of action theory, in the sense that the basic, not further decomposable element is the action. Later, maintaining this sort of pure reasoning, communication occupied an increasingly important position in his thinking, up to the point that he adopted the operation of communication as the basic, not further decomposable element of social systems.

The functional approach that Luhmann followed in FFFO already emphasises the aspect of contingency that became a more and more central element in his work. Exemplary for

this is the notion of functional equivalent, that is, every performance is assessed in terms of other performances which can be considered as functionality equivalent in contributing to the continuity of the system. The origins of the bypass of ontology, that Luhmann completed when he proposed social systems as autopoietic systems, can already be observed when he writes “Er sucht nicht voraussetzungsfähige substantielle Einheiten, erste Ursachen, Ideen oder Werte, die in sich selbst gesichert sind, um dann anderes daran anzuhängen, sondern sieht alle Invarianz in differenzierten, veränderlichen Umwelten als problematisch und leistungsbedürftig an, um die verschiedenen Möglichkeiten, sie zu erhalten, in den Griff zu bekommen.” (Luhmann, 1964, p. 396).

The notion that it is actions that constitute systems enabled a viewpoint that fuelled Luhmann’s intellectual interest in a systems approach for his investigation of the formal organisation, as “ formal organization offers possibilities for integrating and stabilizing social systems that no longer also automatically satisfy personality needs” (Luhmann, 2020a, p. 426). The central tenet is the conditioning role of entry and exit, that is, the membership of the organisation. Luhmann argues that upon entry, individuals leave their individual reasons behind and reorient to the behavioural expectations that pertain to their membership role (ibid., p.433). Also in his later work on organisations, membership retained this principal systemic role. This formal inclusiveness/exclusiveness attached to membership has been challenged though, in recent years, by scholars who pointed out that in many organisational forms the boundaries between members and non-members are not so straightforward anymore (Grothe-Hammer, 2020; Tacke, 2019). The membership role is endowed with further, more specialised roles that are connected to the position and function of the individual. Furthermore, there are informal roles, the adoption or non-adoption of which is at the discretion of the individual and is not sanctioned by the formal organisation. Complex organisations differentiate the formal and informal roles, and in this way, the organisations retain flexibility and can deploy informal roles optimally to their advantage. The formal roles that an individual holds are associated with “selective perception and attribution” that enables individuals to harmonise their experiences “through interpretation of the invisible and through the concealment of latent relationships” (Luhmann, 2020a, p. 437). Luhmann argues, in the vein of Parsons, that the function of formalisation is to stabilise and generalise expectations, within and towards the organisation, in their time, factual and social dimensions. The temporal dimension allows expectations to attain normative meaning.

The quality of continuity abstracts them from the flavours of the day and is enacted in the fact that they can only be changed by decision. The factual dimension allows the formation of roles. The factual dimension is crucial for formal organisations as it enables the depersonalisation, without which formal organisations would be constantly obstructed. Depersonalisation allows for role separation. Fundamentally, it separates the roles an individual holds in various social systems, and with that, the social spheres are kept apart. Also, different roles an individual holds within the organisation are kept apart. The social dimension refers to the institutionalisation of the expectations and the establishment of consensus. The process of formalisation, generalisation, abstraction, and separation forms the basis for trust, more precisely a generalised trust in the system (ibid., p. 440-446).

The fact that Luhmann in FFFO was clearly theorising from an action perspective becomes apparent in his discussion of the formation of organisations as systems. Luhmann sees systems as a constellation of interrelated actions, which are stabilised and regulated through consolidated behavioural expectations (Luhmann, 1964, p. 57 ff). Therefore, in Luhmann's view, the formation of systems does not occur on the level of actions but on the level of expectations. In this sense, a specific action can belong to several systems, corresponding with the expectational structure of these systems. Doubling down on this notion, Luhmann sees the environmental complexity problem that an organisation faces, also solved through the consolidation of expectations: "A social system that wants to survive in an uncontrollable, changeable environment requires a generalised expectation structure that can be kept invariant and yet is elastic enough to allow differentiated reactions." (ibid., p. 60). This is an aspect in particular where a certain loss occurred after the autopoietic turn. From that moment on, organisations are defined by their recursive decision communications. The membership also loses part of its function, as membership is reduced to a matter of acknowledged identity, that is, a person can be identified as a formal member of the organisation. If yes, then the communication of this person can become part of the autopoiesis of the organisation. If not, they are perturbations arriving from the environment. In *Organisation und Entscheidung*, his final, integrative work on organisation (Luhmann, 2000a, 2018), expectations are more directed to the organisation itself than to persons. Expectations are part of the system memory and contribute to decision premisses.

In FFFO, expectations are still very tangible and manifest in the time, factual, and social dimensions. Through the time dimension, the membership role binds behavioural expectations to the continued existence of the system and thus gives them formal permanence. The factual dimension enables the formation of a singular, formally consistent order of expectations through generalisation, specification, and abstraction. The factual system boundaries are kept invariant through the institutionalisation of impersonality and the separation of roles. The social dimension of the generalisation of behavioural expectations ensures that within the system, consensus with the formal expectations can be assumed among all members, regardless of their individually different attitudes. This overall consensus, brought about through generalised expectations, gives roles the weight of institutions. This, in turn, facilitates interaction in the organisation, since, when meeting others, one can initially assume that mutual expectations are shared, without having to clarify and negotiate the extent of any consent in detail.

This elaboration leads Luhmann to the concept of trust, a subject that remained of utmost importance throughout his later work. In the book he devoted solely to the subject of trust (Luhmann, 2000b, 2017), Luhmann coins the essence of trust as a mechanism to reduce complexity, that is, a mechanism that enables us to make decisions – decisions meaning selections – that one otherwise would not have been able to make or not to the same extent. In FFFO, a precursor of this decision-centred perspective is already present in the form of the trust that is vested in organisations as a formalised social system, that makes rational choice where this would not be the case without this trust in the system, because without trust one would be limited to a narrow range of immediate benefits (Luhmann, 1964, p. 73).

Luhmann uses the aspect of formalisation to propose a new concept of system differentiation. In order to do so, he distances himself from the traditional purpose-means scheme, according to which a purpose is attributed to the organisation as a whole and the differentiated elements within the organisation are the means to achieve this purpose. In FFFO, Luhmann is quite brief about this, whereas a few years later, in *Zweckbegriff und Systemrationalität* (ZSR), he unleashes a major assault on the mainstream purpose-means paradigm. True, in ZSR, his conceptual arsenal has already shifted in the direction of decision-making, which enables him to deal with this matter more accurately. In ZSR, the gravitational centre of his argumentation is situated around decision-making,

elaborated in the notion of purpose programs. This actually puts ZSR more or less halfway between FFFO and OE. In FFFO, Luhmann addresses three issues. Firstly, the function and establishment of system differentiation; secondly, the purpose of formalising differentiated structures; thirdly, the consequences of taking specific system functions as the basis for the differentiation (ibid., p. 75). FFFO breaks in a relatively straightforward way with the basic purpose-means model, by arguing that, once a system has created subsystems, the maintaining of these subsystems requires efforts that cannot be derived straightforwardly as means or sub-means from the purpose of the system, and can even be in conflict with the principal purpose of the system. On the other hand, functionally differentiated systems support their subsystems in order to ease their self-preservation. The organisation, to an extent, needs to tolerate the conflicting action sequences of its subsystems, simply because the organisation cannot distil an order out of its environment that would enable it to mimic this order in an arrangement of internal purposes and means. In other words, the problem of the unknowable environment is inwardly transposed onto the various subsystems. This, in turn, implies that each subsystem carves out its own niche in the environment. Therefore, internal differentiation poses a double boundary problem for the organisation. Internally, the boundaries between the subsystems may act as barriers. Externally, the operation of the subsystems requires nuancing and variability in the boundary with the environment, while at the same time, the organisation needs to establish invariance in order to systemically preserve itself. Luhmann argues now that the formalisation of behavioural expectations, which is depersonalised because it is directed to the capacity of membership, in effect contains both problems. He states that the “organised system is based on an overall configuration of behavioural expectations that outlines a horizon of possible experiences. Within this horizon, it is possible to decide for each expectation whether it is valid or not - in contrast to the more or less promising references to other possible experiences that organise everyday life” (ibid., p.84, translation by author). Nevertheless, the differentiation into subsystems swaps issues that arise during adapting to the environment into internal conflicts. The environment get a “speaker” inside the organisation, says Luhmann (ibid., p.88), and with that he was half a century ahead of the Montreal school’s communication constitutes organisation paradigm, that positioned ventriloquism is one of its core concepts (Cooren *et al.*, 2013).

To summarise, the stabilised structure of behavioural expectations of formalised organisations enables them to engage in substantial internal differentiation, meanwhile

preserve the system as a whole and provide what we nowadays would call a safe space where informality can enact to solve the problems where the formalised expectations fall short, which particularly arise in the management of internal and external boundaries.

The concept of communication in FFFO is, in principle, that of the transmission model. Luhmann makes the qualification though, that communication does not only refer to transmission but also to the processing of meaning. This element bears some resemblance to understanding, which forms with utterance and information the three inseparable elements that constitute a communication in a social system. FFFO distinguishes between three types of communication: formal, informal, and indirect communication. Formal communication is the communication that is tightly connected to the chain of command and is, in its form and content, regulated by the formal expectation structure of the organisation. Furthermore, formal communication is constrained by communication barriers and forced directions of communication. This is the only way to enable the planned distribution of information in the network. An efficient network will always require rules that exclude certain communications. Formal communication channels typically form a network, that is, the channels are interconnected in such a way that information passes through several points in a transparent manner. As was discussed earlier, formal organisations have to find ways to resort to settings of informality. Formal and informal situations are therefore differentiated in order to create opportunities for freer, informal communication, or even indirect communication. When it comes to setting aside formal communication from informal and indirect communication, Luhmann argues along the lines of Goffman (Goffman, 1957, 1961). The use of symbols allows participants in a conversation to quickly recognise whether a communication is meant to be formal or informal. Symbols are even more important in the case of indirect communications, which clearly convey information but are not labelled as communications. Indirect communication refers to the subtleties in communicative behaviour and is performed through subliminal meaning of explicit messages, through emphasis, through the choice of ambiguous terms, through revealing hesitations, well-directed pauses, through not responding to suggestions, etc. We can see from this that the communication concept on FFFO was essentially language-centred. The concept of communication that Luhmann proposed does not regard these indirect communications as unlabeled, but as full communications, as they incorporate all three elements of

utterance (a polite cough), information (to avoid a confrontation), and a nod (as flagging the understanding).

In an elementary form, all the decision premisses that are part of the decision-making framework that is elaborated in OE (explained in detail in the section on decision in this chapter) are already present in FFFO. Luhmann discusses the two forms of decision programs, conditional programs and purpose programs. In FFFO, the focus is mostly on the rule-based conditional programs, whereas OE is more concerned with the purpose programs. This reflects the change in the environmental dynamic that occurred in the three decades that passed between the two works. In FFFO, Luhmann clearly related the purpose programs to positions that deal adaptively with the external environment and therefore need elasticity in their decision-programming. The notion of an information flow directed and constrained by the formal organisation, materialising in a communication network, is in FFFO still too general to regard it as a decision premise, but is yet being related to enabling and facilitating decision-making as well. Once Luhmann made the switch to the organisation being constituted by decision-communication, this notion could logically be elevated to the level of a decision-premise. The third decision-premise, that of the person, is dominantly present in FFFO. Luhmann dwells on the difference between *Verantwortung* and *Verantwortlichkeit*, which is best translated as the difference between being accountable and being responsible. Luhmann uses this aspect of *Verantwortung* in a very particular way, though, as he relates it to the absorption of uncertainty. Absorption of uncertainty implies that information disappears; information that was there before the decision was made is no longer there after the decision has been made. This is the *Verantwortung* of the decision maker in question, the decision maker is accountable for this. The point is, whereas *Verantwortlichkeit*, i.e., responsibility, can be organised and regulated in the formal organisation, *Verantwortung* cannot. *Verantwortung* presents therefore an ongoing problem for the formal organisation, for which it seeks mitigating measures. In modern organisation theory, this is a key element of leadership, and this illustrates how current organisations solve the cohabitation of formality and *Verantwortung*. In OE, uncertainty is still a key concept, in fact more even more important than in FFFO, but is no longer coupled to *Verantwortung*. In OE, where Luhmann has taken a strongly process-based view on the organisation, this relation between *Verantwortung* and *Verantwortlichkeit* has quite changed. Persons, as individual decision-makers who are endowed with personal and organisational

competencies, are treated as a decision premise. Hence, the emphasis in OE is on *Verantwortung*, as the informative value associated with the uncertainty absorption contained in the decision. *Verantwortlichkeit*, on the other hand, may precipitate out of *Verantwortung* and sticks to an individual person, who then has to elaborate on the whereabouts of a decision. In other words, in OE, *Verantwortung* is what keeps the autopoiesis going. *Verantwortlichkeit* occurs in the context of reflexive observation with regard to one or more decisions. The transformation of *Verantwortung* in *Verantwortlichkeit* opens up a learning possibility for the organisation (Luhmann, 2000a, p. 198).

It is particularly in this, in a certain way subtle difference in how the relation between *Verantwortung* and *Verantwortlichkeit* is positioned, where the more fundamental difference between the FFFO and OE framework becomes apparent, in the sense that OE is communication-processual and observation-oriented, while FFFO is action-oriented and is as such caught in the dichotomy of communication and action, for which Luhmann quotes Goffman: “the dilemma of expression versus action” (Luhmann, 1964, p. 110).

2.1.3 Zweckbegriff und Systemrationalität

Zweckbegriff und Systemrationalität (ZSR) represents a vital milestone in the evolution of Luhmann’s thinking on organisations. Although this work, published in 1968, carries many prints of its period, it represents, in my view, a timeless contribution to the understanding of organisations.

In ZSR, Luhmann made a significant shift in the direction of conceptualising decision-making as the core activity of organisations, and at the same time, questioned whether action should be taken as the basic unit of analysis. Where Simon (1947) had already shown that the means-end scheme cannot fully capture the behaviour of organisations, ZSR presents a fundamental systems-theoretical critique of the classical concept of organisational means and ends (purposes). The argumentation of ZSR starts with decomposing the means-purpose scheme. He argues that the scheme can be traced back to the Aristotelian dichotomy of substance and motion. Purposes were seen as invariant in earlier societies. With the development of modern society, the concept of the true purpose has lost its teleological function due to the increasing contingency, and the associated uncertainty, agility, and need for decision-making. Luhmann continues to

demonstrate that a means-purpose scheme is not possible without two further schemes, those of cause-and-effect and order of values. These schemes do not disclose an objective reality but are merely sense-making schemes, through which humans make the world and their actions comprehensible. Thus, as we cannot establish the truth or necessity of purposes, we can take recourse to the function of purposes, as enablers of sense-making or “reduction of infinity” (Luhmann, 1973, p. 48). Elegantly, Luhmann argues that for this, however, we need an action system, “Purposes fixate certain estimated effects by drawing on system viewpoints in order to be able to declare other value aspects of the consequences of action irrelevant” (ibid., p.49).

Once having transferred purpose, and with that the means-purpose scheme, from the level of the individual action to the level of the system, a next crucial step is made. Mayntz (1971) summarized this as follows: “[...] Luhmann defines systems as identities that maintain themselves in a complex and changeable environment by stabilising the inside/outside difference (p. 120). The specific feature of the inside/outside difference is the lower complexity of a system compared to its environment. Thus, boundary conservation and system persistence coincide, and the reduction of complexity and variability becomes the decisive mechanism of system conservation” (ibid., p. 57, translation by author). What Luhmann calls the “Bestandsproblem”, the quest of the system to persist, is a permanent problem, he coins as an unsolvable problem. With this reasoning, Luhmann is in the vicinity of his later, more radical conception of a system, where a system is defined as the difference between the system and the environment, with this difference produced and reproduced by the autopoiesis of the system. In ZSR we see a similar chainlike sequence, which is here driven by the Bestandproblem, i.e., the problem to persist in an environment that is more complex than the system itself, and consists of purposes that shape an identity of the organisation, as well as means and actions that produce and reproduce the inside/outside differential and, with that, the system. Luhmann is not yet at the stage of defining the operational closure of social systems, but emphasises, that a social system “must develop a certain autonomy in its boundaries, which should at least consist in the fact that it can treat causal factors selectively, i.e. as information, and compare them with other possibilities” (Luhmann, 1973, p. 177) (translation by author). In the same vein, he points out that purposes “are not decision standards external to the system that are valid solely due to their value content; rather, they are created by decision-making processes within the system itself,

set as provisionally accepted preferences and changed if necessary. They must therefore be carefully distinguished from the expectations that the environment places on the system” (ibid., p. 192).

The Bestandsproblem itself cannot be solved; therefore, in order to persist, the system has to transform it into solvable problems. At this point, the key concept of purpose programs is introduced. Before going into the discussion of purpose programs, some further explanation must be given to the function of purposes and the role of the concept of functional equivalence therein. The most general function of setting purposes is to reduce the complexity and variability of the environment (Schmid, 1970, p. 359). The purposes do not directly exercise this function, but it is mediated through a combination of reduction strategies such as subjectivation, institutionalisation, environmental differentiation, internal differentiation, and indeterminacy of the system structure (ZSR, p. 237). Subjectivation relates to the circumstance that systems do not react to the immediate reality, but to their simplified version of reality. Institutionalisation of certain forms of experience processing (habits of perception, interpretations of reality, values) contributes to simplifying and stabilising the external environment. Environmental differentiation relates to the segmentations that systems articulated in their representation of the environment, associated with this segmentation, a system “forms particular boundaries with these different segments of the environment, stabilises particular relationships at their boundaries and bases its autonomy and its ability to be indifferent to environmental changes precisely on this difference” (ZSR, p. 184). Through internal differentiation, a system enhances its capacity for processing environmental complexity. Thus, complexity is a relative concept that finds its expression in the balance between environmental and system complexity. Similarly, indeterminacy of system structure is not in the first place an aspect to reduce the environmental complexity, but rather increases the capacity for processing complexity. Systems achieve this by making their decision premisses specific enough to make selections, but also open enough to respond to complexity and variability in the environment. In his later work, Luhmann referred to the concept of redundancy to express this indeterminacy. There are some further interesting connections with the later work of Luhmann. In OE, Luhmann posits “adequate complexity” as expressing the complexity that a system needs to effectively represent the environment within its own structures and processes. The notion that complexity is not only a matter of structure but also one of process, moreover, that

complexity is a result of the “cooperation” of process and structure, is clearly expressed in ZSR (p. 266). Likewise, the combination of environmental and internal differentiation pre-empt the logic underlying the concept of structural couplings, a concept that Luhmann adopted from Maturana (Maturana Romesín, 2002). This is further explained in the section on Soziale Systeme.

Since these five strategies are governed by purposes, purposes can be regarded as coordinating generalisations (ZSR, p. 189). Purposes can contribute in a positive or negative way to the Bestandsproblem. This brings up the question: which criteria can be applied to judge or determine this? Luhmann argues that, more than the aspects of content, the (dys)functionality of purposes is primarily determined by their level of specificity. In other words, whether they are too general or too specific vis-à-vis the degree of differentiation of the relevant segment of the environment.

Luhmann defines purpose programmes as follows. “Purpose programmes define system purposes and regulate their transformation into sub-purposes. They connect and integrate the subsystems involved by relating their respective outputs to each other in imagined causality and coordinating the value judgements implicit in the various subsystem purposes. This is not done by establishing a common transitive order of values, but by deliberately fixing certain decision-making premisses, some of which apply generally, some of which apply to the overall programme, and some of which apply only to individual stages of the decision-making process” (ZSR, p. 302, translation by author). Luhmann points to three important dynamics related to purpose programmes, operationalisation, algorithmisation and reflexivity.

Operationalisation is the process that makes a purpose program usable for decision-making by defining which operations (actions, decisions, procedures) are consistent with achieving the intended purpose. Algorithmisation is the process of specifying sequences of steps or rules that can be followed to realise the purpose without the need for further decision making during the deployment of the means. In organisations, this pertains to standardising routines, procedures, or workflows. Although operationalisation and algorithmisation stabilise the system and contribute to efficiency, they take the process of decision making further away from the system-environment problematic, which is the fundamental problematic of the system. Therefore, the organisation needs to build in ongoing controls. In contrast to the traditional viewpoints, Luhmann argues that control

should not refer to the execution of programs, but to the Bestandsproblem, which is nothing else than the problem of complexity. This is an essential consequence of the transition from an action perspective to a system perspective. Three levels of control are distinguished. The control of the transformation of the Bestandsproblem into purposes (crisis problem), the control of system level purposes into operationalised sub-purposes (indicator control), and, the control of realisation of the operationally defined sub-purposes (normative control) (Schmid, 1970, p. 363).

Reflexivity is directly associated with the fact that the programmatic nature of organisations implies that any decision is inevitably a decision about other decisions. Thus, decision making is continuously applied to itself and thus becomes reflexive. This reflexivity only exists on the level of the system, and not on the level of action. Luhmann follows FFFO here, and argues that their capacity to establish generalised structures of expectation enabled formal organisations to operate with highly complex structures like purpose programmes. Thus, the formal organisation is “the evolutionary achievement that enables decision-making processes to become reflexive” (ZSR, p. 340, translation by author).

2.1.4 Legitimation durch Verfahren

Legitimation durch Verfahren (LDV) was originally published in 1969. It was reissued in 1975 with an extended introduction. LDV is a macro-sociological work in the first place, but since it draws heavily on decision-making concepts from Luhmann’s earlier works, it has some relevant organisational implications as well, which were elaborated by other scholars more recently (Schwartz, 2020). LDV can be regarded as a classic that did not become a classic (Heck *et al.*, 2020), and was criticised at the time it was published, for what was seen as the reductive perspective of systems theory on the topic of legitimation (Stallberg, 1972).

As the title suggests, LDV hinges on two concepts, legitimation and procedure. Procedures are defined as temporary social systems, which are “synchronised” with decision processes, but are not identical with them. They are interaction systems in which certain decision premisses are strictly defined, while others are left open. Individuals always participate in specific roles, which also have several premisses attached to them (LDV, p.3). Legitimation is defined as the acceptance of binding decisions. Legitimation

is connected to legitimacy, which is defined as the "generalised willingness to accept decisions that are still undefined in terms of content within certain tolerance limits" (LVD, p.28, translation by author).

LVD explains how legitimation in differentiated societies is not the result of invoked truths, nor is it inherently endowed to institutions, a state, or representatives of states. In contrast, legitimation is produced and reproduced through procedure, therefore, it is a system achievement. LVD analyses various public procedures to underpin the argumentation. These are judicial court procedures, the procedure of parliamentary elections, and the procedure of law-making. In LVD, Luhmann argues that the increasing complexity of society imposes an increasing stress on the institutions that execute the procedures, which implies an increasing difficulty for these institutions to legitimate themselves. The answer is, according to Luhmann, that these institutions should be relieved from the task of legitimation. The political system and the legal system should continuously adapt by differentiating themselves effectively, in order to constitute legitimacy on a system level, as a result of the network of rational and consistent decisions as they are accomplished in the individual procedures. This boils down to "to temporalising the concept of legitimacy [.....] and to regain the content-dependent certainty thus abandoned by differentiating and reconnecting a multitude of procedures" (LVD, p.2, translation by author).

There are various connections between procedure and organisation. Schwarting (2020) clarifies that it is in fact the meta-procedural structures, specified and maintained by organisations, which constitute the framework from which the procedures are established and facilitate the acceptance of the decisions of the procedure. For this purpose, organisations use their own decision premisses, which do not enter into the procedural interactions and decisions.

Furthermore, while Luhmann reserved the concept of procedure for public procedures of the political system and the legal system, it is worthwhile to sketch the meaning this concept has for organisations themselves. Though the analysis in LVD does not extend to this matter, Luhmann suggests that (extended) conditional decision premisses can be regarded as procedures. At the same time, he points out that such procedures differ from legal procedures or parliamentary elections in the sense that they cannot cause disappointment, so they do not face the immediate acceptance issue, in other words, the

questioning of legitimacy. The matter of procedures within organisations becomes more interesting if we look to ambiguity instead of disappointment. Ambiguity refers to situations in which a decision cannot, or only partially, be validated by relying on, or referring to, decision premisses. For example, we can regard labelling a set of actions that is to result in a proposal as a ‘project’, a form of legitimation through procedure. The fact that the proposal was the result of the ‘project’ serves as the legitimation of the proposal. Similar examples could be CSR or sustainability audits. The importance of procedures in alliances has been pointed out (De Ridder and Rusinowska, 2008). The common element is that it is not so much the outcome, but rather the procedure that solves the issue of ambiguity and acceptance.

LVD can be regarded as a station in Luhmann’s thinking. The concept of decision premisses was further strengthened. Equally important, LVD illustrates how decision premisses and decisions produce system continuity, in this case through legitimation. Furthermore, the concept of the “contact system”, as a special form of interaction system. We speak of contact systems as a condensation of interaction systems, brought about through the repetitive character of the interactions over time, on which various issues have to be dealt with, and as such creates a pattern of cooperation and mutual dependence (LVD, p.75).

2.1.5 Consolidation of the pre-autopoietic organisation theory

Luhmann consolidated the perspective on organisations he had developed since the early 1960s in two writings. One is a manuscript titled *Allgemeines Modell organisierter Sozialsysteme* (General Model of organised Social Systems) that originated in 1971, but was not published at that time (Luhmann, 2019a). In this manuscript, a general organisation model is presented. The other one originated in 1978, and is the earlier-mentioned conference paper also titled *Organisation und Entscheidung* (Organisation and Decision) (Luhmann, 1978).

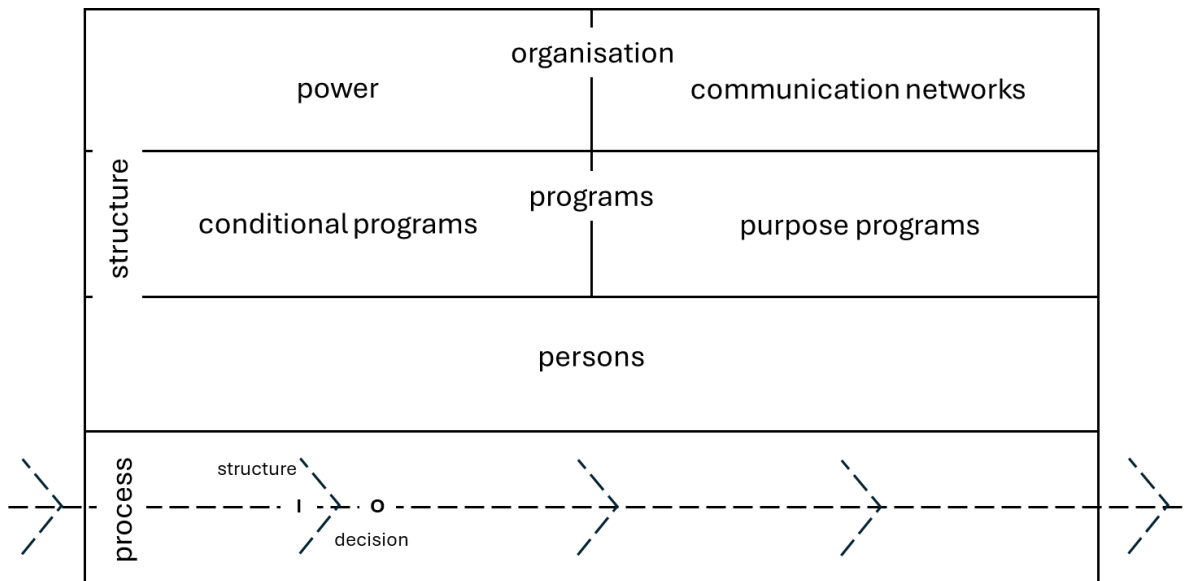
These works on organisations should be seen against the backdrop that Luhmann's primary scientific interest shifted to the theory of society. This had started already with *Legitimation durch Verfahren*. In the 1970s, Luhmann published an iconic book together with Jürgen Habermas on the theory of society (Habermas and Luhmann, 1971). Luhmann developed his perspective of society consisting of functional subsystems, which

resulted in an important book on the educational system (Luhmann and Schorr, 1979, 2000).

2.1.5.1 Allgemeines Model organisierter Sozialsysteme

In Allgemeines Modell organisierter Sozialsysteme (AMOS) (Luhmann, 2019a), as the title indicates, Luhmann puts forward a general model of organisations. Organisations are systems that make selections and are embedded in an environment, whose complexity always exceeds that of the organisation system. As in ZSR, the identity of organisations is not given by their purpose but acquired through the selections they make in order to cope with the complexity of the environment (AMOS, pp. 122-123). AMOS presents an input-output model of the organisation, in which information is the input, and action is the output, which is achieved through a decision that is facilitated by structures (decision premisses). Where Luhmann had a partially developed structure of decision premisses in FFFO, focused entirely on programs as decision premise in ZSR, in AMOS he presents now a clearly structured model of decision premisses. The structural decision-making premisses of an organised social system can be divided into three groups: organisational rules, decision-making programs and personality structures. This model is shown in Figure 1 below. Organisational rules establish power and communications networks. Programs are of two kinds, conditional and purpose programs, this was already introduced in FFFO. Thirdly, there is the premise of persons, which does not relate to the concrete person in question, but to the person as a decision premise, that is, a person as the occupier of a position, as it would later be phrased in OE. These structures funnel information input, enabling the making of a decision that represents an output in the form of a concrete course of action, which is followed by the next decision.

Figure 1. General model of organisation



Source: adapted from AMOS, p.128

The structures depicted in Figure 1 can themselves be changed through a reflexive process of decision making that invokes one or more of the decision premisses: organisation, programs, and persons.

AMOS further articulates the concept of system differentiation, as Luhmann elaborated it in ZSR. System differentiation is therefore seen as the formation of subsystems within the system. System differentiation enables the system to operate with multiple environment references, as each of the subsystems will have its own system-environment relation. This is possible when the system has segmentalised its environment and allocates these segments to the respective subsystem. The subsystems are therefore a representation of the construct of its environment that the system has created. The overall system then functions as an already more organised, less complex 'inner environment' of its subsystems and therefore enables them to build more improbable (more presuppositional) structures (AMOS, p. 131). What Luhmann interprets here as complexity reduction, he will actually describe as the increase of complexity in OE. The reason is, that in OE, Luhmann defines complexity as increasing the selectivity of informational relationships within the system, thus increasing the negentropy of the system. In this, he was influenced by the works of Heinz von Foerster. AMOS also gives a more articulated elaboration of

the problematic relation between structures and differentiation than that of ZSR, where structure basically related to purpose programmes only. The relation is problematic, since the identity of an organisation system is acquired by the way it makes its selections in coping with the complexity of the environment. These selections are guided by the structures. Since the subsystems will have their own structures, and have basically no doing with the structures of other subsystems, the question comes up, how does this affect the identity of the organisation system, and what can the organisation system do to maintain its identity? AMOS suggests two options to address this. The first is that the organisation system differentiates a representational subsystem. This subsystem entails the system as a whole, but functions simultaneously as a subsystem in relation to the other subsystems. The second option is one of partial differentiation. In this case, only all the processes are differentiated into subsystems, while the structures are retained and “owned” by the organisation system (AMOS, p. 132ff).

AMOS closes with a subject that would become increasingly important in Luhmann’s later works: achieving a more concrete view on the relation between society and organisation, thus trying to give shape to the highly abstract principle of the environmental complexity always exceeding that of the organisation system. Luhmann argues that “[p]erhaps the most important overall social prerequisite for organised social systems lies in processes of institutionalisation and socialisation that guarantee sufficiently differentiated willingness and readiness of role fulfilment” (AMOS, p. 144, translation by author). A good example is projectification, which exactly points to the argument that Luhmann made here. Projectification has a significant impact on the roles that individuals have to assume and organise themselves socially and temporarily (Boltanski, 2007; Jacobsson and Söderholm, 2022; Jensen *et al.*, 2016). Luhmann also points out that generalised media like power and truth come under pressure as a result of increasing functional differentiation. In organisations, “sources of power such as functional differentiation, time pressure, complexity overload, and the distribution of uncertainties are gaining in importance, which are only very indirectly linked to legal norms and do not become effective as a generally accepted structure, but only through tactical skillfulness. One of the consequences is that internal power relations are less and less visible and controllable from the outside” (AMOS, p. 147, translation by author). Self-evident truths have evaporated and are based on their scientific nature. As a result, truths have become increasingly complex, and for most people hardly understandable,

thus diluting the meaning of truth. Luhmann touches on the subject of society becoming more and more organised, without being an organisation itself, which leads to the interlocking and nesting of organisations. Later, Luhmann would address this subject more closely in *Die Gesellschaft der Gesellschaft*.

2.1.5.2 Organisation und Entscheidung

Much of the framework of AMOS, we find back in *Organisation und Entscheidung* (OE78) (Luhmann, 1978). I will therefore restrict the discussion of OE78 to the new elements it harbours only.

“Organisation systems are social systems that consist of decisions and mutually connect these decisions with each other” (OE78, p. 13, translation by author). Luhmann is now very explicit about the nature of organisation. What Luhmann would do after this, was to frame this viewpoint as communication autopoiesis. Since autopoiesis is a theoretical, epistemological assumption that cannot be proven, from a practical point of view, did Luhmann arrive at his endstation here. Luhmann explains the nature of the decision as an event in quite some detail. He argues that a decision consists of two unities: the relation of the difference of the alternatives, and the selected alternative. The execution of the decision is the substitution of the former for the latter. Still, decisions have to pretend that they are a unity that traverses the execution of the decision (OE78, p. 10, 15). In OE, Luhmann reframed this as the paradox of the decision, that is, the decision is the same, and it is not. The paradox can be unfolded in the time dimension only by adding a before and an after the decision. Still, the decision can only exist in the present, so the unfolding in time is a way to hide the paradox. OE78 emphasises that decisions always communicate their contingency. Decisions operate from a twofold selection perspective: they not only choose one of several alternatives, but they do so with a view to creating or preventing relationships with other decisions. Although this is an elegant and, in fact, quite realistic conception, Luhmann had to drop this later in OE for the obvious reason that there is either autopoiesis or there is none; that is, there are either interconnected communications or there is no communication. Still, Luhmann states in OE that there is connectivity (*Anschlussfähigkeit*), which increases or decreases the probability of the next communication. OE78 also deals with the time-binding aspect of decisions, an aspect that would occupy a prominent place in OE. Decisions are seen to make a temporal incision

in the present and create a past horizon and a future horizon, and the decision expresses the difference between these two horizons.

Apart from the twofold selection perspective, OE78 posits further mechanisms that increase the probability of decisions occurring. Three such *amplification mechanisms* are proposed. The first is the presumption of decisions. Whenever a decision is taken in an organisation system, this occurs under the presumption that other decisions have already been taken or will be taken in the future. This is supported by the characteristic of organised social systems that they are prone to interpret human conduct as decision-making. This works as long as a regular reality cover is provided for this presumption. The second is the magnet function of the probable. This is closely related to risks, too. What is probable cannot be neglected and thus attracts attention and calls for a decision. Any observed risk will increase the likelihood of a connected decision, depending on the perceived magnitude of the risk and a risk-sensitivity threshold. The third mechanism is the reflexivity of decision-making. The reflexivity of decision-making was already present in ZSR and LDV, in the form of making decisions about decision premisses. As an amplification mechanism, this reflexivity is extended into a *second-order* process that can be constantly accessed in order to decide whether and when to make decisions and which decisions to make. This reflexivity is a correlate to the time-binding effect of decision (OE78, pp. 33-38). Luhmann caps by underlining that “[a]ll amplification mechanisms only function on the basis of a decision network, which they themselves make possible as an emergent system that ascended from an underlying reality” (OE78, p. 38). Clearly, this statement is very close to the concept of autopoiesis in OE. OE78 already posits, therefore, that decisions cannot be understood in isolation or from an intended purpose-means scheme.

Luhmann introduces the concept of system memory in OE78. In OE, system memory has grown into one of the key concepts. System memory creates a capacity to reactivate previous decision contents. In addition to the twofold selection perspective, a third one is added, namely the retention selection. Retention selection mainly occurs in the form of keeping written records. The main reason for retention is in creating a sense of having grip in uncertain environments. OE put the concept of system memory in the autopoietic functioning of the organisation system and became much more versatile. This will be discussed below in the section on OE.

As for decision premisses, OE78 has more pronounced attention for the decision on decision premisses, which is in line with the notion of second-order process that Luhmann had picked up. These are decisions about staff recruitment and deployment, decision programs, and communication networks and competencies. Luhmann refers to these decisions as planning, a wording he would keep using onwards. OE78 even refers to cybernetics when describing the role of planning: “All planning must first decompose the complexity of the system in which it takes place and transform it into the form of problems that can be solved, which must be decided on the basis of further planning. Concerning planning itself, this process of problem generation is a process of positive feedback, that is, the reinforcement of deviations” (OE78, p. 55).

OE78 is concerned with the relation between society and organisation, the aspects of increasing complexity, as a result of the progression of functional specialisation and differentiation. What is new is that it presents an account of how organisations react to the resulting decision pressure. The factual dimension is bypassed, the focus is directed to what is available, and alternatives are pushed into the background. In the time dimension, the decision is shifted, into the past (‘we came to a decision on this already’), or into the future (‘we will decide this at some stage’). In the social dimension, it leads to involvement of additional parties (OE78, p. 61).

2.1.5.3 Conclusion

By 1978, all major elements of Luhmann’s concluding work on organisations, *Organisation und Entscheidung*, which was published posthumously, were in place with the concepts of the organisation as a cybernetic systems, the system-environment differential, complexity, organisations consisting of self-referential decision making, the duality of process and structure, the various decision premisses, system memory, the relationship between organisation and society.

In *Organisation und Entscheidung*, Luhmann rearranged these concepts in the framework he elaborated in *Soziale Systeme*, which is the subject of the next section.

2.1.6 *Soziale Systeme*

Soziale Systeme (Luhmann, 1995, 2021a) was published in 1984 and was considered as Luhmann’s groundbreaking theoretical achievement. As the subtitle ‘Grundriss einer

allgemeinen Theorie' (Outline of a general theory) suggests, we are looking at an extensive integrative work, which Luhmann builds on a successful interdisciplinary theory development from another discipline, namely the theory of autopoietic, self-referential systems (Luhmann, 2021a, p. 9), which he considers as a 'super-theory' (Reese-Schäfer, 2019, p. 57). In the following sections, I will discuss the elements that contributed to the framework Luhmann developed in OE: communication, distinction, system, autopoiesis, and meaning.

2.1.6.1 Communication

Communication is situated in the basic characteristic that defines social situations, double contingency. Double contingency means that all persons in a social situation observe the (contingent) selection of their contribution contingent on the contingency of the (response) contribution of the other. This is often expressed as 'if you do what I want, then I do what you want', as the principle that guides those present in the social encounter.

Communication consists of three inseparable parts: an utterance conveying information that has been resolved into an understanding. A precondition for understanding is that a listener can differentiate between the utterance and the information, that is, between the factuality that someone uttered something, in a certain way and in a certain context, on the one hand, and the factuality of the information that was uttered on the other hand.

"Communication transforms the difference between information and communication into the difference between acceptance or rejection of the communication, i.e., it transforms an 'and' into an 'or'. According to the theorem of double contingency, it should be noted that it is not age that represents one difference and ego the other, but that both differences must be seen and handled on both sides. It is not a question of a social difference of position, but of a temporal transformation. According to this, communication is a completely independent, autonomous, self-referentially closed process of processing selections that never lose their character as selections" (SS, p. 205, translation by author).

Thus, communication is detached from the interacting individuals and exists only on the level of the social system, in which communication can only proceed recursively; indeed, each communication anticipates any query, doubt, acceptance, or rejection it is subjected to. The notion that communications pre-empt, build on, and refer to each other leads naturally to the concept of themes. Communication is time-wise and subject-wise centred around a theme and developed through theme contributions. A theme should be

identifiable so that multiple contributions can be made to the respective theme. As there is no factual limit to what can become a theme, this makes the theme versatile in the ability to structure communication (SS, p. 193-215).

Although communication is by nature recursive, this does not imply that communication is automatically maintained. Communication is made up of communicative events that appear and disappear, and thus the connectivity (*Anschlussfähigkeit*) needs to be considered as a factor to sustain communication. Connectivity is based on the fact that a piece of information can only be uttered because many other informative possibilities were discarded; in other words, negative selection is needed to establish connectivity, which is then realised through information. Weinbach emphasises that in Luhmann's framework, connectivity not only refers to the continuation of communication but also to a higher predictability of the next connecting communication event (Weinbach, 2015, p. 429). Very condensed, we can say that connectivity varies with the degree of information being relatively new.

2.1.6.2 Distinction

Apart from adopting the theory of autopoietic, self-referential systems, in SS Luhmann adopted the operative logic of George Spencer-Brown, expressed in the concept of the 'Form' (Spencer-Brown, 1979). A form is the result of a distinction. A distinction is to cleave any space into two parts: the one part that is intended to be distinguished or marked, and the other part from which the distinguished part is distinguished or separated out. The latter part is an undifferentiated background to the marked part. Essential is that they always exist together. A distinction consists of three inseparable elements: an intention to make a distinction, the distinction or form that separates the marked from the unmarked, and the time-related act of making a distinction. The operative logic was also the basis for the operative constructivism that Luhmann laid out in SS, following the views of Von Foerster. The principle of operational constructivism is that to observe (understand, reason about) reality, we have to apply distinctions, which are not part of the reality but an addition of the observer. Thus, we can never know the world 'as it is', but only to the extent that we observe it through the distinctions we apply.

2.1.6.3 System

The system concept of SS is not new, but rather a consolidation and repositioning of the system concept as Luhmann had already elaborated it in the frame of autopoiesis and distinction.

SS presents a more articulated view on the environment, and emphasises the importance of distinguishing between the environment of a system and the systems in the environment of a system. Particularly where it concerns the difference between the dependency relations between systems and the dependency relation between system and environment (SS, p. 36-37).

Systems have the capability of internal differentiation, thus replicating system-environment distinctions. Systems gain complexity through differentiation. Hierarchy is just one form of differentiation (SS. p.39).

Two significant concepts are conditioning and complexity. Conditioning refers to the capability of system state change: the relationships between elements can be regulated by the presence/absence of factors parallel to the involved elements. Complexity is equivalent to the forced selections that occur when, in a system, no longer can all elements maintain relationships with each other. Whereas systems can increase internal complexity, they are forced to reduce environmental complexity, as they cannot deal with the full extent of environmental complexity. They reduce complexity by selectively relating to certain aspects of their environment.

While self-reference figures in Luhmann's earlier writings, as we have seen, in SS, he makes a forward, by fleshing it out and positioning it as one of the core concepts of systems theory. This is certainly connected to the observational paradigm that underlies his later work. Self-reference refers to the unity that a system is for itself. Self-reference does not exist in advance but has to be produced through a relational operation. Self-reference functionally occurs as operational self-reference and observational self-reference. Operational self-reference means that the constituting elements of a system are recursively connected to each other, and only to each other, thus resulting in operational closure. Through observational self-reference, the organisation establishes itself by referring to itself. As a system only exists as the difference between itself and the environment, this self-reference functions in a pulsation between self-reference and hetero-reference, i.e., referencing to (elements of) the environment. In social systems, the

medium of meaning enables this oscillating processing of both internal and external references within the system (SS, p. 57ff).

2.1.6.4 Autopoiesis

This concept was put forward by the biologists Maturana and Varela (1980). They proposed that living organisms are self-producing and self-organising. As such, they are „operationally closed“. Their relationship with the environment exists in selected channels, which are called structural couplings. Social systems are reproducing themselves through a continuous chain of interlocked operations. The basic operation of social systems is communication. Essential for any social systems – they come in three types: interactions, societies, and organisations - is that communication is the autopoietic operation, and therefore can only occur within a system. Communication follows on an earlier communication and paves the way for a following communication in the way this was explained above.

2.1.6.5 Meaning

Meaning is the foundational concept, as Luhmann defines social systems as meaning-generating systems. Therefore, everything that occurs in social systems occurs in the medium of meaning. Meaning cannot be framed in a form, that is, it cannot be framed in a distinction meaning-meaningless. Therefore, meaning cannot be observed; it is the medium of the morphogenesis of social operations. Luhmann attaches three dimensions to meaning: fact, time, and social. If we experience something as ‘meaningless’ is experience then that is the acquired meaning. Meaning operates as a distinction agent. It distinguishes the actual (actualised) from the larger or smaller sea of possibilities. Meaning again and again provides a relaxation, the settling of an actual content out of a multitude of possibilities. Hence, there is always an uncertainty about the outcome of the next link in the meaning chain. The three dimensions enable a well-structured analysis of the function of meaning in any particular context (SS, p. 92ff).

2.1.7 *Die Gesellschaft der Gesellschaft*

Die Gesellschaft der Gesellschaft (GG) (Luhmann, 2021b, 2021c), was originally published in 1997 and is considered as his most important work. GG builds on SS, but makes further essential development in the overall framework of Luhmann’s social systems theory. A detailed, comprehensive account of this would take us once more out

of the boundaries of this introduction. Therefore, I will focus on those aspects that bear a relation to the theorising of organisation systems.

Perhaps the most important achievement that GG accomplishes is its description of society (world society) as a single integrated system, which is differentiated into various functional subsystems, like economy, science, education, legal, religion, political, etc., and thus we can speak of a polycontextural society. These functional subsystems are autopoietic and hence are operationally closed to each other. The subsystems work, and can only work, that is, evaluate their basic operations, according to their own binary codes: true/false for the science system, have/have not for the economy, legal/illegal for the legal system, moral/immoral for the religion system. Furthermore, GG elaborates on the progressing differentiation of the subsystem, as a result of which, paradoxically, they become more dependent on each other. The subsystems operate with their own symbolic generalised communication media, which form a unity with the binary codes and the principal function of the respective subsystem. For example, the symbolic generalised medium for the economy is money, for the legal system law, for the science system truth, and for the political system power. These media contribute to the formation of systems because they can enhance or diminish the probability of acceptance of certain forms of communication (GG, pp. 317ff).

These developments increase the complexity of the environment for organisations. Although organisations have a primary bond to a particular functional subsystem (firms to the economy, hospitals to the health system, universities to the educational system and health system, etc.), they are exposed to the other functional subsystems too. Hence, organisations have to find ways to cope with this increasing complexity. GG emphasises that organisations are increasingly important as mechanisms of steering. This steering can be achieved through so-called structural couplings. These structural couplings between organisations are particularly essential in the steering between functional subsystems, e.g., the steering of the economy by politics, or the steering of the education system by the economy.

2.2 Organisation und Entscheidung - the concept of decision

The theory of organisations that Luhmann lays out in OE is truly unique, as it is the only one that regards organisations and self-referential, operationally closed social systems.

As was said earlier, Luhmann distinguishes between three types of social systems: societies, organisations, and interactions. All three are constituted through their basic operation, communication. In the case of organisations, however, these communications are of a special type, namely decision communications. Hence, OE renders a very detailed and deep account of the notion of decision.

Decisions are observations that operate with distinctions (forms, with a marked and unmarked side). The observational format of decisions is the same as that of meaning. The first distinction creates a horizon of potentiality; this distinction makes the alternatives visible, which are set apart from the non-relevant world. The second distinction actualises the alternativity by marking one of the alternatives as the preferred. This distinction, similar to meaning, has both sides determined; in other words, it is a distinguishable distinction: the decision can only be observed as a decision when both sides of the form (preferred and discarded) are seen as a unity. The alternativity contained in a decision turns the decision into a paradox: only that can be decided is what is in principle undecidable. To frame it in a reversed question: how can an alternative be an alternative, if it wasn't an alternative in the first place? (OE, p. 123ff).

Thus, decisions communicate their contingency, their unsolvable element of arbitrariness. For organisations, it is crucial to hide this, as it would paralyse the autopoiesis of the organisation if this were a theme at each decision. Decisions, therefore, have to be made to look less contingent and organisations achieve this through decision premisses. Here, OE provides a continuation of earlier work, but some modifications are introduced. As in OE78, there are three types of decision premisses defining the organisation, and these are now defined as: decision programmes, communication channels, and persons. Decision programmes (OE, pp. 256-278) are rules, procedures, and heuristic schedules that serve the factual evaluation of the inputs and outputs related to the decision. It is useful to distinguish between mainly input-oriented programs and mainly output-oriented programs. The input-oriented condition-programs select a specific output for a set of specific inputs; these are basically if-then algorithms. The output-oriented purpose programs select a set of specific means to (achieve) a specific goal. Purpose-programs are more open and have more intrinsic uncertainty than condition-programs. Purpose programs, therefore, need more scrutiny in terms of monitoring whether they actually work as envisaged. It is worthwhile to highlight some specific aspects of decision programmes. For a decision to be acknowledged as a decision-communication, specific

communication channels need to be observed: who is entitled to make a decision? who should be consulted in advance? who can communicate with external partners? what can be delegated to whom? etc. Persons are also a form of decision premisses because individuals are selected on their basis of assumed sufficient acumen to perform a specific position (OE, pp. 225-226). Decision premisses are typically merged into positions: a position is filled by a capable individual, it is a structural node in a communication network, and it is endowed with decision programmes. The phenomenon that if a wrong decision is made, not only are the involved programs questioned, but also often communications and competencies are scrutinised, also illustrates that decision premisses do not operate in isolation (OE, p. 259).

New in OE compared to the earlier work is the element of decision premisses, which are not the outcome of decisions (planning). These are organisational culture, which is self-referential, and cognitive routines, which are hetero-referential. Luhmann regards organisational culture as a specific set of organisation-defining decision premisses, which are not based on decisions. This conceptualisation gives organisational culture a pluriform, possibly ambiguous, and evolutionary character. Organisational culture principally eludes “culture engineering” efforts. Organisation culture as a decision premise interferes with the decision-based decision premisses and may latently alter their rationality assumptions (OE, pp. 240-249). Cognitive routines are hetero-referential decision premisses, constructs of the organisation regarding elements of its environment that have ‘reality credit’ assigned to them (OE, pp. 250-252).

As mentioned earlier, the idea of a system (organisation) memory figured incidentally in Luhmann’s earlier writings. In OE, however, system memory is one of the most referred to concepts. This is connected to the centrality that Luhmann assigned to time in his later writings. Time is seen as an observational construct using the form of ‘the present’. This form operates in the actual, constructing inactual horizons on both sides of the distinction, the past horizon and the future horizon. In this form, the present is the distinction, therefore the unobservable third element, that coincides with the position of the observer. In OE, it is argued that decisions have a crucial temporal function. Not only are they ordered temporally, but they also ‘bind’ time as they fix certain pathways into the future, and thus temporally ‘pre-order’ the future. This is supported through temporal structures, such as routines, deadlines, planning processes, calendars, reporting cycles, etc., which help organisations synchronise or coordinate actions and expectations (OE, p. 152ff).

System memory is mostly located in stored written information, so nowadays the system memory exists on hard drives or cloud storage. Besides, verbal accounts that are widely shared and acknowledged are also a part of the system memory. System memory engages in all decision operations and serves the coordination between past and future in every actual situation (OE, p. 442). The system memory is needed to construct alternatives of the past and make determinations of the future (OE, p. 156). As system memory continuously runs along the decision autopoiesis, it is dynamic and adapts to the progress of the recursive production of decision-communication in the organisation. Only what has future value is remembered, and thus is re-impregnated by follow-up decisions (OE, p. 114) and enables the transformation of decisions in decision premisses, which pre-structure and constrain future decisions (OE, p. 193).

Besides decision premisses, self-descriptions are a key content of the system memory. Self-descriptions are those contents of the memory that are related to the system as the unity of all its operations (419). Self-description is vital for the organisation as it ensures that self-reference unambiguously refers to the same invariant unity. In the self-description, the system memory remembers itself (OE, p. 420ff).

Another matter that is completed in OE is the positioning of organisations within society. Here, Luhmann further unfolds the perspective of GG. In this, two aspects are quite relevant for this overview: interruption of interdependencies and structural couplings. Both of them are based on the fact that organisations are operationally closed systems, while exerting opposite effects. Both of them were vital for the emergence of the differentiated society and are even more vital in the highly differentiated, dynamic society we know today. Both of them are based on the principle of loose coupling. For functionally differentiated societies to build up complexity, it is necessary to avoid events in one part of society echoing through the society; in other words, everything impacts on everything. Earlier societies achieved containment through segmentation or stratification, but in functionally differentiated societies, these structures are no longer available. In the differentiated society, organisations render the interruption of interdependencies. Based on their operational closure and the associated system rationality, they prevent that an unchanged transverse through the system can occur. This appears on the system level as loose couplings between system elements. Structural couplings refer to stable relationships between operationally closed systems that are associated with articulated reception niches in the structure of both systems and are, as such, recognisable and

predictable. “Structural couplings are consequences of the functional differentiation of society. They arise because this form of differentiation increases both the dependencies and the independence of the functional systems in relation to each other. They are located at the level of the social system and as such are not a function of organisations. But they would hardly be possible with the necessary complexity and differentiation if there were no organisations that can gather information and bundle communications and thus ensure that the permanent irritation of the functional systems generated by structural couplings is converted into connectable communication” (OE, p. 400).

3 RESEARCH CONTEXT AND RESEARCH QUESTIONS

3.1 The functionally differentiated society

“A society can be described as functionally differentiated if it forms its most important subsystems with regard to specific problems, which must then be solved in the respective functional system” (Luhmann, 1987, p. 34) (translation by author).

The functionally differentiated society is an evolutionary societal achievement, which was preceded by the segmentary and the stratified society. Segmentary societies, the oldest form of society, are differentiated into principally equal entities, which relate as environments to each other. This implies, without exception, the formation of families (Luhmann, 2021c, p. 634). Larger entities can emerge in the form of villages or tribes. These can be formed based on family lines or locality (ibid., p. 635). Accordingly, in these societies, individuals are assigned to a family, possibly supplemented by an assignment to a village or tribe. There are no exceptions to this (Braeckman, 2006, p. 68). The position of individuals in the social order is fixed and cannot be changed by effort or performance (Luhmann, 2021c, p. 636). Segmentary societies evolved into layered, or stratified societies, when descent was no longer the primary inclusion/exclusion principle, and society was represented as a hierarchy, and order without differences in rank became inconceivable (ibid., p. 678). Accordingly, individuals derive their status and meaning as a person in society from the societal layer to which they belong (Braeckman, 2006, p. 68). The feudal society was a stratified society, as it was differentiated into the strictly separated and secluded societal layers of nobility, clergy, urban citizens organised in guilds, and the peasantry.

The transition from stratified societies to functionally differentiated societies occurred gradually from the 16th century onwards. In Europe, the transition accelerated in the 18th century. The 19th-century Western European and North American societies can be considered as fully functionally differentiated societies. The functionally differentiated society became the dominant societal form on a global level in the 20th century.

Under functional differentiation, a society is differentiated into subsystems that can no longer be integrated by a basic symbolism common to all systems. The individual

functional subsystems—economy, politics, law, religion, education, science, art, etc.—always operate from their respective function-specific perspectives, which are indispensable for them (Kneer and Nassehi, 2000, p. 131 ff). Each of the functional subsystems “describes its own relationship to society as a relationship between system and environment within society. But these descriptions cannot converge, because for each functional system, the environment, and thus society, looks different” (Luhmann, 1987, p. 35). The functional subsystems operate each with dedicated, specialised structures in the form of symbolically generalised communication media. The availability of such a generalised medium is vital for the operability of a functional system, because it compensates for the dynamic that functional differentiation removes communications from their original contexts in everyday life, family, tradition, and customs, and therefore makes it unlikely that the communications will be accepted (Luhmann, 1987, p. 40). A further complexity reduction facilitates the communicative operability of the functional subsystem, namely, that each functional subsystem operates with a dedicated communication-evaluation operator in the form of a binary code that matches the specific symbolically generalised communication medium of the respective subsystem (Luhmann, 2021b, p. 359 ff). Reese-Schäfer provides an overview of various subsystems with their respective medium and code (2019, p. 76).

Table 2. Functional subsystems, media, and codes

Functional subsystem	Generalised medium	Binary code
Economy	Money/Property	Have/Not have
Law	Law (= laws, legal rulings)	Legal/Illegal
Science	Scientific findings and discoveries	True/False
Politics	Power (public offices)	Government/Opposition
Religion	Religious faith	Immanence/Transcendence
Education	Career expectations	Good grades/Bad grades
Mass media	Messages	Information/Non-information
Morality	Value concepts	Good/Evil
Art	Aesthetic forms	traditional: Beautiful/Ugly modern: Innovative/Old

Source: after Reese-Schäfer (2019), translation by author

In Luhmann's theoretical model, the subsystems are autopoietic, i.e., they are self-referential and operationally closed. This puts the subsystems in a state of constant indeterminacy, with regard to form and future (Luhmann, 2021, p. 745). For example, if a payment is made, this fixates an existing contingency on the side of the payer but simultaneously creates a contingency for the receiver who has to decide what to do with the money received.

A further consequence of the operational closure of the subsystems - the generalised medium is only informative and understandable in the respective subsystem, and the binary code is only valid and applicable in its dedicated subsystem - is that these systems cannot directly communicate with, and appear as indifferent to, each other. They can only "irritate" each other through structural couplings. Nassehi expresses this as follows: "What appears to be a problem for society is the experience that functional perspectives always have to contend with other possibilities, that political control of the economy always has to reckon with its self-regulation, that the juridification and economization of medicine does not override the logic of medicine, but forces it to make new kinds of self-adjustments, that the media representation of science is a different context than the self-plausibilisation of science itself, that the ethicalisation of discourses draws attention to contexts that run counter to scientific, political, or economic connectivity" (2004, p. 115) (translation by author).

In modern societies, no functional subsystem can generally be given priority over others. Modern societies do not impose any order on the relationship between the functional systems. In fact, society can no longer regulate the relationships between its subsystems. These relationships, as well as the relative importance of the subsystems, result from evolutionary dynamics (Luhmann, 1987, p. 48, 2021c, p. 746). Empirical research shows that the relative importance of functional subsystems indeed varies over time; moreover, it indicates that new subsystems may emerge during the 21st century (Roth *et al.*, 2019, 2025).

While the various subsystems cannot communicate with each other and are in terms of influence relations confined to structural couplings (see 3.2), they can observe each other. In functionally differentiated societies, principally three categories of observations exist. First, the observation of the overall societal system to which the subsystem belongs, this the observation of function, i.e., how a subsystem is fulfilling its contributing function to

society. Second, the observation of other subsystems, which is the observation of performance, i.e., how a particular subsystem observes the output of another subsystem as contributing to its own operation. Third, the self-observation of the subsystem, which is the observation of reflection, i.e., the subsystem can perceive itself as different from its environment, and direct its observation to its own doings, symbols, etc. (Luhmann, 2021c, p. 757 ff; Luhmann and Schorr, 2000, p. 41 ff).

Organisations have played a crucial role in the development of the functionally differentiated society; in fact, functionally differentiated societies would not be sustainable without organisations (Luhmann, 2000a, p. 395 ff). “Organisations produce forms of communication in which decisions use the connectivity of functional system processes and thus also relate them to each other. The functional purpose of organisations is precisely to provide the operations of the functional systems with zones of dense communication and thus ensure their operational separation. A modern society without organisations would probably react with complete de-differentiation” (Nassehi, 2004, p. 110, translation by author).

This pivotal role of organisations is further elaborated in the next section.

3.2 Functional differentiation, contingency, and organisations

In the previous section, it was discussed that, with the transition to functional differentiation, the strict social order of a stratified society was left behind, and this made successful communication and behavioural expectations more improbable. Moreover, in their very nature, functional subsystems have inherent indeterminacy. Together with the symbolically generalised media, the spread of the modern organisation facilitated communication and expectations and thus contributed to the operability of the functional subsystems. The organisation form achieved this by integrating two types of structuration. The first is social. It relates to the fact that in a functionally differentiated society, the individual has access to all functional subsystems, but no one ever belongs fully to any of them. This implies that, unlike earlier societal forms, the individual is not defined by inclusion but by exclusion. Therefore, as a matter of fact, the individual thus falls outside society (Braeckman, 2006, p. 70). However, the individual can join an organisation by decision and leave by decision. Because members have to submit to the rules of their rules and processes, organisations can ensure highly improbable behaviour, for example,

highly specialized behaviour that does not directly serve the interests of the individual (Luhmann, 1987, p. 41). The second structuring is factual and temporal. The indeterminacy that exists in functionally differentiated societies can only be stabilised through decisions. In this regard, organisations function as differentiated entities that are capable of structuring decisions factually and temporally. As Luhmann puts it: “....society must go beyond functional differentiation and use a further principle of system formation in order to provide itself with ultra-stability and sufficient local capacity to absorb irritations, namely organisation” (Luhmann, 2000a, p. 395).

Besio and Tacke distinguish four different roles of organisation in functionally differentiated societies.

- 1) organisations specify and concretise functional possibilities and even implement functional systems
- 2) they recombine and reconcile different systems’ requests
- 3) they irritate functional systems with their specific ways of tackling complexity
- 4) they are capable of doing this as single organisations and/ or in exchange with other organisations (Besio and Tacke, 2024, p. 1367)

The relation between the functional system and the organisation has been the subject of ongoing debate. Luhmann principally argued that organisations are assigned to specific areas of social function. Therefore, they are oriented towards a particular functional subsystem and are, therefore, subject to functional determination. At the same time, they must align with a socially determined environment and are accordingly subject to environmental structuring (Luhmann, 2019b, p. 230). It has been argued that Luhmann perceived organisations as part of a particular subsystem, and that such contradicts the principles of autopoiesis (Kneer, 2001). While the latter is true, the former is not, in my view, although Luhmann’s wordings are sometimes ambiguous. Fundamentally, as functional subsystems are purely operationally defined, similar to, as a matter of fact, logically, particular communications of organisations are operations in the autopoiesis of one particular subsystem, while other communications are operations in the autopoiesis of another one, depending on the generalised medium in question. In my view, Luhmann has been very clear on this matter; he states that “[m]ost organisations base their goals on the functions of specific functional systems”, and that almost all organisations necessarily participate in the economic subsystem because they use money (Luhmann, 2000a, p. 405).

Nevertheless, in the current literature, the concept of “multi-functional” organisation has become fashionable (Besio and Tacke, 2024; Cárcamo-Petridis, 2025; Roth *et al.*, 2020). To repeat, this is in my view not a development of Luhmann's views, as the organisations conceived by him were already multi-functional both with regard to deployment of generalised media as well as their societal alignment. The notion of multi-functional organisation is useful, though, because it illustrates that organisations are increasingly affected by a multitude of subsystems, something I will revert to later in this section again. Finally, in the context of the relationship between functional subsystems and organisation, it is relevant to mention that organisations are social systems that can communicate on their behalf with their environment, e.g., other organisations. Since functional subsystem communication is exclusively self-referential, “communication” between subsystems essentially occurs through organisation-organisation communication, particularly where such organisations are element of, or situated on structural couplings (Luhmann, 2000a, p. 401 ff).

An excellent and detailed account of these dynamics between society and organisation, in the light of functional differentiation, is also given by Drepper (2018).

After having pointed out the pivotal structural and operational role of organisations, as decision-based social systems, in functionally differentiated societies, I will now turn to developing the argument that the progressing functional differentiation implies that organisations are faced with an ever-increasing decision intensity. Four intertwined factors are responsible for this dynamic.

- 1) The inherent indeterminacy of functional subsystems and the associated emergence of risk
- 2) The abstract nature of symbolically generalized communication media
- 3) The evolution of selection, variation and restabilisation in functional subsystems
- 4) The multi-functional organisation

ad 1) In *Soziologie des Risikos* (Sociology of Risk) (Luhmann, 1991a), Luhmann demonstrates how the idea of risk developed historically. With the onset of functional differentiation, a society-wide uncertainty originated. The root of this uncertainty lies in the indeterminacy associated with the binary code-based autopoietic operation of the functional subsystems. The binary codes are abstract and universally applicable distinctions. Their purpose is to generate a positive or a negative value, but they contain

no indication of the correct assignment of either the positive or the negative value. This openness forces us to make decisions—and thus to take risks (ibid., p.88-89). The emergence of the experience of risk is associated with the contingency of the future, which is implied by the development that the future is increasingly shaped by decisions, and the higher degrees of freedom to compose the set of alternatives to be decided upon. This is an autocatalytic process, as a decision will invoke follow-up decisions, these representing new contingencies, that in turn will ask for more decisions. Risk is attributed to decisions and represents the possibility of a less advantageous future than was projected in the decision. Conversely, decisions are attributed to risks, and what the structured complexity of society triggers in terms of environmental changes and what one wants to be seen, treated, and avoided as a risk is also taken as a consequence of decisions (ibid., p. 130). Therefore, the more prominent observed presence of risk will amplify the decision sensitivity and thus also amplify decision-making itself. What Luhmann points out is that, due to the increasing complexity of society, individuals and organisations are increasingly exposed to risks that are not the result of their own decisions. To capture this reality, he proposes that the distinction of risk-certainty be replaced with the distinction of risk-danger, where risk is related to the possible negative consequence of one's own decision, while danger relates to negative consequences that may be brought about by the decision of others. We can easily see that this by itself, will amplify the urge for decision-making of organisations.

A further factor in the autocatalytic decision-risk dynamic is the occurrence of second-order observation. As the evaluation of the code in a particular instance (the first-order observation) determines the risk, systems will be prone to engage in second-order observation, i.e, to observe and evaluate how the evaluation is made (ibid., p.244 ff). For organisations, as decision-based social systems, this will imply additional decisions concerning what to do with the result of the second-order observation.

ad 2) Symbolically generalised communication media foster variation and change because of their abstract nature. The functionality of a generalised medium is situated in the simultaneous presence of tight and loose couplings. The medium is tightly coupled to its symbol representation and to its binary code. Besides that, they are loosely coupled in the factual, temporal, and social dimensions. For example, in the case of money, one can, in principle, spend it on anything at any given time or exchange it with anyone. Therefore, from an evolutionary point of view, they will tend to generate variety (Luhmann, 1987,

p. 40 ff). The variation potential is further increased by the avoidance of direct conflict interactions (Luhmann, 2021b, p. 464 ff). An example is the primacy of competition in the economic system: organisations do not fight each other directly, but compete on markets, which they do in the form of variation (based on differentiation or cost strategies) (Luhmann, 1991a, p. 101 ff). Variation induces decision-making pressure, i.e., with increasing (pace of) variation the amount of decisions (selections) will increase as well, concerning whether or not to accept or engage with a variation (Luhmann, 2021b, p. 474).

ad 3) Selection, whether accepting a variation or negating a variation, always leads to an increase in the complexity of the system, and the system must respond to this with restabilisations (ibid., p. 488). The notion that selection implies stabilisation (also the axioma of the organism organisation model, see section 1.2.2) is no longer tenable when it comes to functionally differentiated societies. This is a result of the high level of compatibility of both the generalised media and the binary codes. “With the transition of the restabilisation function to the functional systems, stability itself becomes a dynamic principle and subsequently indirectly a main stimulator of variation” (ibid., p. 482). As restabilisation induces variation, a cyclical acceleration is induced. This acceleration occurs on the level of the subsystem, so organisations are essentially confronted with this. Organisations need to create forms that can sustain a higher rate of change in the environment and in the organisation system itself (ibid., p. 503). Stability becomes based on flexibility, changeability, and decidability (ibid., p. 499). For organisations, it means a higher decision intensity.

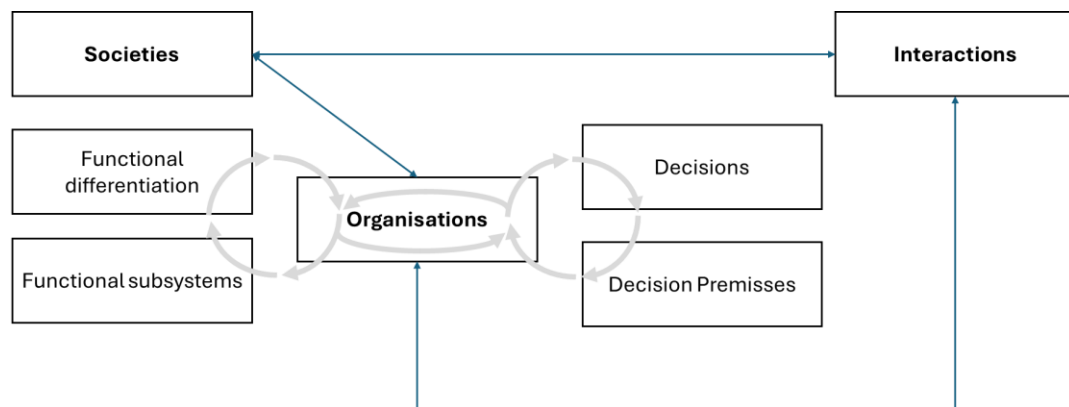
ad 4) Several multi-functional factors contribute to the gearing of decision-intensity. Above, the aspect of risk was discussed. However, apart from risks, functional differentiation equally creates distinct pools of entrepreneurial opportunities. Organisations, therefore, need to strategically adjust the amount of attention they devote to the different forms of social differentiation (Roth *et al.*, 2018). With the increasing complexity of the subsystems, which is accompanying the progressing internal differentiation of the subsystems, a paradoxical phenomenon occurs in the interrelation of the subsystems. Subsystems become more independent and simultaneously more dependent on each other. The increasing independence is a consequence of their increasing intransparency towards their environment, while the growing dependency is a result of the increasing specificity of the performances they need from other subsystems for the purpose of upholding their differentiation. On the level of organisations, this

precipitates as more adjustments, more specification, more decisions. The concept of the multi-functional organisation was already referred to. It implies that organisations need to include more semantics of other subsystems, in addition to the subsystems(s) of their primary orientation (Roth *et al.*, 2018, 2020), while it also leads to the formation of multi-organisational organisations (Grothe-Hammer and Rachlitz, 2025). Plausibly, this new diversity will add to the decision intensity in organisations.

Functional differentiation and the emergence of the social system of organisation went hand in hand. To summarise, according to social systems theory, the evolution of the functionally differentiated society is structurally connected with the emergence and rise of the organisation as a social system constituted by decisions and is process-wise connected with a progressing contingency of the future, generation of variation and multi-functionality, which have a mutually reinforcing relation with decision-making. The structural and process components of functionally differentiated societies are in a reinforcing loop with each other.

These relationships are graphically represented in Figure 2 below.

Figure 2. Model of the function of organisations in the functionally differentiated society



Source: author, after Luhmann (2000a, 2021b, 2021c)

In section 1.2.7, I coined the concept of decision topology. Against the backdrop what was outlined above, a decision topology is a form through which organisations seek to stabilise decision-making in conditions of increasing decision intensity, which is primarily based on “flexibility, changeability and decidability” (Luhmann, 2021b, p. 499) and is able to “keep up with a higher rate of change in the environment and in the system

itself” (ibid., p. 503). A decision topology transcends individual decisions into decision constellations, organised clusters of decisions solving particular issues, structures that represent particular decision paradigms. We can speak of decision topologies because they consist of tight couplings combined with loose couplings. In this thesis, two of such contemporary decision topologies, projects, and artificial intelligence (AI) will be addressed. Projects can be conceived as decision topologies, because when organisations revert to a project, they create a decision constellation in the factual, social, and temporal dimensions. While projects can take many shapes, this underlying structure is invariant, and hence we can speak of a topology. The same can be said about AI, where AI applications affect structured groups of decisions (factual), organised in time (temporal), and involving technology-human interactions (social).

Therefore, within this context, projectification (Jacobsson and Söderholm, 2022; Jensen, 2023; Jensen *et al.*, 2016; Wagner *et al.*, 2021) can be seen as a reaction of organisations to cope with the increased decision pressure which is caused by the progressing differentiation and the associated increase in contingency, variation, and multi-functionality. Projectification has been evidenced by macroeconomic research (Henning and Wald, 2019). It is pursued as a managerial approach to foster responsiveness, agility, and innovation (Jacobsson and Jałocha, 2021). Meanwhile, it has become clear that projectification also has negative effects (Jacobsson and Jałocha, 2025).

The increasing use of AI has been linked to adaptability (Popa *et al.*, 2025). AI has been shown to affect decision-making speed, decision quality, and overall organisational performance. Decision-making speed is a critical factor contributing significantly to enhanced organisational performance (Neiroukh *et al.*, 2024). AI has potentially a transformative impact at different stages of strategic planning and can facilitate the required strategic planning characteristics within a VUCA business landscape (Biloslavo *et al.*, 2024). Through AI, organisations delegate selections and reflexive operations to technical architectures to maintain operational stability while concealing complexity (Cárcamo-Petridis, 2025, p. 13).

Pursuant to these developments of projectification and use of AI, and given that they can be framed as decision topologies and are a response of organisations to increasing decision-making density, the reach of social systems theory can be extended by a more detailed investigation of the phenomena of the deployment of a project and AI in

organisations. Such explorations may provide new insights, since, while these topologies are instrumental, they exert an influence on the organisation as a system on their own behalf.

As for the study of projects with social system theory, we can discriminate between an external perspective and an internal perspective. The external perspective refers to the ability to steer projects on an intra-organisational level or an inter-organisational level. As was indicated earlier, steering is a fundamental for maintaining society as an integrated whole under the circumstances of progressing functional differentiation (Esmark, 2009; Luhmann, 1997; in 't Veld *et al.*, 1991). Such an external perspective logically addresses decision-making, as projects, as some form of organisation, will also be constituted by decision communications. The internal perspective is equally important. As was elaborated earlier, communication-based social systems are operationally closed. Hence, any influence from outside can impact a social system only indirectly, that is, any impact will be mediated by a decision of the social system in question. In this regard, the internal perspective becomes relevant, as decisions of a project will be based on its structures that enable it to deal with the environmental complexity. This, however, is based on the construct it has made of the environment.

This leads to the following two research topics and research questions.

- 1) What is an appropriate conceptual model, based on social systems theory, for the steering projects? How does this model relate to the existing research on the steering of projects?
- 2) How do the decision dynamics of a project affect its environmental perspective? What is a conceptual model, based on social system theory, that represents these relationships? How can existing project research be re-interpreted using this model

As for the progressing use of AI, the focus is not on the 'quality' or speed of decision making, as would be the case with the mainstream theories of decision making, but on how the nesting of AI affects the organisation as a system.

This leads to the following research topic and question.

- 3) How does AI impact the decision-making communication in organisation systems? How are the system structures affected, and how is the basic operation

of the organisation affected? How can organisations maintain adequate levels of internal steering?

The choice to retain social systems theory as the underlying theory to investigate these topics in detail and on what can be called a micro level can, of course, be questioned. Arguably, one could switch to another theoretical framework, which would potentially render higher insights, that on their behalf could be integrated or evaluated with the broader framework of social systems theory. Such an approach certainly represents a viable option, and should actually be promoted as it can attract a broader part of the scientific community to social systems theory.

Nevertheless, for the following reasons, the framework of social systems theory was maintained. First, it renders an opportunity to refine the framework of social systems theory, in other words, to add coherent elements to the existing framework, that sharpen the lens of social systems theory and extend its coverage of social phenomena. Second, social systems theory is a capable instrument to analyse organisations in detail (Besio and Pronzini, 2011; Domke, 2006). Third, the mainstream theories, like rational-choice models, would not enable us to capture the system-level dynamics that we are primarily interested in (Nassehi, 2004). Fourth, social systems theory is preferred above other theoretical frameworks that approach organisational dynamics from the perspective of communication. One of these, the so-called CCO approach (Basque *et al.*, 2022; Cooren, 2014; Cooren and Seidl, 2022), has proven to be a viable way to analyse organisations as constituted by communication. However, it lacks the rigorous framework that social systems theory is made of. Particularly, it cannot compete with social systems theory when the instrument set for investigating decision communication is concerned. Then, the communication-based theoretical work of Jürgen Habermas has been applied to organisation research to a considerable extent, and for that matter, certainly enjoys a greater popularity than social systems theory. The communication theory of Habermas (Habermas, 2019) has mainly found its way in the ‘critical’ theory of organisations, where the main interest is in issues of morality, power, emancipation and inequality (Burrell, 1994; Forester, 1980; Meisenbach, 2006). In that regard, the framework of Habermas was found less suitable for the current research objective, which can benefit the most from the paradigm of functional analysis associated with social systems theory.

3.3 Research papers

This thesis is compiled from the following three papers.

- 1) Aal, E. B. W. (2022). The significance of Luhmann's theory on organisations for project governance. *Project Leadership and Society*, 3, 100070. <https://doi.org/10.1016/j.plas.2022.100070>
- 2) Aal, E. B. W. (2025). The world according to the project. *Systems Research and Behavioral Science*, 42(2), 270–286. <https://doi.org/10.1002/sres.3082>
- 3) Aal, E. B. W. (2025). 'The end user takes the final decision': AI and Decision–Communication in Organisations. *Systems Research and Behavioral Science*, 42(2), 455–476. <https://doi.org/10.1002/sres.3124>

Before giving a short overview of each of the papers, some words concerning their emergence. The first paper resulted from my original interest in investigating the steerability of projects, as this was an issue I had frequently encountered in the project profession. Having completed the paper, I meanwhile realised the importance of the decision concept in the broader sense of Luhmann's theoretical framework. At the same time, I concluded that several areas in Luhmann's social system theory were underdeveloped with regard to project organising. This led to the second paper, which focused on the evolutionary dynamic of projects and the impact thereof on the relation between organisations and their projects. A nuanced view on the steering issue emerged, which was also connected to the societal level by means of the reference to projectification. A further objective of the second paper was to 'test' some of the Luhmannian concepts. The approach of constructing a conceptual model and then investigating how it matches up with the results of research that has been executed was a dominant driver for the next, third paper. Like projectification, the usage of AI is a societal development strongly affecting the operation of organisations. Moreover, the connection between AI and decision-making processes was evidently present. Therefore, I constructed this paper as a systematic analysis of the impact of AI on decision communication, together with reviewing systematically how the obtained analysis holds up against the results of available research.

The first paper (Aal, 2022) addresses the means and measures that stakeholders, in the first instance, project owners, have at their disposal to steer projects. The paper seeks to make a contribution to the project governance literature by approaching the topic with a

social systems theory perspective. The paper assumes the decision-making perspective, following some relevant recent contributions that were made in the field, which also centre on decision-making. Stepping away from mainstream project taxonomies and instead taking a systems approach that takes the project-organisation distinction as a starting point, the paper argues that principally two types of projects exist. The paper shows how this has important implications concerning the steering of a project and actually represents significant steering limitations in certain cases. The paper focuses on the so-called autopoietic projects, which are those projects where project owners and stakeholders may face limitations in their steering capabilities. The paper concludes with a model of how such projects can still be effectively steered amidst all the constraints resulting from the particular systemic relations. Thus, the paper represents an advancement of social systems theory by applying the theory in a field in which it had so far not been applied. Also, the study adds to the conceptual understanding of projects in general and contributes to the field of project governance.

The second paper (Aal, 2025a), builds on the first paper. It refines the position argued in the first paper that two types of projects exist, namely organisation-bound and autopoietic projects. It does so by taking a dynamic approach and showing that, within the framework of social systems theory, projects can exist in various states. The unique theoretical contribution of this paper to social systems theory is that it describes the genesis of autopoiesis. This is a system-theoretical possibility, which was never addressed or researched by Luhmann or subsequent scholars working on the basis of social systems theory. With an emphasis on the micro-dynamics of a project, the paper shows how these shape the ‘world view’ of the project. The paper contributes to the wider field of project studies by undertaking a reinterpretation of several case study accounts and succeeds in showing that new insights are gained through the lens of social systems theory. Synergetically with the first paper, some conclusions regarding steering are made, but now in a wider societal context of projectification.

The third paper (Aal, 2025b) assesses the impact of AI on the constitutional process of organisations, that is, decision communication. Again, this paper draws fundamentally on the social systems theory framework, like the first and second papers. The new element of this paper, apart from a new topic, is that is structured along the concept of the ‘distinction’, which, as was elaborated earlier, is foundational for social systems theory. Thus, the discussion of the impact of AI on organisations progresses along four

distinctions. The paper shows how this taking of a particular observational position makes phenomena visible that otherwise would remain hidden. Also, methodologically, the paper represents an advancement on the first two papers by taking a rigorous functional analysis approach. For each of the four distinctions, first the distinction is defined conceptually, next the distinction is functionally applied to AI in organisations and finally this is confronted with the research results that are available. The paper concludes with a model of measurements that aims to support organisations in maintaining ‘adequate rationality’ while relying increasingly on AI applications.

All three papers aim to develop social systems theory in areas that pertain to the consequences of functional differentiation of society on an organisational level. In that regard, they represent an extension of social systems theory. Nevertheless, the topic of each of the papers has relevance on its own, abstracting from the recourse to the theory of functional differentiation.

4 PUBLICATION 1 – THE SIGNIFICANCE OF NIKLAS LUHMANN’S THEORY OF ORGANISATIONS FOR PROJECT GOVERNANCE

Abstract

The aim of this paper is to lay out a novel analytical perspective for project governance. Applying two elementary concepts of Luhmann’s organisation theory, distinction and autopoiesis, as well as Luhmann’s decision-making model offers a deeper comprehension of the project, which renders a novel classification of projects. These project classes are associated with a certain influence relation between organisation and project, which determines the modality of how organisations steer their projects. These are labelled as governance mode and management mode. Fleshing out the decision-making approach of Luhmann, a detailed operational framework for the steering modality governance mode is advanced, as in this case the organisation faces elevated steering challenges and limitations. It is reasoned when and why governance can be effective and positively impact on the project. These contributions offer an enhanced understanding of project governance and new perspectives for developing its practice.

Keywords

Project governance, Niklas Luhmann, decision-making, social systems theory

4.1 Introduction

Turner (2020b) supports the view that project governance may contribute to project performance but points out that the mechanism that mediates this performance impact is unknown. In a related paper (Turner, 2020b), looking for a deeper theoretical anchoring of project governance, he explores how it may affect decision-making in projects. Indeed, the seminal contributions to the field in the past two decades primarily deal with the composition, contents and structures of project governance. Project governance is often defined as a framework. Too and Weaver (2014) define it as the framework that comprises the management of project-management. Müller (Müller, 2017a) emphasises the framework aspect but distinguishes between (board-level) governance of projects and

project governance, the latter referring to the active involvement of governing entities in individual projects. Ahola et al. (2014) conclude that two streams are present in the literature on project governance, one stream considering the governance framework to be a stable one across projects, whilst the other one represents the view that governance frameworks should be flexible and adapted to the particular project. Regarding the critical contents of any governance framework, approaches and viewpoints also vary. Müller and Lecoivre (2014) differentiate between governance aimed at controlling outcomes versus governance aimed at controlling behaviour; furthermore, they discriminate between stakeholder-oriented versus shareholder-oriented governance. Kujala et al. (2021) propose six dimensions of governance, which are further detailed into over twenty elements. Out of these six dimensions, Lappi and Aaltonen (2017) elevate the criticality of decision-making authority, and transparency of organisation structure. Young et al. (2020) operationalise project governance into six constructs. Yesudas and associates (2020) note there is need for integrating of governance approaches and propose a framework based on Systems Engineering. The contributions of Brunet (2019), who focusses on the actual governance practices, and that of Zwikael and Smyrk (2015), who focus on the active contribution of a project owner to project governance, both rather address the aspect of governance as action.

Although these contributions offer a stimulating variety of approaches, what they have in common is that their analytical conceptualisation of the project stops at the level of what organisations label as projects. It is true, that several studies deal with specific types of projects like large, complex projects, public sector projects or IT projects (Ahola and Davies, 2012; Brady and Davies, 2014; Brunet, 2021; Brunet and Aubry, 2016; Johnstone and Tate, 2017; Miller and Hobbs, 2005; Williams *et al.*, 2010) These studies do not result in a taxonomy based on a coherent theoretical frame and thus do not provide any further development of the concept of the project relevant for project governance. It can be concluded therefore, that apart from the need for looking into the mechanisms that produce the workings of project governance as pointed out by Turner, the very concept of the project may benefit from a similar deepening.

Applying Niklas Luhmann's organisation theory, reveals that the concept of the project should be and can be further conceptualised. The conventional approach treats projects, which are materially different with regards to the systemic relation that exists between the organisation and the project, in an equivalent manner. Luhmann's organisation theory

however sheds a light on the influence relations that exist between the organisation and the project. The nature of the influence relation determines the scope, means and measure that are available for an organisation to steer projects.

Using the two elementary concepts of Luhmann's organisation theory, *distinction* and *autopoiesis*, I will outline that principally two types of projects exist, that differ essentially in the type of recourse the organisation has on them. Adding the decision-making model of Luhmann, introduces a dynamic element that describes how the genesis of this split into a project belonging to the one class or the other materialises. In section 2, I will discuss the above mentioned two basic concepts and put them into the context of Luhmann's wider organisation theory. In section 3, I make the argument for the two project classes and show how their origination runs over the process of decision-making. I discuss the decision-making model of Luhmann in some depth here.

Having established the two types of projects with their underlying dynamic, the next part of this paper deals with the nature of the influence relation between the organisation and the project, as it occurs for the two types of projects that I distinguish. Here, a distinction between governance mode and management mode is introduced, as the principal steering modality associated with each of the project types. This part of the paper is structured as follows. In section 4, I will give a short presentation of the concept of steering, as it is put forward by Luhmann. In section 5 management mode and governance mode are elaborated. Focussing on projects that can only be steered by the organisation in the governance mode, a model for project governance is presented that reasons on the premise that project governance, when it has effect, works principally on the decision-making practice of the project. The means of project governance are discussed in detail, and I make plausible which elements of governance have the highest prospect of achieving impact as was intended.

In the final part of this paper, section 6, the overall governance model is discussed and reviewed in the light of some major research contributions. The limitations of the model are addressed, and a research agenda is presented.

4.2 Distinction and autopoiesis

The signature status that Luhmann's systems theory (Luhmann, 1964, 1986, 2000a, 2009, 2021a, 2021b, 2021c) achieved, is attributable to the incorporation of the concepts of

distinction and autopoiesis. Both concepts address structure and process simultaneously. In both recursiveness plays a central role and they are recursive to another.

4.2.1 Distinction

The concept of the distinction is the beginning and the end of Luhmann's theory in the same manner as it is the beginning and the end in the thinking of George Spencer-Brown, who introduced the concept of form for the study of the distinction (Spencer-Brown, 1979). A form is the result of a distinction. A distinction is to cleave any space into two parts: the one part that is intended to be distinguished or marked, and the other part from which the distinguished part is distinguished or separated out. The latter part is an undifferentiated background to the marked part. Essential is that they always exist together. A distinction consists of three inseparable elements: an intention to make a distinction, the distinction or form that separates the marked from the unmarked and the time-related operation of making the distinction. Luhmann elevated the Spencer-Brown concept out of the isolated, abstract mathematical sphere and injected it into a sociological theory. The distinction presupposes the existence of an observer and the operation of observation. Any observer is already a distinction itself, in other words observation is only possible due to pre-existing forms or distinctions. In his usage of observation as a core element of his theory, Luhmann connects to the stream of second-order cybernetics, i.e., the science of systems observing systems (Von Foerster, 1984). When observing systems are (also) observing themselves they become self-referential.

4.2.2 Autopoiesis

This concept was put forward by the biologists Maturana and Varela (1980). They proposed that organisms are self-producing and self-organising. As such they are „operationally closed“. Their relationship with the environment exists in selected channels, which are called structural couplings. Luhmann's theory applies this concept of autopoiesis to social systems and psychic systems, he argues that these systems are reproducing themselves through a continuous chain of interlocked basic operations. The basic operation of a psychic system is an instance of consciousness, that of social systems is communication. Social systems and psychic systems – the latter are persons from the viewpoint of a social system – have co-evolved and cannot exist without each other. Essential for any social system – they come in three types: interactions, societies, and organisations - is that communication is the autopoietic operation, and therefore can only

occur within a system. Communication follows on an earlier communication and paves the way for a following communication. Autopoiesis is the ongoing operation that reproduces the identity of the system and the boundaries between the system and the environment and thus upholds the distinction system-environment.

Luhmann frames his central concept of complexity in terms of autopoiesis and observation. He argues that observing systems, like social and psychic systems, are in a continuous struggle to reduce complexity – needed externally as well as internally, because one-on-one relations with occurrences in the environment, or between elements within the system, cannot be maintained by a system - and such complexity reduction occurs through selection. Following entropy principles as applied in cybernetics, Luhmann poses that reducing external complexity enabled and enables systems to increase their internal operational complexity. This results in sustainability of a system within its dynamic environment, and is in fact an evolutionary process, or better said, the core of the co-evolution of the psychic and social systems.

4.2.3 Luhmann's theory of organisations

Distinction and autopoiesis, constitute the foundation of Luhmann's theory of organisations, of which I highlight the following aspects for the purpose of this paper. For a good overview of Luhmann's theory of organisations and its application the reader may refer to Seidl and Schöneborn (2010).

Firstly, organisations are systems that uphold a boundary with their environment (the boundary is the distinction between the system and the environment, in the sense of the form). Organisations are autopoietic systems that recursively reproduce themselves from their own elements, which includes the continuous reproduction of the system-environment boundary. Communication is the transmitting batch in this process of autopoiesis.

Secondly, in organisations - being a particular form of social systems - communication must be meaningful for the organisation. Complexity is the central element in achieving meaning. The environment is always more complex than the system, the system cannot achieve requisite variety (Ashby). Hence, through selection, reduction of complexity is achieved in the mapping of the environment, which enables the creation of internal complexity on its turn. This complexity engineering is an ongoing process, for two reasons. The environment is changing, this brings up new combinations for selection and

moreover, as any selection introduces uncertainty by itself this generates the starting-point for the next selection. Connecting this to autopoiesis, constant self-production is necessary to compensate for constant self-decay and vanishment. The process of complexity-engineering is based on observations which oscillate back-and-forth from self-reference to hetero-reference. This implies the “re-entry” of the distinction system-environment: when assessing, observing itself the system necessarily adopts the distinction system-environment.

Thirdly, the autopoietic production that is enabled by communication are decisions. Decisions are part of the complexity engineering as organisations handle uncertainty through decisions. A decision is effectively an uncertainty transformer: an uncertainty is transformed into another uncertainty which is deemed more beneficial for the organisation at a particular moment in time. The time construct is crucial in the decision-making process, as decisions are made in the present, working from the past and selecting the future. It is an unfreezing-freezing activity. Decisions make the past temporarily less fixed in order to settle on the future (Luhmann, 2000a). The autopoietic process of an organisation runs over the communication from decision to decision. Organisations operate with standardised and/or generalised constructs that (pre-)structure communications and decisions. I will discuss these constructs, decision-making premisses and decision-making programs in Luhmann terminology, in detail in section 4.

4.3 Typology of projects

As outlined in the previous section, Luhmann’s sociological enquiries assume that any social system is a self-referential communicative system, and this equally applies to organised social systems (Luhmann, 2003). For an organisation, the communicated decision is the elementary autopoietic act. Luhmann states that the value of the concept of autopoiesis becomes apparent when studying the relation system – environment (Luhmann, 2000a, p. 49).

Before starting the argumentation, I inform that in this paper a project is defined as a temporary entity that is to undertake a specified endeavour (Turner and Müller, 2017, p. 75).

The question comes up whether projects themselves, as organised units, can be considered as autopoietic systems or not. Answering this question, in the exposé below I will show that there are principally two types of projects. **Organisation-bound projects**, in this

case the decision-making process of the project functions within the autopoiesis of the organisation. **Autopoietic projects**, in this case the project is an operationally closed system with autopoietic decision-making and the organisation forms part of the environment of the project.

4.3.1 Decision-making and the organisation – project distinction

To answer the question above, we should analyse how the decision-making process of a project unfolds. The decision-making model of Luhmann offers a viable and accurate analytical tool here. Luhmann argues that organisations are reliant on constructs when decisions are made: *decision premisses* and *decision-programs*, where strictly spoken a decision-program is a particular type of decision-premise. Premisses are suppositions, which are used because of their relevance for a particular problem, and not because of their validity (Luhmann, 2000a, p. 222). Decision-premisses do not determine the outcome of decisions. They contribute to the feasibility of decision-making by decreasing the cost of decision-making through reducing the amount of information involved. Decision-programs are a particular type of decision-premisses, which are usually embodied in rules, procedures, or routines. The use of decision-programs is in the evaluation of the factual correctness of decisions (p. 257). The factual quality of programs presumes that can be verified at any time whether a program is being adhered to or not. The *eigencausality*, which enables operational closure of a system, through which it can build internal complexity, ultimately rests in the decision-programs.

Our question can be reformulated now as follows: do the organisation's existing decision-making premisses and programs suffice for the project to operate, or does the project need to develop its own particular set of premisses and programs in order to operate?

Luhmann's concept of distinction provides the answer to this question. I propose five dimensions in which projects can be distinct from their initiating organisations: output, technology, time structure, human resources, and knowledge. The dimensions that I postulated above are akin to the 4T concept as was originally put forward by Lundin and Söderholm (1995). I consider these five dimensions explicitly as distinctions because the distinction includes the element of reference. The self-reference of the autopoietic project as being distinct from the organisation, is supported by the referencing on the various dimensions. I will shortly address these five dimensions.

Output. Decision-making premisses and programs are functional because they are generalised and/or standardised. They are related to the contents in communication and decisions that recursively appear in the repetitive or routine operations of the organisation. The more the output of a project, in terms of scope or content, deviates from the content or scope of the organisation's regular activities, the lower the opportunity that the constructs of the organisation can be "exported" into the project, or the other way around, the project processes can be integrated into the constructs of the organisation.

Technology. The premisses and programs are also associated with technologies that are routinely used by an organisation and therefore have characteristics that allow for an optimal pairing with these technologies. Hence, in case a project operates with technologies that are deviant or even alien to those of the organisation, this would again make these constructs less suitable to function in the decision-making process of the project.

Time structure. Luhmann argues that the generalised, standardised constructs exist in the first place for the organisation to battle the time factor. This logic runs over the complexity reduction that is ongoingly needed: for organisations to analyse over-and-over again the full complexity of situations or events would simply be impossible within given, feasible timeframes. This also implies that organisations, through their constructs, have created time structures for their communication and decision-making that essentially solved their time requisites. Here, we can think of the deadlines that are given for decisions or processing communication, or the cycle-times of decisions and

communication-exchanges. Projects generally require fast cycles and short deadlines, and this would reduce the viability of the organisation's constructs in this respect as well.

Human resources. Luhmann points out at length, that much of the constructs and routines that organisations make use of, as well as the knowledge they employ, relates to concrete persons within the organisation. He sees membership a primary determinator of the organisation. In case projects are staffed with personnel that is not a part of the organisation, the question of membership and hence the question "what organisation is this?" immediately comes up. Additionally, the constructs of an organisation cannot operate in a project as there are white spots of missing knowledge. Additionally, and equally important, there is the issue of transferability of *positions* from the organisation to the project (Luhmann, 2000a, p. 291 ff). As will be explained below, the

communication and decision-making constructs are closely connected to positions within organisation. The extent to which a project can operate using these positions as such or as proxies, may vary greatly. The lower the extent this is possible, the lower the likelihood that the constructs of an organisation are operable within a project.

Knowledge. The argument here runs along similar lines again. In case knowledge is involved that is not part of the know-how base of the organisation, this would immediately require project-specific decision-making and communication, for which the existing constructs in the organisation would not be effective, as they could not provide the selection operation that is the essence of communication and decision-making in organisations.

4.3.2 Organisation-bound and autopoietic projects

Projects, when they are conceived by the organisation, will form a part of some organisational unit, be it a PMO, department or ad hoc structure. Therefore, projects are organisation-bound projects at this stage. The team working on the project in the very early phases can report in standard departmental or project steering committee meetings on which usually a group of projects is reviewed. The decision-premisses of the organisation are suitable to deal with the decision challenges of the project. In case of limited distinction on the five dimensions between the project and the organisation, the project will function as an organisation-bound project until completion. The decision-making premisses and programs will suffice for the project to make the decisions that need to be made.

In the case of a project with significant distinctions on the five dimensions, very soon autopoietic tendencies will emerge which will encapsulate the project and increasingly build up the boundaries between the project and the organisation.

The higher the extent to which a project is distinct from the organisation on the five dimensions, the more it will have to rely on alternative structures for communication and decision-making particular to the project. In other words, it will not be able to use the autopoietic processes of the organisation and will necessarily develop its own autopoiesis. As a result, a system-environment relation will develop between the project and the organisation with the associated boundaries. Or stated from the observing perspective of the project: the organisation will be another system in its environment.

This process of a project becoming an autopoietic organisation should be seen within the context that the self-reference of organised systems and therefore also the building of self-reference is done by reference to decision communication, and the decision communication constitutes a self-justification because it distinguishes between what is inside and what is outside the system (Cooren and Seidl, 2020). For further clarification, two remarks need to be made here.

Firstly, there is no half-pregnancy in autopoiesis, a project is either organisation-bound or autopoietic. We can use the metaphor of a horizon of autopoietic gravity to explain this. The decision-making process, fuelled by the distinctions of the five dimensions, acts as the force that can propel a project beyond the autopoietic horizon of the organisation. The distinctions on the five dimensions set a process in motion that generates question of existing decision premisses and programs, the construction of and finally settling on alternative premisses and programs. Whilst there is a great deal of contingency - in other words which are the relevant distinctions and how significant should they be depends on the situation – we should expect to find a statistical relation between overall level of distinction and the probability of projects functioning as an autopoietic system.

Secondly, any project, due to its nature of being a project, will to a degree put the existing decision premisses and programs under pressure. For example, because outside contracted parties become involved, or the execution involves a field of particular expertise that is alien to the organisation, or the deadlines for delivery are exceptionally shortened to compensate for earlier delays. To continue the metaphor, an organisation-bound project can at times approach the gravity horizon. The organisation may not want to allow the project to pass the horizon, by simply accepting exceptions, modifying the premisses and programs or stretching the flexibility that these constructs anyway have, or by intervening into the project.

Now that the role of the decision-making premisses and programs is explained, I will deal with these constructs in more depth. This creates the necessary context needed for the discussion of the means of governance later in this paper.

4.3.3 Decision-premisses.

Decision premisses are only useful if they can be structurally applied to decisions of some sort. Thus, there is necessarily a swap between complexity and reach: the reduction in

complexity enables that the premise can serve for a multitude of other, future decisions (Luhmann, 2000a, p. 223).

Decision-premisses can be divided into two groups: self-referential decision-premisses and hetero-referential decision-premisses, according to whether the organisation as an observer attributes the root of the decision-premise to itself or to its environment. There are two kinds of self-referential decision-making premisses: premisses that are themselves based on decisions, Luhmann calls these decisions planning (p. 230), and decision-premisses that are not based on decisions, Luhmann calls this organisational culture (p. 241). Planning must accomplish the coordination of decision-premisses. Luhmann argues that organisations create positions with the objective of facilitating this planning (p. 231). Although decision-premisses are continuously actualising, since they are part of a network of premisses and associated with positions, there are limits to the extent and speed they can be changed. The organisational understanding and acknowledgement of intertwined premisses, that whilst working with certain premisses regarding a certain decision, there are other premisses dealing with the other decisions accounts in fact for the value of decision-premisses lies with (p. 239). It can therefore be understood, that already for this reason only organisations may have to install projects, i.e., to set up a temporary unit rather than interfering in an existing setup.

Organisation culture, representing the total of non-decided decision-premisses, develops spontaneously. It is mostly fed by the informal organisation and operates by its implicit presence. With the notion of organisation culture being the realm of decision-premisses not based on decisions, the resistance organisations show against planned change can be seen in the light of planned change only affecting the decision-based premisses, whilst not implying many others (pp. 241-249). The impact of organisation culture on a project is quite unpredictable.

The need for decision-premisses stems from the re-entry mode of autopoietic systems. The operationally closed autopoietic social systems need the re-entry of the form system-environment in order to uphold their relations with the environment and their own autopoiesis. This re-entry causes a bipolarity, an undetermined oscillation between self-reference and hetero-reference. The decision-premise stabilises this oscillation, and the uncertainty in the plane system-environment can be orthogonalized into the plane time, with its two, not-actual horizons of past and future. The actual orthogonalization is the

decision, by synchronising past and future and selecting a future course, which is embedded in the uncertain future. With decision-premisses the decision-making can be checked on two levels: the level of what is actually happening, as well as the level of the decision-premise leading to (un)intended results (p. 224).

Through the operation of decision-premisses so-called *double closure* of the system is achieved: closure on the level of decisions and closure on the level of decisions on decisions. This leads to certain reflexivity of the system and literally forces autonomy. Luhmann explains that a system can only differentiate from its environment when it can decide on the coordination of decisions, i.e., can regulate its regulation. In absence of this, the system would be dependent on an external signal to prompt it to do something differently (p. 229). This holds logically for the genesis of autopoietic projects as well. Their increasing autonomy runs over the coordination of coordination, i.e., the extent to which the project itself decides on its decision-premisses.

Next to self-referential premisses, hetero-referential decision-premisses exist. Luhmann designates these with the term *cognitive routines*. Cognitive routines are standardised, readily accessible pieces of information regarding the environment, they represent the essential notions on how the world around the system works. Cognitive routines develop along with the practice of decision-making in the ongoing oscillation between self- and hetero-reference. The system does not treat cognitive routines as an organisational artefact but bestows them with “reality credit”. Self-referential premisses are embedded in cognitive routines and could not even exist without them (p. 250-252). The cognitive routines of an organisation are in a symbiotic relation with decision-premisses: premisses cannot develop without a base of cognitive routines and cognitive routines will disappear if not applied in decision-making. With increasing distinction between the project and the organisation only the more general cognitive routines (common sense) will retain relevancy for the project. Without a sufficient basis of cognitive routines, a project will not be able to develop proper decision-premisses, it will therefore have to create or takeover some specific, sensible cognitive routines on its own behalf. An importance secondary consequence is that an autopoietic project will also have to develop cognitive routines that relate to and describe the organisation, as the organisation will not have cognitive routines on itself available (cognitive routines are by definition hetero-referential). This introduces the considerable degree of contingency in the relation that develops between the project and the organisation.

4.3.4 *Decision-programs*

Luhmann distinguishes between two kinds of decision-programs: input-oriented programs – the *conditional programs* - and the output-oriented programs, the *purpose programs*. Conditional programs occur in the form of: (only) if – then. Luhmann points out, that this program is rooted in the past, as it requires something to have occurred and been verified in order to be triggered. This makes the conditional programs suitable for a high level of specification. Although a high level of precision is possible, usually this is not how conditional programs are devised. They leave a certain indeterminacy on the if-side, there is room for interpretation, as well as on the then-side, the decision is not defined in all aspects. Adaptability of these programs is also enhanced by complementing them with rule-exception schemes. These schemes of course ask for a separate evaluation before the decision can be made. The required decision-making capacity exponentially increases when more indeterminacy and exceptions are allowed. Purpose-programs occur in the form: goal – means. These programs are future-oriented and hence surrounded with uncertainty. In their standard operation, they are usually connected to conditional programs. The alternatives that can come into consideration have to be contained, because they operate on the default principle that everything goes, except what is specifically excluded. Additionally, some causality must be established between means and goals, for a workable purpose program to be created. In the purpose programs the perspective of risks appears, and within the framework of risk management the trade-offs between residual risks and costs must be made. Luhmann points out, that both types of programs contribute to the structuring of what he calls the memory of the organisations. This memory retains those aspects of decisions that can be used as a decision-premise and forgets everything else. The function of the memory is therefore not to store as much data as possible, but the reduction of complexity by means of continuous forgetting (pp. 261-275).

Since they are rooted in the past and their flexibility is limited, conditional programs of an organisation are the first that lose their relevance for projects with increasing distinction of a project from the organisation. Some of the organisation's purpose programs may be suitable or relevant for the project. Considering, however, that they are usually connected with conditional programs, which are less applicable to the givens of the project, this could lead to decision-making ambiguity in case they are transferred, or simply prevent the transfer of the program. Moreover, although purpose programs are

quite flexible, they are tied to certain causalities to be legitimate as a program, and it is precisely these causalities that may appear as problematic when observed from the perspective of an autopoietic project, for which these causalities are now hetero-referential and will oscillate with its self-reference.

On their behalf, projects do not easily add to the memory of the organisation. The learning capacity in projects, in terms of delivering programs for future use, in other situations, is quite limited (p. 267).

4.3.5 *Dynamic aspects*

Relevant for projects is Luhmann's assertion that organisations need adequate decision-making capacity, which is delivered through the programs (p. 277). Whereas the required decision-making is high in projects, the initial availability of decision-programs may be low, particularly for projects with significant distinction on the five dimensions. This leads to a situation of overload, which triggers the complexity reduction process. Faced with decision-making overload these projects will likely erase what has been taken over from the organisation and effectively perform a reset and speed up their course towards autonomy.

Luhmann addresses the particularities of projects, especially with regards to their heightened need for ongoing, renewed reflection. He attributes this to two causes. Firstly, projects are more in a flux situation in terms of where they are, compared to where they planned to be. Secondly, pointing out that projects cannot rely on the reflexivity that is built in the organisation, Luhmann states that "Reflection loops must be installed – partly to correct the normal functioning of the system memory, partly to run the project as a non-trivial, self-reflective machine and to ensure that information is constantly renewed." (p. 274).

4.4 **Luhmann and governance**

First of all, the term governance is absent in the works of Luhmann. In this context, Luhmann applies the concept of steering (*Steuerung*) when one system actively tries to direct another system. When it comes to governance, Luhmann has a specific view, which is generally known as his "steering pessimism". The fundamental limitation to steering lies in the autopoiesis of social systems. Systems cannot determine each other, can only "massively irritate each other through structural couplings" (p.401). Luhmann differentiates between *trigger-causality* and *intervention-causality* in this regard (p.401).

It is conceivable that an external impulse triggers a specific internal response of the system and would consistently do so, but what happens after that depends on the actual state of the system itself and its autopoietic process in those conditions. The environment has no recourse on that. So even with a trigger-causality, the lack of throughput causality will still leave the final outcome unpredictable. Luhmann makes an important provision, by pointing out that organisations can exchange steering-oriented communication between each other. Nevertheless, the autopoietic limitation still holds (p.402). According to Luhmann, organisations may actively pursue close, or even “symbiotic” relationships with other organisations to be able to cope with a turbulent environment. He stresses however that “although the system-system distinction may enhance the system-environment distinction, it cannot replace it” (p.410).

So far it can be concluded that a world of autopoietic organisations offers little room for governance that produces results matching the intentions of the governance intervention. Outside their boundaries, organisations are confined to exchanging steering-oriented communication and pursuing close relationships in turbulent environments. In the next section, I will argue that it is therefore necessary to differentiate between the steering of organisation-bound and autopoietic projects. I will also address the question whether effective steering of autopoietic projects is possible, and if yes, where are these possibilities located?

4.5 Governance of projects

A project can be viewed as a protective measure of an organisation against undesirable complexity increase: the complexity that arises is solved within a dedicated unit, the project. Luhmann views such differentiation as the introduction of relational selectivity and coins the concepts of simple complexity and complex complexity to illustrate this. Simple complexity refers to the situation where most elements of a system interact with each other, complex complexity marks the case when more selective and contingent patterns become necessary (p. 173). The relation between a project and the organisation is therefore also based on selectivity and contingency which is captured in the rules and process for the steering of projects.

4.5.1 *Two modes of relation*

As stated earlier, I support the approach of Turner (2020a, 2020b) that links project governance to decision-making in projects. The framework that organisations use to steer their projects can most accurately be seen as performing the task of “managing project-management” (Too and Weaver, 2014).

Now, the setting in which this task of *managing project-management* is performed, is qualitatively different for an organisation-bound project and an autopoietic project. This qualitative difference of setting critically influences the impact that the *managing of project-management* may have on the decision-making processes, and what are potentially effective means for *managing project-management* for each of the project types.

In the case of an organisation-bound project, there is no autopoietic segregation between the organisation and the project. An organisation-bound project is a differentiated unit that is confined by the autopoiesis of the organisation. Therefore, from the position of the organisation both trigger-causality and intervention-causality are available. The organisation has a higher degree of recourse on the decision-making process as it occurs in the projects.

In the case of an autopoietic project, the organisation loses a great deal of its recourse on the decision-making process of the project. The decision-making process of the project is operationally closed, and from position of the organisation there may be trigger-causality but no intervention-causality. Apart from this limitation, there is another one the organisation is faced with in the case of autopoietic projects. I explained earlier that autopoiesis of an organisation, in fact the recurring making of decisions, is upheld by a constant oscillation between self-reference and hetero-reference. Exercising the authority that the organisation is endowed with vis-à-vis the project, may cause that hetero-referencing crowds out self-referencing, and thus distort the autopoiesis of the project which will negatively affect its functioning. Summarising, when steering an autopoietic project the organisation is confronted with (even) more challenges compared to an organisation-bound project.

I therefore differentiate between two modes of *management of project-management*.

- *Management mode* in the case of organisation-bound projects
- *Governance mode* in the case of autopoietic projects

The term *management mode* illustrates that *management of project-management* in this case refers to one entity acting on another entity in the same (autopoietic) system. From a social systems perspective, this can be considered as management activity.

The term *governance mode* illustrates that managing project-management in this case refers to one social system steering another social system.

In distinguishing between these two modes, we restore the qualification which is at the heart of the agency theory of governance, which locates the governing entity *outside* the governed entity. This starting-point of agency theory was abandoned in the concept of project governance as it emerged in the past two decades, which focussed on the shell-activities of the organisation around its projects. The proposition that I make here, is that these shell-activities are either management-type or governance-type depending on whether they are directed at an organisation-bound project or an autopoietic project.

The literature on project governance has documented the available means and measures quite extensively. In the next section I will focus on the means that are available for the steering of autopoietic projects. This type of project presents the greater challenge and requires more diligence from the organisation. The particularities of this have not been addressed in the literature on project governance so far. As the relation between the organisation and the autopoietic project is a governance relation in the classical sense of the agent theory, I will simply use the term (project) governance for what is in full the governance mode of the management of project-management.

4.5.2 Impacting on autopoietic projects through governance

I will structure the discussion on governance for autopoietic project by applying two classifications. The first one relates to what governance should achieve as for its impact on the decision-making in the project. I will call this the *area of concern*. The second classification refers to how the governance is mediated. I will call this *platform*.

Area of Concern. The impact of governance on project performance concerns on the one hand the quality of decision-making in general, i.e., facilitating that decision-making optimally contributes to preventing avoidable costs, avoidable wastes, and quality loss (Turner, 2020a); on the other hand, it concerns preventing drift of the project away from the organisational objectives connected to the project, as a result of sequence of decisions.

Platform. There are two principal platforms through which governance is mediated. Firstly, providing context for decision-making; this context can either exist as uniformly applying to projects, e.g., a procedure or a manual, or can be specific to a project and even develop along with the project. Secondly, acting on the decision-making “real-time”, e.g., the communication and discussion around decisions as they take place; it should be noted, that if a governance entity participates or contributes to an actual decision this remains a decision within the recursive “operationally closed” process inside the project of which the governing entity is not a part. In Luhmann’s wording again, trigger-causality does not guarantee intervention-causality in the case of autopoietic projects.

Using these classifications, we can construct a governance matrix as shown below. The numbers in the cells refer to the next paragraphs in which the particular cell will be discussed.

Figure 3. A matrix for means of governance

		<i>Platform</i>	
		<i>Contextual</i>	<i>Decision interaction</i>
Area of Concern	Quality of decision-making	<i>5.2.1</i>	<i>5.2.3</i>
	Preventing drift	<i>5.2.2</i>	<i>5.2.4</i>

Source: author

I will now discuss the possibilities and limits for project governance that exist within the Luhmannian framework. To do that, I will rely on the work of several scholars who have made efforts to somehow compensate for the built-in steering pessimism in Luhmann theoretical framework.

4.5.2.1 Area of concern: quality of decision-making / platform: contextual

Willke (2005, 2014) coined the paradigm of contextual steering (Kontextsteuerung), which builds on Luhmann’s notion that it makes no sense trying to directly influence autopoietic systems. Consequently, steering should be directed to influence contexts, and organisations should work from decentralised and non-hierarchical models. In case the environment, or a relevant system in the environment observes a negative difference at a particular system, the observing system in this environment should not exert direct intervention in the observed system, as this would endanger its autonomy. However, it is

possible that the observing system in the environment of the observed system sets context conditions in such a way that the observed system selects its options from the point of view of the greatest possible environmental tolerance and compatibility (2014, p. 101). The context that an organisation can provide to a project concerns resources, norms, rules and regulations, routines, know-how, technology, and infrastructure. Naturally, all of these are vital to the success of any project to some extent. However, the more distinct the project is from the organisation, the less the organisation will have to offer. For autopoietic projects, there is reason enough for “steering pessimism”. On the other hand, if one would give up contextual steering, project governance would stand almost empty handed. How can an organisation realise a contextual steering of which at least some desired impact can be expected? Let us first look to resources. Here, much more than the plan-actual reviews that are part of normal project practice cannot be done. The discussions around budget and staff increases are usually one-sided. Governance should be a level playing field where both the governing party and the governed party are exposed to having to argue on their own behalf (Baecker, 2019). In other words, as much as a project must convincingly argue for additional budget and time, the organisation must convincingly argue why the planned allocations are realistic.

An organisation can of course make and should make rules, regulations, and processes especially for the conduct of projects. These will only come alive within the project and given the fact that the project will have its autopoietic production, it is uncertain how these regulations and rules will be used within the project. But this is just one side of the issue. On top of this, any learning or any practice that will develop around these rules and regulations will stay within the project and will most likely disappear when the project is completed. This is something that Luhmann also points out. Luhmann talks about the high “rate of forgetting” that goes with projects. He brings up the question whether organisations have a “narrating, story-telling culture” (Luhmann, 2000a, p. 273). Indeed, it makes much more sense to direct this part of project governance to the organisation rather than the project itself. The crucial element is that experiences are shared, that staff from different projects takes part in meetings which are not about that each project concisely presents itself, but about sharing experiences. The building of organisational memory is closely tied to persons. It also underlines the necessity of moving staff across projects and developing career trajectories for project-related staff which is increasingly regular practice in professional organisations.

Mostly, however, should contextual steering take the form of stimulating the reflexivity of the project, particular in the early phases of the project when the self- and hetero-reference are needed to build up the adequate decision-making premisses. This will take the form of intense discussion between representatives of the organisation – be it project owner, steering committee, or expert staff – and the project team. Such discussions may be an effective form of steering if they work from the proposition that the project is autonomous, and the goal is to make the project team reflect.

4.5.2.2 Area of concern: preventing drift / platform: contextual

One can provide autopoietic projects with water but not force them to drink it. Still, to hold up their basic oscillation the projects will have a continuous thirst for information from their environment. Buchinger (Buchinger, 2007) elevates the point that autopoietic systems display openness towards their environment as a means for survival, these systems constantly scour their environment for impulses. The openness towards the environment is necessarily connected to the self-reference of a social system, which is the condition for maintaining its identity. The organisation is just one system in the environment of the project though, and secondary to the environmental information directly connected to the actual tasks that the project has to perform. The establishment of structural couplings between the organisation and project is the vital part here, as this may allow incoming information to resonate within the project. A structural coupling between the organisation and a project refers to something which is deemed reliable, predictable, and beneficial for both organisation and project. It is available anytime when the organisation and/or the project needs it. Structural couplings produce consistent connection-points for both the organisation and the project. As such, they support the autopoiesis of both the organisation and the project. Evidently, that this severely limits what can act as a structural coupling between the organisation and the project. Moreover, it underlines that any one-sided steering effort by the organisation, whether that is done with the intention of benefit for the project or not, will have no chance to serve as a structural coupling and hence will not evolve as a base on which receptivity of the project can foster. In terms of project governance, structural couplings can only take the form of, and must be limited to very basic, standardised occurrences. These can be in the form of reports, meetings, or procedures. The ultimate benefit of these means is to be sought in the fact that they will keep the relationship between the organisation and the project open. There should be a perceived benefit for both sides. For example, a steering committee

meeting should not have as the main purpose to bring the members up to speed, but also to provide recognition, support, and consent for the project. Maintaining alignment is a result of the outcome of numerous decisions in the project's autopoietic process, these cannot be individually tracked. Structural couplings produce consistent connection-points for both the organisation and the project and are the best means to secure alignment.

4.5.2.3 Area of concern: quality of decision-making / platform: decision interaction

The notion of Luhmann that governance should be directed to differences and not to the system itself (Luhmann, 1997), can find useful application in the micro-environment of projects too. Firstly, if governance is focused on differences, this can structure the governance in terms of content. An agreement can be made which *differences* will be subject of governance. Outside observers, like steering committees, tend to wanting to know "what is going on in the project" with the hope that once they know this, they can get a grip on the project. Now this is exactly what is not possible, for the reasons that are extensively set out in this paper. Obvious differences one can think of are differences on variables of the project triangle. Although indispensable, these would not bring any steering effort very far, very principally because the realism of planning most often develops only in the course of a project. Differences should ideally extend to decision-premisses, this would enable a more targeted steering. Project governance may be more effective if the selected differences are overlapping with structural couplings between the project and the organisation, in this sense the organisation should have something "to offer". For example, if one of the observed differences concerns the updating of the risk register, governance can be effective if the organisation can make temporary resources available to reduce a difference. Generally spoken, taking differences as an entry point for governance will keep governance actors at bay and therefore hold back any management-mode intervention into a project, which will most likely be harmful for the project.

Trust belongs here as well. In Luhmann's analysis of organisations, trust is a vital factor in the cooperation between organisations, it enables organisations to uphold their boundaries, and hence their internal processes, whilst trust serve as base for checking each other references and hence makes joint complexity reduction possible (Luhmann, 2000a, p. 408 ff). The function of trust is to keep options for decisions open, without trust

the choice of decidable possibilities implodes (Luhmann, 1988). This is particularly important when no decision premisses are available or the organisation and the project have deviating decision premisses. In this case trust creates a reference that enables a decision that takes a wider range of, probably also more risky alternatives into consideration. In instances of critical decisions that may have a major influence on the course of the project.

4.5.2.4 Area of concern: preventing drift / platform: decision interaction

Following the governance model of Baecker (2019), project governance should follow a somewhat paradoxical approach by on the one hand putting forward truly clear instructions and underlining the legitimacy of these instructions, but on the other hand making the governance effort fully open and transparent to criticism. This touches on the notion of governmentality. Du Gay poses that governmentality “create(s) a distance between the decisions of formal political institutions and other social actors, conceive(s) of these actors as subjects of responsibility, autonomy, and choice, and seek(s) to act upon them through shaping and utilising their freedom.” (Du Gay, 2000). Müller (2017a) defines governmentality in the context of projects as the mentalities, rationalities, and ways of interaction, chosen by the governance roles. The reference to the possibility of criticism and how this can be effectuated, should therefore be part of any project governance framework.

Most of the decision-making that determines the occurrences of avoidable costs is highly intrinsic to the project, as this is typically a sum of many small decisions. In case of tactical decisions - one can think of decisions that involve a wider stakeholder evaluation, or a decision to sink costs to prevent worse - a notion put forward by Blendel is of value (Blendel, 1993). Blendel reasons that communicating systems are in a constant search of making self-reference meaningful vis-à-vis hetero-reference. This can in effect synchronise the selectivity that shapes their autopoietic processes and make the systems act in a coordinated manner. Blendel argues, that it is the perceived rationality of the other system that is the enabler of this intersystemic coordination. Projects will perceive the interest of the organisation to exercise project governance most likely as rational. If the channels between the project and the organisation, and what is conveyed over these channels, are deemed rational by the project, this may penetrate the *eigenselectivity*, that is, the organisation-specific selectivity built into the autopoiesis. This offers an opportunity for steering but does not provide any guarantee for the result of any steering

effort. Relevant is that the opportunity for steering prevails as long as the relationships are deemed rational. In other words, the reflection of the governance actors is crucial, because they should be aware whether their efforts are being perceived as rational by the project or not. This implied coordination may be a factor in preventing drift of the project away from the organisation's goals. Also Baecker sees the reflexion of the governing entity as a condition sine qua non: "Governance is a system, which would not function without the reflection on the own responsibility for a system coming into being." (Baecker, 2019, p. 3)(translation author).

The discussion above can be summarised in the matrix that was introduced earlier

Figure 4. Means of governance allocated to governance dimensions

		<i>Platform</i>	
		<i>Contextual</i>	<i>Decision-making</i>
Area of Concern	Quality of decision-making	<i>Context steering, project memory, reflexivity</i>	<i>Trust Governing on differences</i>
	Preventing drift	<i>Structural couplings</i>	<i>Governmentality, and openness to criticism Perceived rationality</i>

Source: author

4.6 Discussion and conclusions

4.6.1 Contributions to the field

Applying Luhmann's theory of organisations results in several relevant contributions to the study of project governance.

The project concept. The concept of autopoietic organisations was so far not systematically applied to projects. Applying this concept we can discriminate between organisation-bound and autopoietic projects, which relate fundamentally different to the organisation. This, on its behalf greatly affects what is available for the steering of projects, in other words, for the management of project management. When research is conducted that is based on samples of projects, it is crucial to know which type of project is represented in the sample. A mixed sample would, without further considerations, most likely produce unequivocal results.

Distinction matters. I argued that when studying projects in relation to project governance, it is key to pay attention to the distinction between the organisation and project. This distinction drives the eventual emergence of the autopoiesis of a project. The study of project governance did not apply this perspective so far. The notion that the differentiation between the organisation and the project influences the modalities of their interrelation is also discussed by Pemsel et al. (2014). Sydow et al. (2004) extensively enquire the tensions that this differentiation causes in the embeddedness of projects in the permanent organisation. However, the project distinction concept proposed here is more radical: project differentiation may exactly lead to a situation in which a project is no longer embedded in the organisation.

Foundation in decision-making. The model presented in this paper starts from the foundation of the project process, i.e., the decision-making, and argues how governance may be steer decision-making. This approach is similar to that of Turner (2020a, 2020b) - which was an innovation to the field in the first place - with the difference that, by applying Luhmann's theory of organisations, the model drills down to the level of the decision-making itself.

Management of project-management. The term "management of project-management" (Too and Weaver, 2014) is highly accurate one, more accurate than the term project governance in fact. This paper makes the proposition that organisation-bound and autopoietic projects are each associated with their own mode in the management of product-management. I argued that in the *governance mode* the organisation faces additional criticalities and limitations compared to the *management mode*. This opens up a completely new research perspective of studying the governance of autopoietic projects, as well as differences with steering organisation-bound projects.

Governance of autopoietic projects. A framework that offers a functional connection between the operational process of a project and the practice of project governance, was so far not offered by the dominant approaches in the field. This paper outlines such a model for autopoietic projects. By structuring governance means and measures according to their concern with regards to the decision-making of the project, as well as according to the way of their mediation, this functional relation between governance practices and the decision-making process as the elementary operational process was established.

4.6.2 *Discussion of earlier research*

To close the discussion part of this paper, I review the model put forward in this paper in the light of several important research contributions. Before that, a comment is to be made. So far, the empirical research and conceptual frameworks on project governance have never applied a differentiation between organisation-bound and autopoietic projects, whereas I argue that this differentiation is vital for understanding how an organisation can steer its projects. Hence, the conclusive value of any reference to previous research is quite limited, as it is undetermined whether the projects, which were the subject of the research, concerned (mostly) organisation-bound or autopoietic projects. Still, I argue that it is valuable to see whether the outlined framework for governance of autopoietic projects resonates with some of the more significant conclusions from earlier research. Autopoietic projects have quite specific manifestations of reacting to steering, which can be observed and as such will have been observed by the research of projects.

Müller (Müller, 2017b, 2019) found evidence for a significant relation between project sovereignty and project success. The potential destructive effect that direct intervention into autopoietic organisations can have, was addressed by Teubner and Willke (1984) (1984), and Willke (2014). Naujoks (1994) adapted this view and elaborated the concept of context steering for the corporate sphere. The autopoietic projects need to maintain their autopoiesis as it sustains the identity and boundaries that are vital for their functioning. Lack of sovereignty points to a dominance of hetero-reference over self-reference, which will hamper the recursiveness of the decision-making. Loss or partial loss of recursiveness will cause loss of meaning and consequently interpretation issues, as well as confusion in decision premisses. We can expect that the quality of decision-making deteriorates, and the project performance will suffer. The perceived sovereignty of project managers that Müller and his associates found in their research, indicates a healthy, balanced autopoiesis.

Müller et al. (2014) researched the positive role of trust in project governance. Müller (Müller, 2017b) provided also a concise literature review on this subject and concludes that trust positions an important factor in the acceptance of project governance. I stated earlier that the function of trust is to keep options for decisions open, without trust the choice of decidable possibilities implodes (Luhmann, 1988). This is particularly important to provide a sound base for decisions when no decision premisses are available or the organisation and the project have deviating decision premisses. In case of decisions

in critical situation a steering committee or a project owner, or even an entity beyond that, may want to participate or even strongly influence the decision. Looking from inside the project, these governing persons and entities are not part of the recursive decision-making process as it goes on in the project. In these cases, trust - as hetero-reference - is vital for accommodating the influence or interference that the organisation exerts on the project, in other words, trust will contribute to maintaining the balance between self-reference and hetero-reference. This implies that the decision will likely be productively integrated in the recursive chain of decisions, and the follow-up decisions will be more effective because of that. Based on the results of the 2014 research Müller concludes that a “freedom to act” is a prerequisite for a successful governance structure (Müller, 2017b, p. 175). Again, this points to the importance that (particularly autopoietic) projects need to be able to uphold their autopoietic operation, which boils down to maintaining a balance and a free movement between self-reference and hetero-reference.

The context that governance provides to a project is a key factor in the model that I presented in this paper. As was stated, several scholars in the Luhmannian tradition even argue that contextual steering is the only effective way for governance. Context steering will inevitably have a structural and a project-specific component. Structural because the governance will have to fulfil certain expectations from the side of the organisation, specific because there is a uniqueness to each project. Studies by Turner and Simister (2001) and Miller and Hobbs (2005), underline that project governance should adapt to the specific project context in order to be effective. Also, the time-dependence is addressed as an influencing factor. Regarding the structural aspects of context, a contribution of Locatelli and associates offers valuable insights (Locatelli *et al.*, 2014). Systems Engineering is a process-based comprehensive management-system for the full project cycle, which is multidisciplinary, suitable for complex environments and offers a comprehensive set of approaches, techniques, and tools. Systems Engineering is standardised under ISO15288. The authors argue, based on a review of project governance literature, that Systems Engineering can materially contribute to the improvement of project governance and foster a more holistic approach towards projects. This conclusion is very much in line with the model presented in this paper. Systems Engineering (SE) is on the one hand structural, as it is standardised in terms of the processes involved and the way these must be structured and documented, on the other hand it is specific as a project will have to tailor it to reflect its own operation. Once

implemented, SE typically provides decision premisses. In addition, it provides transparency towards the organisation and increases the opportunities to build up project memory. Because the SE framework will have to be in place fully fledged when a project moves into execution, it stimulates reflexivity, as key project staff will have to reflect on how the project will want to operate. Lastly, it offers great opportunity for governing on differences, of which was stated that this is to be directed to decision-premisses rather than outcomes. SE can be connected to a maturity model (ISO15104). Governance on differences can then take the form of monitoring the progress on process maturity.

Lappi et al. (2018) discuss the governance of agile projects. They show that much of the steering ambition is relinquished in the agile approach, as the focus is the autonomy of projects. Pivotal in this regard, also in terms of decision-making, is the inclusion of the project owner or customer in the project team. The research challenges the idea of predetermined governance dimensions. The goal-based steering is transformed by the scrum practice, which can be regarded as a periodic self-reference / hetero-reference exercise. The analysis indicates that in agile projects context is easily defined too narrow, thereby limiting the scope for contextual governance, which the authors see as a point of attention.

The intent of this paper was not to suggest new instruments of project governance. Project governance research has sufficiently described and analysed the means and methods employed by project governance, or better said, that go under the flag of project governance. What is less known, or at least surrounded by a high level of contingency, is why project governance works out well, and which are the relevant ingredients of the overall governance framework. This often results in suggesting a maximalist approach to governance. Within the model that I outlined this paper, such an approach may cause an overload of hetero-references, and this could very well hamper the project rather than supporting it. The quality of governance practice may manifest itself in selectivity, and the granular framework of project governance proposed in this paper is intended to contribute to that.

4.6.3 Limitations

The conceptual model on governance of projects as laid out in this paper is grounded in the rigorous theoretical framework developed by Luhmann. Still, the foremost limitation of this paper is the lack of empirical validation of its propositions. The four foundation

blocks of the model – distinction organisation/project, organisation-bound/autopoietic project, decision-making process, management/governance mode of managing project-management – must be subjected, individually and in conjunction to empirical research.

A further limitation is that, whereas I defined two modes of the management of project-management, only for the mode associated with the autopoietic project a detailed analysis was made. Luhmann's organisation theory can equally be applied to what I called the management mode which is associated with the organisation-bound project. With such an analysis available, a more granular comparison can be made regarding the differences between the modes.

4.6.4 Directions for future research

The Luhmann-based approach to governance of project opens a wide field of research opportunities.

A first orientation concerns secondary analysis of previous empirical research, particularly such studies that provide clues regarding the five dimensions of distinction. On a post hoc basis the projects involved in the research could be classified as organisation-bound or autopoietic and from there the conclusions of the research could be re-interpreted.

A second line of research is directed to testing the notion that the level of distinction of the project determines whether projects operate as organisation-bound or autopoietic. This calls for a research instrument with the level of distinction can be qualitatively evaluated. This can then be used to establish whether there is support for the two modes that were proposed in this paper.

A third group of research would look at autopoietic projects in more detail, particularly how the decision-making processes evolve. We would expect to find intense struggle for control during the transition phase when a project is propelling towards autopoiesis. This should be fought out mainly in the field of decision-making premisses and programs. Relevant suggestions for communication research based on Luhmann's approach have been put forward by Cooren and Seidl (2020). A further research topic is the necessary redefinition of the relation organisation-project is when a project has become autopoietic. In such case study-based research the adaption of narrative analysis methods could provide valuable insights.

The matrix presented in figure 2 provides direction for focussed research into the means of project governance. For example, case-study based research directed to structural couplings between organisation and project: which are these couplings and how do they develop, what was their impact on the decision-making.

A possible fifth stream of research relates to the dynamics generated by the presence of non-organisation staff in the project organisation, in relation to emergence of autopoiesis of projects and the functioning of governance. As stated earlier, “membership” is a primary defining factor of an organisation in Luhmann’s theoretical framework (Grothe-Hammer, 2020).

Inter-organisation projects are of great interest when studying autopoiesis in projects. Generally, inter-organisation projects will be autopoietic organisations from the start. Of interest here is the referencing to the various project-owner organisations and the internal tensions this may cause. Furthermore, the impact of a singular dominant organisation, or a host organisation on the transition into autopoietic project (Kujala *et al.*, 2021).

5 PUBLICATION 2 -THE WORLD ACCORDING TO THE PROJECT

Abstract

The purpose of this paper is to address the communicative reality of projects, which has an organisational and interactional component. I argue that projects can either be seen as organisation-bound projects which are differentiated subsystems which progress along the decision premisses of the organisation, or as operationally closed projects with boundary-constituting decisions (autopoietic projects). These two types of projects operate with fundamentally different world constructs. The analysis of the case study accounts of four papers shows that with Luhmann's conceptual framework we can make a significant contribution to the explanation of "contextuality", the understanding of the role of interaction systems in the functioning of projects and organisations in general, as well as the modelling of the relational dynamic between organisations and their projects.

Keywords

Social systems theory, Project studies, Decision-making, Interaction systems, Autopoiesis, Project communication

Practitioner Points

The key to understanding projects is to understand their decision-making

The differences in perspectives between organisations and projects are often of systemic, rather than personal nature

5.1 Introduction

When we take the Manhattan Project as the first project that had a profound and lasting impact on the world (Shore and Zollo, 2015), it took the world about a half-a-dozen decades to elevate to the meta-level of projectification. Jensen et al. (Jensen *et al.*, 2016) frame projectification as the shift from the disciplinary society to the project society, which they associate with reversing the influence relation between activity on the one

hand and space, time, and relations on the other hand. In the disciplinary society, space, time, and relations were the ordering elements, whilst in the project society the activity itself is the ordering element and space, time, and relations act merely as contingencies for activities. Jacobsson and Söderholm go as far as positing a “homo projecticus” (Jacobsson and Söderholm, 2022). The authors argue that bracketing is a key mechanism for individuals in the projectified world to effectively deal with the multitude of temporal and factual contexts. The central concern is that impact on societies is mostly made through projects, projects are not the exception but the rule. Wagner et al. (Wagner *et al.*, 2021) argue that project management associations exert an influence on this projectification. These associations appear as rational-technocratic but are in fact highly normative. They do not always have a strategic orientation towards the requirements of society and corresponding stakeholders. The authors conclude that to “be effective, associations must anchor themselves better in society and act from its midst” (Wagner *et al.*, 2021, p. 11).

Niklas Luhmann’s sociological concept of the differentiated society (Luhmann, 2021c, p. 707 ff) can contribute to our understanding of projectification, when we draw on two fundamental aspects of the differentiated society. Firstly, the differentiated society has immanent steering limitations, due to the autopoietic nature of the functional subsystems (Buchinger, 2007; Luhmann, 1990, 1997; Van Assche and Verschraegen, 2008). The functional subsystems construct their own worlds (Van Assche and Verschraegen, 2008). Secondly, Luhmann argues that as the differentiated society advances, its decision-density increases. This causes the future to be evermore contingent, thus making again more decisions necessary (Luhmann, 2019c). The dominant role of organisations in societies is also cause-and-effect of the increasing contingency (Luhmann, 2000a). The fact that organisations increasingly resort to projects may find its cause in this increasing contingency as well, in the sense that only through projects they can respond effectively. At the same time, organisations - more exactly, structural couplings between organisations - are important to create (indirect) steering capacity in societies (Buchinger, 2007; Van Assche and Verschraegen, 2008). Projectification thus, from a steering perspective, brings up the question whether the project eventually did realise the intent that the organisation had when it initiated the project. This question has intensively been addressed in the project governance literature (Ahola *et al.*, 2014; Bekker, 2015; Cicmil and Braddon, 2012; Müller, 2009; Müller *et al.*, 2014; Turner and Keegan, 2001). In this

paper, working from the principles of Luhmann's theory of organisations, I will elaborate that the world views of the organisation and the project may come to differ, and this can result in the project not delivering the outcomes that correspond to the organisation's original intent. Framed in the context of societal steering: projectification nests a secondary steering limitation within the indirect steering through structural couplings between organisations, on a broader scale.

This paper is structured as follows. In the next section, concisely situated in the broader Luhmannian organisational literature on the one hand and the current challenges in project studies on the other, I will shortly review the work based on Luhmannian systems theory that is directly related to projects. The review shows that there has been limited attention to projects, and this gap by itself calls for scholarly work, both conceptual and empirical, to advance the Luhmannian contribution in this field. In section three, I will present a framework for analysing projects. This analysis draws on the duality of interactional and organisational communication in the total of the communicative reality of the organisation. It is centred around the extent to which decision premisses of the organisation can foster the progress of a project. I will sketch the circumstances under which a project that is functioning as a part (or differentiated unit) of the organisation may evolve into an autopoietic project. Section four deals with the research questions posed for the review analysis of four case study accounts. This analysis serves a preliminary empirical test of the framework outlined in this paper, which will be the subject of further field research. In section five, the results of these reviews are presented. The paper closes with a section of discussion and conclusions.

5.2 Luhmannian literature on projects

Luhmann's theory development on organisations, which started with his extensive analysis of formal organisations in the early sixties (Luhmann, 1964) and culminated in *Organisation und Entscheidung* (Luhmann, 2000a), which lays out an overall theory on organisations. The core of this theory is that organisations (re)produce themselves through an operationally closed, recursive process of decision-communications. Through this process organisations uphold the difference between themselves and their environment. It constitutes the boundaries with which the organisation can observe itself and refer to itself as system, and observe and refer to its environment (Grothe-Hammer

et al., 2022; Nassehi, 2005; Seidl, 2007; Seidl and Becker, 2006; Seidl and Schoeneborn, 2010; Tacke, 2019).

The field of project studies was oriented towards execution methodologies in its early stages, but gradually shifted its focus to understanding projects and their organisational aspects, and develop the theoretical background to accomplish this (Tekic *et al.*, 2022). There is a call for the advancement of underlying theory ((Geraldi *et al.*, 2020; Geraldi and Söderlund, 2018), and reflexivity as fundamental for theorizing (Geraldi *et al.*, 2021). At the same time there is increasing awareness of the need to study the actual project practice (Carlsen and Pitsis, 2020; Hodgson and Cicmil, 2016; Sergi *et al.*, 2020).

Luhmann's framework offers a magnificent potential for the study of projects and advance the field of project studies in the aspects mentioned above. Projects as temporary entities have continuous boundary dynamics and are decision-intensive (Kreiner, 2020). Luhmann's organisational theory provides a powerful lens to study this, given its very basic conception.

Dominantly concerned with the general aspects of organisations as social systems, Luhmann made only few, nevertheless quite relevant direct references to projects and the characteristics of projects. In his discussion on decision-programmes (Luhmann, 2000a, 2018) he explains that complex projects need particular planning and purposive decision programmes. He points out that most of these specific programmes are lost in time because project staff turns to new duties after completion of a project. Luhmann points out that a "narrative culture", institutionalised debriefings or involving experienced project staff in decisions on accepting/rejecting projects could be possible means to retain valuable knowledge (Luhmann, 2000a, pp. 272–273). Although he considers this forgetting of project experience as a cost, it should be put in the light of Luhmann's own notion of the reduction of complexity by means of continuous forgetting (Luhmann, 2000a, pp. 261–275). Since each new project is in a way unique, storing and actively retaining project memory, of which it cannot be said how and when it will be of any use, may just be too much of a burden for organisations that frequently have to deal with the variety that comes with new projects.

Luhmann addresses the particularities of projects, especially their heightened need for ongoing renewed reflection. He attributes this to two causes. Firstly, projects are more in a flux situation in terms of where they are, compared to where they planned to be.

Secondly, because of the relation with the organisation, touching on this point Luhmann states that “[r]eflection loops must be installed – partly to correct the normal functioning of the system memory, partly to run the project as a non-trivial, self-reflective machine and to ensure that information is constantly renewed.” (Luhmann, 2000a, p. 274) (author’s translation). Luhmann refers here specifically to megaprojects (Großprojekte) and points out that such projects need self-reference, i.e., establish autopoiesis. I will point out that it is not so much the size of the project but the distinction with the initiating organisation that is relevant when it comes to establishing autopoiesis. This is actually more in line with Luhmann’s theory as it works with distinction as the underlying concept.

Luhmann’s outline of differentiation inside systems does not specifically mention projects as differentiated units but is clearly relevant for projects though. He views differentiation within organisations as a means to reduce complexity. I argue that in this way a project can be viewed as a protective measure of an organisation against undesirable complexity increase. If projects are considered as temporary, differentiated subsystems of an organisation, it is important to follow Luhmann’s assertion that, whilst it only is concerned with a part of the system-environment distinction, the subsystem still reconstructs the system on its own behalf (Luhmann, 2021a, pp. 262–263). Therefore, the self-reference of a project overlaps with the self-reference of the system. Nevertheless, this internal differentiation calls for observational adjustment mechanisms, in order to maintain the integrity of the observations and perceptions of the various subsystems (Luhmann, 2021a, pp. 262–265).

There is a limited number of studies in the field of project research that apply a Luhmannian framework. In a recent paper, Lies (Lies, 2020) presents an interpretation of agile projects along Luhmann’s theoretical principles. The author asserts that a critical factor for success in agile project management can be found in the fact that agile project teams are closed systems, possibly using their own codes (binary schemata). Lies emphasises the agile team as observing itself as well as its environment, thus also fostering other philosophies of control inside organisations. Instead of aiming at radical shifts, agile projects rather enable continuous incremental development of an organisation. The observation of the closed-system agile teams itself turns into a source of change. Relating to the complexity-adaption of organisations, the author states that “[s]crum exemplifies the means of systems differentiation as a result of observation” (p. 1426). The fact that agile project management is associated with other orientations and

measures of control is generally acknowledged. Lappi et al. (Lappi and Aaltonen, 2017) show that much of the steering ambition is relinquished in the agile approach, as the focus shifts towards greater autonomy of projects. However, the argumentation of Lies that scrums and/or agile project teams are closed systems per se, since they are subsystems inside the organisation-system, is in my view questionable regarding Luhmann's framework. On the one hand, as stated above, differentiated units inside an organisation will still constitute the self-reference of the organisation, and as such are a part of the autopoiesis of the organisation. On the other hand, even if we treat the agile project team as an interaction system and thus attribute operational closure to it, we cannot simply explain the presumed benefits of agile management to this operational closure, as this is true for any of the interaction systems that continuously occur within any organisation. Still, and this is the real point in Lies' argumentation, the agile approach likely allows more room for interaction episodes that, if effectively tied back to the organisation, can contribute to the organisational dynamic. I will address the question when a project should be considered as a differentiated unit and when as a separate closed system in the next section of this paper. A highly relevant and insightful contribution was made by Grothe-Hammer and Schoeneborn (Grothe-Hammer and Schoeneborn, 2019). This research is situated in project-based organisations (PBOs) and investigates the migration of decision premisses between PBOs and the projects they initiate and execute, resp. have executed. The authors point out that this migration is limited in both directions. The authors conclude that "temporary organizations cannot deterministically influence the elements of the PBO, while PBOs have difficulties to adopt changes and learn from the temporary organizations" (p. 77). Grothe-Hammer and Schoeneborn attribute this to their assumption that the projects are operationally closed entities and thus the project and the PBO are environment to each other. Since we are talking about systems that are based on decision premisses, we can more precisely say that the authors claim that both the PBO and the project are organisations in the Luhmannian sense. This is where I disagree with the authors. As I will elaborate in the next section, in the Luhmannian terminology, projects can be conceived as differentiated subsystems or as organisations. This is not to say that none of the cases that the authors investigated concerned projects "as operationally closed organisations." The authors researched film production and consultancy projects, and in the case of the film projects, the information provided in the paper would show some support for that, whilst for the consultancy projects this seems

much less assumable. Whether a project operates as a differentiated subsystem or as a separate organisation, is a matter of affirmative investigation.

A case study analysis of Vazquez et al. (Vásquez *et al.*, 2016) is not directly based on the Luhmann-framework but is situated in the closely related CCO-stream. This study analyses how order-disorder-order sequences are transmitted through communications. The authors are not primarily interested in the project itself but chose projects because of the observation that while project “...endeavours are marked by conscious efforts to establish order and control, there is a constant need to grapple with contingencies” (p. 633).

5.3 A framework for analysing projects

Projects are referred to as temporary entities that are to undertake a specified endeavour (Turner and Müller, 2017). This implies that the concept project is not confined to the setting where the term ‘project’ is explicitly used and a ‘project manager’ is appointed (Hallin and Gustavsson, 2010).

In a recent paper, the author (Aal, 2022) laid out a conceptual framework for projects that builds on the relation between the organisation and the project. The foundation of this framework lies in the proposition that distinction between the organisation and the project may set in motion particular communicative and structuring dynamics. There are five distinction dimensions: output, know-how, time structure, human resources, and technology. In case significant distinctions develop, the decision premisses of the organisation may not suffice to support the progress of the project. In the time-dimension for example, organisations have created time structures for their communication and decision-making that essentially solve their time requisites. Here, we can think of the deadlines that are given for decisions or processing communication, or the cycle times of decisions and communication-exchanges. Projects may at some stage require faster cycles and shorter deadlines, and this would reduce the viability of the organisation’s decision premisses. As for the output, technology and know-how dimensions the question is to what extent the existing decision premisses (adequate decision-programmes, competence along the hierarchy, redundance in communication channels) provide the selection operations – which are the essence of communication and decision-making in organisations – which are needed to advance the project. Lastly, the human resources

dimension refers on the one hand to the extent external staff is allocated to key positions in the project, on the other hand to the extent existing positions as such or as proxies are of use for the project. Decision premisses are closely related to persons (personalised memory) and positions (Luhmann, 2000a, p. 201 ff). This concept of distinction dimension can be illustrated with the example of IT projects in financial institutions. Such organisations will typically have multitude of IT projects running, often resorting under a Project Management Office. Projects concerning the extension of functionality of specific modules of the IT systems, system adaptations for reasons of complying to changed regulations, maintenance projects are examples of projects that are associated with low distinction on the various dimensions. Typically, these projects appear as a pipeline of tickets and are administrated with project management and tracking applications. Thus, in terms of decision-making time structures, they can be well integrated. As far as the dimensions output, know-how and technology are concerned we can expect low to moderate distinctions. Though all these projects will have their uniqueness, most of them will resemble previous projects. Involving relevant staff across the organisation will ensure sufficient know-how, whilst new technology is usually not involved. In case external staff is involved, this is often recruited from a known pool of firms, who on their behalf are also familiar with the organisation, hence the involvement of external staff will not cause necessarily high distinction on the HR dimension. This is not to say that such projects are always easy, and no wrong decisions are taken. It implies that the existing, shared and acknowledged decision premisses mostly suffice to generate decisions with connectivity. So called Next-Gen IT projects are an example of projects that will go together with moderate to significant dimension distinctions. The implementation of AI-based applications, transition to next-gen core system modules and complex cybersecurity projects, amongst others, typically belong in this category. The involvement of external parties is higher and also often more in key roles. The technology can be new to the organisation. Such projects are not recurring, so familiarity with the output is lower in these projects. While the organisation will have the know-how to understand larger parts of these projects, they have significant blank patches as well. As the complexity of these project will often lead to bursts of decision-making needs, the time-structures of the organisation will be pressured at times. Finally, the (experimental) implementation of supercomputing, would be an example of a project associated with critically high distinctions on all dimensions. In this case the output is completely new and likely only partially known. The organisation has no familiarity with the technology

and hardly any own know-how. External parties are likely to be dominant. Decision-making patterns are unpredictable. Therefore, few of the existing decision premisses are relevant for such a project, mostly only the general common-sensical ones.

When significant distinctions emerge, the project may start to develop its own premisses, i.e., decision-programmes, communication channels, and positions. This will push the project towards the *horizon of autopoietic gravity*, which can be regarded as the systemic boundary within which the organisation can still retain the project in its own autopoiesis. Before I continue, the term of horizon of autopoietic gravity should be further elaborated. In organisations recursive mass builds up (in Luhmann terms: system memory and self-descriptions), that creates a recursive inertia. We can model communications as taking place in a recursive force field. This force field has a horizon, which expresses the limit of the recursive mass effectively (referentially) influencing communication. Luhmann treats the orientation of self-reference as variable (Luhmann, 2000a, pp. 47, 193–220, 275–278), but this is principally a variation in content. Inconsistencies with the system memory will be solved through adaption (p. 74-75). If we allow that the variability extends to the strength of the recursive force in particular situations, then, instead of treating the organisation system as a communicative monolithic, it is possible that changes in the communicative morphology develop. This conception offers in my view a purposeful analysis of transient organisation settings like project dynamics, relationships between organisations and subsidiaries, divisional relations, but also mergers and divestments.

Returning to the situation of a project facing the need to develop decision premisses to advance its own operations, the organisation has several adaptive measures to retain the project within the horizon: amongst others, it may accept new or modified decision-programmes (i.e., learning), or change the project staff, increase control, change the scope of the project, or even terminate it. In case these measures are not effective and the dynamic of the project effectively deciding about its own decision premisses reaches a critical level, a project “escapes” the autopoietic gravity of the organisation and forms a self-referential organisation system on its own. From that moment on, the organisation and the project are environment to each other. It is hypothesised that in their initial stages, projects are organisation-bound, after that some projects remain organisation-bound (as differentiated units) whilst others may transform into autopoietic projects. Inter-organisational projects are likely to operate as autopoietic projects early on as they do not

originate inside an organisation. In such cases, the presence of a dominant project owner organisation may be of influence and can still make the project organisation-bound, at least in its early stages.

A central issue is of course, how such systemic changes process-wise can be brought about. My central tenet here, is that it basically runs over interaction systems. Luhmann argues that an essential aspect of organisations is that they are able to feed the thousands of interactions that occur between the members of the organisation back into the decision-making autopoiesis of the organisation. This is made possible by the existence of decision-making premisses, that we can imagine as acting as a router to channel interaction communication into the recursive decision-making process. Luhmann actually speaks about the “miracle” that organisations accomplish, when he refers to their ability to adjust enormous amounts of interactions to each other (Luhmann, 2021c, p. 837).

Although the interaction systems form “within” organisations, they do not coincide with the organisation system, as they are themselves operationally closed in their communication. Moreover, they can eventually “usurp” the influence on decisions (Luhmann, 2000a, p. 25). Interaction (systems), although in principle ephemeral, can assume structural qualities if repeated over time, Luhmann uses the terms “eigen-states”, “eigen-developments” and “eigen-selectivities” (Luhmann, 2020b, p. 448). We can consider a project as consisting of members who operate (partially) outside the standard operational structures and channels of the organisation (otherwise it would not be necessary to initiate the project; in PBOs this will be habitual though). We can assume that over time this project will form an interaction system with such eigen-properties. Kieserling, building on Luhmann’s insights, extensively dealt with the subject of interaction systems within organisations (Kieserling, 1994, 1999). He reasons interaction systems as acting as a reservoir of adaption and flexibility for the organisation. Organisational overload and issues the decision premisses cannot handle are shifted-off into interaction systems. Interaction systems are simple in structure and are highly flexible in processing and changing themes. Thus they can come up with material that the organisation can use to adapt its decision premisses (Jäger and Coffin, 2011). Interaction systems can “solve” the problems that result from the formality of the organisation or feed them back as irritations (p.64). The flow of themes in the interaction systems is not made up of the themes of the organisation however, they always are the themes of the interaction system itself. In this sense, the interaction systems cannot be controlled by the

organisation, but organisations may condition them to a certain degree. Kieserling calls this technification of interaction systems (Kieserling, 1999, p. 191). Within this approach, interaction systems are seen from the interest perspective of the organisation and in the base case the interaction systems are ‘assisting’ the organisation.

Jäger and Coffin discuss intensively what happens if the interaction systems turn into conflict systems: they get stalled and do no longer provide the elasticity and flexibility the organisation could potentially benefit from (Jäger and Coffin, 2011, pp. 121–143). In my view, there is another function of interaction systems, namely, that under certain conditions they are able to catalyse the genesis of autopoiesis of a project. We can say that as long as the decision premisses still work as a proper router for a project, this project can effectively work within the organisation system, which is to say, constituting and contributing to the autopoiesis of the organisation system. However, if significant distinctions between the organisation and project emerge, the decision premisses are not an effective router anymore, this implies that the communications that occur in the project interaction system are in effect decoupled from the decision-autopoiesis of the organisation. Since projects are decision-intensive and their progress is based on decisions, the eigen-properties of the project as an interaction system provide the leverage to make some own decision premisses. When this occurs, the project is moving towards the horizon of autopoietic gravity. Normally this will not go unnoticed by the organisation. The decision premisses have alarm bells that will be triggered when some non-compliance is detected (Luhmann, 2000a, p. 319). Some typical examples are: someone who should have been included was not involved in the decision, information was used to take a decision that was not circulated outside the project team, the project team defends a decision just by referring to time pressure and unavailability of staff, etc. Of course, this is where tensions and conflicts can occur, also in the principal sense in which Luhmann positions the conflict dynamics between the various social systems (Luhmann, 2019d, pp. 22–24). The organisation will make efforts to keep the project within the horizon, applying some of the earlier mentioned retention measures, in order to effectively process the material produced by the interaction system. Should the router-function of the organisation decision premisses deteriorate further from the perspective of the project, the project will work increasingly with decision premisses of its own. The deciding on decision premisses triggers self-organisation (Luhmann, 2000a, p. 226) and will propel the project further towards the autopoietic horizon. This dynamic is reinforced

by the fact that projects are generally quite decision-intensive, a project will easily generate plenty of themes that contribute to this build-up. Another factor is that a significant part of the decision premisses the project gradually generates, are in fact parallel decision premisses and this parallel build-up does not necessarily trigger the alarms of the organisation. Decision premisses are distinctions and like any distinction, they have a marked and an unmarked side. If no crossing is made, the unmarked side remains the unmarked side, and then the organisation has little clue what is going on in the unmarked side. In other words, the project can make decisions, resp. develop decision premisses, of which the organisation may not observe that these should be decided upon.

The distinctions between project and organisation generate a new level of dynamic when these distinctions take the form of the re-entry of the distinction interaction-organisation into the project interactions. With this re-entry the distinctions are factually reified and serve as the basis for the establishment of increasing self-reference of the project, propelling it closer to the autopoietic horizon and possibly beyond. The determining feature of crossing the autopoietic horizon is that eventually the project decides on its own decision premisses. This constitutes the eigen-causality that enables (decision-communication) operational closure. It is not necessary, and in fact highly unlikely that the project detaches from all of the decision premisses of the organisation. From the perspective of the project, in order to pursue its objectives, there may be particularly good reasons to decide not to sever certain decision premisses. The essential point is that a self-referential momentum has developed inside the project, and the project will uphold boundaries to sustain that self-referential moment. For a third observer, there may be a partial merge in the autopoiesis of the organisation and the autopoiesis of the project, but system-technically this is not a merge but communication in the contact system (Mohe and Seidl, 2011) between the project and the organisation. To put the above into perspective: the gravity of autopoiesis principally causes interaction systems to work in the two ways that Kieserling describes. Still, in case significant distinctions exist between organisation and project, the decision-making urge of projects (they cannot pile decisions up) and in particular the teleologic nature of projects, are two factors that may give the project sufficient momentum to move beyond the autopoietic horizon.

The organisation constructs its world through its decision premisses. The world is the result of its decision history (Luhmann, 2000a, p. 216). The world according to a project that crossed the autopoietic horizon is therefore another world than that of the

organisation. When the above line of reasoning is accepted, it has the system-theoretical implication that a series of disparate reflective observations of an interaction system may enable the constitution of autopoiesis and thus world construction.

5.4 Research questions and methodology of case study review

The framework outlined in the previous chapter is the foundation for a theory-led qualitative longitudinal field research, which will follow several projects over the period of one year starting autumn 2023. The research will investigate the operational meaning of the five distinction dimensions for the communication and decision-making processes that occur in the project and between the organisation and the project.

As preliminary research for the above-mentioned field research, several acknowledged papers on case studies of projects have been critically reviewed using the theoretical framework presented in the previous chapter. Papers were selected that contain sufficient detailed information on what happened in these projects and that provide clues regarding the five dimensions of distinction. Four reviews are presented in this paper (see Table 1). This analysis is intended to yield basic insights into the validity of the conceptual model. Furthermore, it contributes to the operationalisation of the distinction dimensions, and investigative directions when it comes to dedicated field research. In the next section, the results of this case study review are presented.

The review of the case study accounts is oriented along the following research questions:

- 1) Based on the case study account, what inferences can be made regarding distinction on the five distinction dimensions?
- 2) Based on the case study account, what inferences can be made regarding decision premisses used by the organisation, resp. the project?
- 3) Based on the case study account, what inferences can be made regarding the organisation-bound or autopoietic character of the project?
- 4) Based on the case study account, what inferences can be made regarding the dynamic of the project as an interaction system?
- 5) Based on the case study account, what inferences can be made regarding the world of the project in relation to that of the organisation?

Associated with the research questions, the analytical framework predicts the following tendencies to be found in the case study review.

In case of no or moderate project-organisation distinctions, projects are more likely to use decision premisses that are shared with or acknowledged by the organisation; projects are likely to be of type organisation-bound; the dynamic of the interaction systems will be assimilative; the world views of the project and the organisation will largely overlap.

In case of high or critical project-organisation distinctions, projects are less likely to use decision premisses that are shared with or acknowledged by the organisation, and struggle between the organisation and project associated with decision-making is likely to be indicated; projects are likely to be classified as type autopoietic; the dynamic of the interaction systems will be divergent from the organisation; the world views of the project and the organisation may show deviations of significance.

Table 3. Short description of the four case studies

	Project	Basic topic of source paper(s)
1	Heathrow Terminal 5 (Brady and Davies, 2014; Davies <i>et al.</i> , 2009, 2016; Gil <i>et al.</i> , 2012; Gil and Tether, 2011)	Analysis of two megaprojects from the perspective of complexity, dynamic capabilities; trade-off and risk management with respect to adaption of innovations
2	Swedish rail tunnel project (Eriksson and Kadefors, 2015, 2017)	A longitudinal case study design phase of a major railway tunnel project regarding the usage and impact of heuristics
3	Real estate construction project in a Nordic country (Toivonen and Toivonen, 2014)	Case study analysis of a construction project which suffered huge cost overrun and the consequential changes in the governance relation between the parent and the project organisation
4	Implementation of CRM system in France (Beldi <i>et al.</i> , 2010)	Case study analysis of the implementation of a new CRM system in a French telecom firm. The study follows the various stages of the project, from inception to implementation and roll-out and pays particular attention to the reactions the project team encountered

Source: author

5.5 Results

Project 1 - Heathrow Terminal 5

The extension of Heathrow Airport with a new fifth terminal was a project of BAA (British Airports Authority), a state enterprise that was privatised in 1987. Given the number of external staff involved, the technical challenges, the pressured time frame, and external know-how involved, a megaproject like this is almost inevitably destined to emerge as an autopoietic project. I will argue that until the very end it actually operated as an organisation-bound project. This is equivalent to stating that the T5 project could rely on the decision premisses of the project owner organisation BAA, and there are three major reasons for this.

First, there was a very long preparation phase which lasted from 1989 to 2002, in which year the T5 project was formally kicked off (Gil and Tether, 2011, p. 421). During this period decision premisses and particularly decision-programmes could be firmly established. BAA devised a project structure such, that its decision premisses were in fact capable of handling the decision load. A differentiated unit was created, headed by an executive director who was a member of the executive board. Furthermore, BAA positioned the best of its own staff on all key decision and communication points (Brady and Davies, 2014, p. 28). This way BAA created a business unit of around 200 people, predominantly of its own staff and persons specially recruited for the project (Davies *et al.*, 2016, p. 33; Gil *et al.*, 2012, p. 456). Instructed by the CEO of BAA, who worked in manufacturing industry, the T5 unit abandoned the project-as-a-tabula-rasa approach and strived to “adopt successful lean production techniques found in automobile, retailing, and other high-volume industries to achieve an orderly, predictable, and replicable approach to project design and delivery” (Davies *et al.*, 2009, p. 114).

Second, the project owner assumed the cost risk, implementing an innovative cost-plus agreement closed with all contractors (Brady and Davies, 2014, p. 27). This logically implied that important decisions necessarily were routed through the decision premisses the organisation had available for this, and thus an essential part of the decision-making was tied into the recursive decision-making process of the organisation itself through the transparent governance structure, in which the operative T5 project board reported to the T5 Executive Board, which in turn reported to the BAA board (and had a linking pin with the BAA board) (Gil and Tether, 2011, p. 420). Time was another essential risk factor as

BAA had publicly committed to the delivery deadline. This decision-premise was consistently maintained when making decisions on change proposals or other factors that potentially endangered the schedule (Gil *et al.*, 2012; Gil and Tether, 2011). This shows how cost and time were clearly “BAA matter” and dealt through decision premisses that were essentially BAA’s.

Third, throughout its duration, the project relied heavily on written documents. These contributed strongly to the self-description (Luhmann, 2000a) of the T5 project organisation. Examples of this are the T5 agreement (the standard (sub)contractor contract, containing many contextual-steering parameters), the T5 handbook containing detailed project management processes and procedures, as well as BAA’s Continuous Improvement Project Process (CIPP). The CIPP was implemented in the preparation phase, but the approach continued during the project phase (Brady and Davies, 2014; Davies *et al.*, 2016).

As a result, the recursive decision-making of the organisation itself was upheld. Mention should also be made of the inclusive project culture that was established by BAA and strongly iterated during the course of the project, deviant behaviour was “brought back into line” (Davies *et al.*, 2009, p. 33). This resulted in a sense of identity of the project and contractor staff (Brady and Davies, 2014, p. 28), the identity in fact belonging to the organisation of the project owner. So, we can say that this sense of belonging to the project was in its effect a sense of belonging to the organisation of the project owner. This can be seen as reinforcement through interaction systems (informal culture).

Conclusively, we can state from a social systems perspective that the project configuration of integrated (sub)project teams operated within the boundaries of the project owner’s organisation as a differentiated unit. The world according to the T5 project was therefore the world according to BAA.

Project 2 – Swedish STA railway tunnel design phase

This project concerns the basic design phase of an urban railway project which took place in the period 2011-2014. The project owner organisation, Swedish Transport Administration (STA), no longer performs any construction work and does only little design work; its task comprises top project management, project managers, technical experts to supervise and review supplier designs, and administrative personnel. The case study account reveals little about the relation between the project and the wider STA-

organisation. Nevertheless, I will be able to make a statement on this relation, as I will argue that autopoiesis could not develop within the project, the project logically operated as an organisation-bound project by default. Moreover, I will argue that missing self-referentiality was the root cause of the problems this particular project configuration came to face.

Large parts of the design work were contracted to external engineering firms (Eriksson and Kadefors, 2017, p. 496). Significant for this project was that in the early design phase the project work was separated into two major categories: a technical block responsible for requirements, and a design development block. The first block comprised eleven small technical assignments, divided based on discipline, while the four larger design assignments in the second block were divided geographically. This setup was chosen in order to maximise the involvement of specialised firms (p. 496). An STA-expert (pp. 496-497) headed all assignment teams. Both the technical and the design assignment resorted under a technical, resp. design leader who reported to the design manager, who was a direct-report to the project director (all STA-staff). In addition, there were two coordination assignments staffed fully with consultants (p. 496). This rigorous split-up created a configuration of relatively small subprojects, in which each subproject was highly dependent on input from other subprojects and decisions from STA. The assignment teams were kept as small as possible. However, this limited the contact the subproject leaders had with project top management and other areas of the project (p. 498). The project was characterised by struggle for coordination and ensuring an adequate flow of information throughout the project structure. An example of this can be seen in the cooperation workshops: organising issues were brought up in Increased Cooperation workshops, but these were infrequent and included only a subset of consultants. The situation of frequent information hold-up was recognised by the project top management, and as a result, project staff was told to use existing meetings, talk informally directly to each other, and be more active in seeking the information they needed to perform their tasks. This was not effective however, and participants still experienced that the information did not flow as intended. As a result, the STA project top management started to communicate essential information more broadly, and eventually introduced lunch seminars involving all STA experts (pp. 488-500). During the course of the project, it was decided that the design content should be decreased (less detailed, limited to conceptual designs) in a move to reduce complexity and coordination of information. However, this

led to uncertainty on what should be the allowed minimum and maximum content (p. 489). Although many bottlenecks in coordination and information were perceived and voiced, no substantial changes were made in the project setup. Project staff, particularly the external staff, perceived they were very often involved in ad-hoc coordination work (p. 500).

Since the decision-making was evidently made in the STA organisation, this project can be classified as an organisation-bound project. The individual assignments can be seen as interaction systems and as a result, little formal decision-making occurred in the internal cycles of these subprojects. This severely limited the extent to which the subprojects could mutually adjust to each other, as they were lacking the decision-making capacity to do that effectively. This explains the great need for coordination that emerged during this project. The authors mention the lack of attention for this need for coordination (p. 489,499), but using my theoretical lens, the issue is not whether there was more or less attention to coordination, but rather that the chosen model required much more coordination to be able to operate, i.e., to uphold the recursive communication and decision-making process. The account indicates firmly that decision premisses were not clear for the project staff. The essence of decision premisses is that they are widely recognised and are undisputed, but this can only be achieved through intensive reflexive work. The project director mentioned in the interview that everyone wants to know everything and complained about the attitude “I don't believe it, unless I hear it from you” (p. 498). From the perspective of the project director this was a shortcoming of the project staff and an exaggerated need for information and confirmation without real added value. Using the social systems lens, it is about the establishment of system boundaries and creating self-reference, for which decisions about what communication belongs to the (decision-making) organisation and what does not, are essential. The fact that only a (varying) subset of persons participated in the coordination meetings implies that no effective reflexive activity to build self-reference occurred, therefore decisional autopoiesis could neither operate within the full project structure. Furthermore, the account that there were few formal occasions where project members evaluated and reflected on project organising, implies too that there was no reflexive activity to build self-reference. The authors discuss the routine-like use of heuristics as instances of organisational practice. One heuristic was, that the results should be “good enough” (pp. 501–502). This was a repeated message to consultants from the Project Director and

Design Manager. From my theoretical perspective, is it interesting to recognise the function of such a heuristic in this particular project setting: in fact, this was a move to limit the decision-making capacity that would need to be built, which must be understood in the context that there was an overburdened situation in the first place. The lion share of decision premisses that were brought to the project was contained in the expert knowledge and routines of a previous project. What was missing, were the governance-type of decision premisses, which with the integration and coordination problems that were created as a result of the fragmented structure (which was used for the first time) could have been addressed. STA itself had no clearcut decision premisses regarding the way of running a project, hence this was at the discretion of the project director, a fact that is underlined by the observation that the first and second project director had quite different ideas about the importance of integration in the first place (pp. 496, 498). We can speak thus of scattered decision premisses. Only at the very end of the project, when an end product had to be delivered, some integrations were inevitably made: closing of design reviews, connection between permitting and design (p. 500). The interaction systems were too much in the margin of the decision-making configuration and too scattered to be able to contribute to initiation of reflexivity. Scattered decisions went hand-in-hand with scattered observations. This can be illustrated with the account on the bonus system that was used in the project (Eriksson and Kadefors, 2015). A bonus system was introduced to foster innovation and creativity. The task to manage this bonus system was given to the Cooperation Group. As already said, only six external project staff could sit in on the Cooperation Group, less than half of the fifteen subprojects. The criteria applied were quite fuzzy, and less nominations were made than expected. After one year, the task of managing the bonus awards was taken over by the design management team of STA. Most of the awarded nominations were for cooperation rather than innovation (Eriksson and Kadefors, 2015, pp. 152–154).

An interaction system like the Cooperation Group, in the situated context of scattered decision premisses and representing, can hardly be expected to come up with a clear and transparent decision frame for defining the criteria for nomination and evaluating them. So, in order to get decisions, this had to be moved to the STA-organisation, where the overall project decision-making process occurred. During the project, most of the external staff had no clear picture of the nomination process. The assignments that were not represented in the Coordination Group said that the bonus system did not affect their

efforts in any way. None of the external staff stated that the bonus system had any influence on their way of working. Additionally, among the STA-staff on the project there were mixed views. Whilst the Project Director was relatively positive, the Design Manager was quite sceptical (Eriksson and Kadefors, 2015, pp. 155–156). These scattered observations of a system that is actually intended to foster common goals, could exist because of the lack of decision premisses and the incapability to build recognisable decision premisses, which in turn was caused by the incapability of the interaction systems to produce “material” to contribute to this.

Project 3 – Millbrook real estate construction project

The Millbrook project scope is the construction of a shopping centre in a Nordic country during 2010-2013. The project was awarded to a real estate and construction company. A particular division of the company was responsible for the execution of the project and the division assigned this task to a project team (Toivonen and Toivonen, 2014, p. 1362).

Within the chain client – construction company – project, the object of analysis is the relation between the construction company and the project. The relation between the client and the construction company is sketched as purely contractual, so the issue of organisation-bound versus self-referential is not relevant here. As for the relation between the construction company (as a PBO-like organisation) and the project, I will argue that the project was an autopoietic project, which is to say that the project organisation operated with its own operationally closed decision-making process. The case study account states that the project manager and his team formed a unity; the core team under the project manager largely remained the same and they shared similar values that had been enhanced over several years of working together, there was strong loyalty and sense of identification with the team (pp. 1364–1365). Moreover, relative distance from the subsidiary office further reinforced the strong unity among the team members. The project manager had the authority to sign virtually every document pertaining to the construction site, whilst the need for the division manager's presence on the site was limited to delivering ceremonial speeches. The authors therefore conclude that “...neither the top nor the subsidiary management had a meaningful or visible role in the monitoring of the site” (p. 1365).

The above-mentioned points clearly to the existence of a closed operational process of decision-making. The unity, the fact that the project employees trusted their project

manager, and because of that were loyal and identified with their project organisation, are all indications for strong self-reference of the project organisation in accordance with the autopoietic operation. Moreover, autonomy and empowerment were granted to the project team by the division organisation, which leads us to conclude that the parent organisation contributed to enabling this autopoietic operation.

The organisation-project relationship, in which the organisation was hetero-referential for the project, is illustrated by the observation that the project team was not particularly reliant on receiving the bonuses which were allocated by the organisation (p. 1365). The self-reference versus hetero-reference was manifested very sharply when it had become clear that the project was not going to be financially successful. The client was considered by the project team as failing to be a responsible client and this view of them as a common enemy initially strengthened project team unity. At the same time, the top management held the project team responsible for the serious budget overruns (p. 1365). The account furthermore states that the project team engaged in a sense-making process of the situation which led to instances of blame finding and scapegoating. The construction of an enemy and the scapegoating can be seen as distinction-generating means of sustaining self-referential mechanisms in face of threats. The reactions of the project team to the interventions of the organisation further illustrate the self-reference versus hetero-reference issue. The behind-closed-doors cooperation of the top management with the client amid an ongoing legal battle raised some intense informal discussions around the coffee table and corridors that were coloured with cynicism and disbelief. In the perspective of the project manager, there was a hidden agenda, and he was quite suspicious of the actions of the organisation (pp. 1366–1367). This indicates that the project viewed its interests as standing apart from the interests of the organisation. The worlds of the organisation and the project stood very much apart from each other.

The account of the project tells us that after a new CEO was appointed, the governance relationship between project and organisation changed dramatically. So far, governance interventions had been fairly absent, the organisation pursued a laissez-faire approach. The direct intervention made by the top management was a trigger particularly detrimental to the team unity of the project, which in the social systems lens tells us that the intervention compromised the autopoiesis of the project. As so far neither the top nor the subsidiary management had had a meaningful or visible role in the monitoring of the site, for obvious reasons, the new CEO opted for monitoring and tight supervision of

operations to close perceived information gaps. Top management initiated a recovery plan, prepared and implemented under the direction of an external consultant (pp. 1365-1366). This is a typical switch of governance approach in times of project crisis, in my lens it can be seen as an effort to "bring back" the project into the organisation and to create unified perspectives between the organisation and the project. Nevertheless, this severely compromised the autopoiesis of the project organisation: the atmosphere within the team was destabilised, the project manager was compromised as a person and in his leadership, a blaming game was set in motion. Thus, the respective world views did not consolidate.

The project was finally completed with a substantial loss and the overall conclusion was that the real mistakes had been made in the tender and contracting phase and the project team was not responsible for the great loss that was incurred. It was only at this moment that we can speak of a reconciliation of the world views of the project and the organisation. As a lesson learned, a new position for supervision of large projects was created, as a liaison between large projects and top management at the group headquarters. It is precisely the emergence of different world views that can be managed (to an extent) by such a liaison function.

Project 4 – CRM project at French telecom firm

This case is interesting because it follows a project from inception until implementation and roll-out (2001-2003). In my theoretical model, in the inception phase any project operates as an organisation-bound project, and under certain circumstances some projects emerge in later stages as autopoietic projects. I will show that for reasons in accordance with the model, this particular project operated as an organisation-bound project throughout its existence.

Projects like this will as their base case tend to be organisation-bound because the own organisation is the scope of the project, but still may emerge as autopoietic projects. In such relatively complex projects, involving both technological and organisational changes, "technochange" as the authors call it (Beldi *et al.*, 2010, p. 341), unexpected emerging perspectives necessitate both a detailed understanding of the dynamics of the organisational processes, as well as knowledge of the intentions of the actors and the IT characteristics. Such circumstances may function as a distinction, and the further course of the project then depends on whether the organisation has the decision premisses

available to handle the situation or can initiate the reflection that is needed to modify the relevant decision premisses. On the other hand, since these are “business projects” that are directly related to the business model - in this particular project even directly to market share and profitability - the autopoietic gravity of the organisation will always be strong.

As outlined in my conceptual model, several dimensions of distinction are ultimately responsible for the emergence of autopoietic projects. The account of this project provided several clues regarding the dimensions of distinction in this particular project. There was a low distinction on human resources: the central project team is composed of the project director, the change management director, senior users representing the CRM modules to be introduced (i.e., sales process national manager, national manager of customers’ claims process, national manager of direct marketing process) and the human resources change director. As for the technical IT scope, an internal unit was charged with the technical customisation of the CRM software and its adaptation to the needs of the end users, as defined by the project central team. This unit was affiliated to the central information system department. This too, points to low distinction on HR as well as low distinction on technology. The account mentions that ‘typical’ tools of IT projects were used in standard processes. Furthermore, it is stated that “the way the development of a software package evolves depends on a series of routines and accepted norms, which guide IS project management in our corporation” (pp. 344–345). This is indicative of low distinction on know-how and informs us that existing decision premisses sufficed. The case study account shows that the organisation and the project team were generally in agreement with their decisions, for example the key decision to implement only the frontend CRM (p. 344). An important characteristic of organisation-bound projects is that they, unlike autopoietic projects, are heavily dependent on the decisions of the organisation, and the timeliness of these decisions impacts directly on the progress of the projects. In this particular project, before the piloting phase, organisational and managerial problems appeared in unexpected ways, which were as a consequence difficult for the project management team to resolve. This is indicative of organisation-bound operation. Since the project team was linked to organisation-operation it could not proceed. Stress on decision-making occurred in this organisation-bound setting, as both the organisation and the project team had to accommodate. The two phases of piloting and rolling-out were characterised by uncertainty, ambiguity, confusion, and the emergence of unforeseen factors (pp. 345–346). The account of the authors gives a

particularly good example of what happens when, in situations like this, the decision premisses of the organisation are (temporarily) not adequate and the project will move towards the horizon of autopoietic gravity. In the phase that internal/external pressures and political conflicts affected the project team directly, from the perspective of the organisation it seemed incapable of conducting the required changes in a predictable and linear way. In this phase, the project director limited the role of the team project to that of an advisor, who provided support and aid to local agencies (p. 346). In effect, the project team's wings were clipped, and thus escapades beyond the autopoietic horizon were blocked beforehand. At the same time, turning the project team into an advisor, relieved the project team from decision-making load, which might have enhanced its role as an interaction system that provides reflexive information to the organisation. Referring to the feedback of the local managers, who were responsible to implement the CRM system with the support of the CRM-team, this did not happen. Local managers perceived the communication content as too global, and not relevant to the specific constraints they faced (p. 347). The authors point out that the scope of the CRM-team was too narrowly focussed on technical issues, neglecting the organisational issues (p. 348). Given this limited assignment, it may have been an obstacle for the project team to become reflexive on the organisational issues and "problematise" them in the interest of the local agencies. The organisation-bound operation of this project was also mirrored on the other side of the project, the local offices where the new CRM system was implemented. First of all, the achievement of the BPR associated with the CRM seemed to cause a modification in the boundaries between the different functions in the local offices. Several local managers perceived the communication content as too global, and not relevant to the specific constraints they faced. Therefore, likewise to the project team, local managers too were on their behalf limited by the organisation-bound nature of the project, their progress was dependent and at times stalled by the decisions that were made on an organisational level. To make it quite clear: decisions taken by the organisation, and not decisions particularly made by the CRM project itself.

5.6 Discussion and conclusions

We can regard a project as the completion of a task, in that sense as a unity, although this unity is composed of many subtasks of varying complexity over a shorter or longer period of time. This is the perspective that Luhmann takes when he argues that projects cannot

be seen as organisation systems since they funnel towards a natural ending, with continuously decreasing margins for decision-making (Luhmann, 2019e, p. 419).

In this paper, I addressed the communicative reality of projects, which has an organisational and interactional component. I argued that projects can either be seen as organisation-bound projects which are differentiated subsystems which progress along the decision premisses of the organisation, or as operationally closed projects with boundary-constituting decision premisses (autopoietic projects).

I reviewed the case study accounts of four papers, to assess whether this conceptual lens offers relevant insights to the study of projects. This approach rendered some valuable and specific interpretations. The analysis indicates that the presence of distinction on the five dimensions can be related to the organisation-bound or self-referential operation of a project. Differences in world view between the organisation and the project were much more pronounced in the case of a self-referential project. The analysis further provides support for the thesis that interaction systems have an important role in the project dynamics and the connection with decision premisses, which is particularly sensitive in the case of projects, appears to be a key factor.

The major observations are summarised in Table 2.

The analysis of the four case studies, and that of the Heathrow T5 project in particular, shows that Luhmann's conceptual framework makes a significant contribution to the explanation of "contextuality" as is put forward by several scholars on temporary organisations (Bakker, 2010; Burke and Morley, 2016; Koch and Sydow, 2013; Sydow *et al.*, 2004; Sydow and Braun, 2018). In particular the deployment of the concepts of decision premisses and interaction systems constitutes a fine-grained analytical level. In addition, the concept of distinction dimensions is a useful alternative to the seminal taxonomy of Lundin and Söderholm (Lundin and Söderholm, 1995).

Table 4. Summary of the results of the reinterpretation of the four case studies

	Distinction	Organisation-bound / self-referential	Decision premisses	Role of interaction systems	World view of project
P1	No significant distinctions for output, know-how and technology as a result of long preparation period; no distinction for time structure as BAA staff on all key positions and delivery date was priority from start till end; no critical distinction for human resources as BAA staff on key positions and strong integrative culture	Organisation-bound	Long preparation period put essential decision premisses in place; T5 contract ensured involvement of BAA executives in major decisions; only proven technologies were admitted; priority of delivery date provided strong rule for decision-programs	Because of high number of BAA staff, most interactions would have had BAA staff amongst those present; intensive effort on integrative culture of trust and cooperation; T5 handbook was likely practically supporting; reflexive ability was established through quality management early on in the project	World view of the project coincided with that of BAA: a landmark project was going to be delivered, in cooperative approach and on time
P2	Certain level of distinction for output and know-how, as STA had stopped doing in-house engineering and was heavily reliant on external firms; significant distinction for human resources; no distinction for time structure as this was the discretion of project top management; technology was not relevant in design phase	Organisation-bound	Decision premisses were located in STA-organisation, feeding the decision premisses with synchronised information was a major issue; efforts to reduce decision-load (satisficing)	Subprojects as interactive systems did not have an interactive or reflexive role, setup of configuration was too fragmented;	Exploitative world view: extract as much know-how as possible with lowest cost possible, this probably coincided with the view of STA-organisation; it is questionable whether on the subproject level this view was shared

	Distinction	Organisation-bound / self-referential	Decision premisses	Role of interaction systems	World view of project
P3	Distinction for output, know-how and technology as these were highly localised; low distinction for human resources as project relied on organisation's staff; high distinction for time structure, as this was also highly localised	Self-referential	Decision premisses were predominantly localised in the project	No overlapping interaction systems between project and organisation	Project regarded client and organisation as not trustful, this was reinforced by negotiations between client and organisation. Organisation regarded project as staffed with loose cannons
P4	Some distinction for output, as CRM system was one-off project; no critical distinction for know-how and technology as mostly standard software solutions were applied; distinction for organisation change know-how is an issue though; no distinction for human resources as project was staffed with organisation personnel; no apparent distinctions for time structure	Organisation-bound	The project could run with decision premisses of the organisation (business, IT, HR, etc., executives represented in central project team); as for organisational change, the decision premisses were reduced to the person of the local managers, who then struggled to establish a connection to previous decisions	Frequently views emerged from interaction systems, labelled as "political", "pressures", "issues"; these could not be used as reflexive input as applicable decision premisses were not present, nor developed	The new CRM-system is a tool that will improve competitiveness, therefore the local agencies will benefit from implementing and using it; "political" issues are an impediment to this

Source: author

The STA project case and the CRM-project case demonstrate that the binary perspective of the decision-making system (organisation) and the interaction system (Kieserling, 1999; Luhmann, 2000a) renders a great depth of analysis. From this binary perspective, we can understand why the STA project meta-level was faced with a huge decision-communication task, it could not timely handle. This caused information shortages in the interaction systems, which would again lead to increased demands to the meta level. The meta-level was equipped with the decision premisses to do the “basic job,” but lacked the reflexive capacity to achieve real improvement, because the interaction systems were too deprived to provide this. In the CRM-project, it can be seen that the CRM-team was focussed on technical issues, thus the project structure lacked the reflexive capacity to deal with the organisational and political ambiguities that were voiced.

The Millbrook project appears clearly as autopoietic, with strong self-reference and boundaries towards the organisation. The strong deviations in “world views” between the organisation and the project can be interpreted as a result of this. Furthermore, this project shows decision premisses that are localised inside the project and have no equivalent on the organisation level. The lack of transfer of decision premisses from projects to the organisation is subject of the studies of Grothe-Hammer and Schoeneborn (Grothe-Hammer and Schoeneborn, 2019) and Scarbrough et al. (Scarbrough *et al.*, 2004). In connection with the Millbrook project, we may elaborate a further variation of the world according to the project, related to a fundamental element of Luhmann’s theory, namely, that organisations are the only social systems that can communicate on behalf of themselves (Luhmann, 2000a, pp. 388–394). This implies that projects can also communicate with their environment, whether they are organisation-bound or self-referential projects. In the latter case, although the project then communicates on its own behalf, from the perspective of the environment it may appear that the organisation is communicating, as institutionally the project is perceived as belonging to the organisation. In this regard, a *The Matrix*-like parallel communicative reality is established. This “disguise” actually facilitates the self-referential project in maintaining its autopoiesis. The intense cynicism, disbelief, and individualistic conduct that took hold of the project team when the organisation started negotiations with the client and thus effectively took over the communication with the environment, can be interpreted as breaking this “matrix” and thus severely damaging the self-reference of the project.

If we follow the approach outlined in this paper, it transpires that the assumption of projects as external organisations, like it is posited by Grothe-Hammer and Schoeneborn, or Mohe and Seidl (Grothe-Hammer and Schoeneborn, 2019; Mohe and Seidl, 2011) is not tenable. On the other hand, the “follow the decision premisses” approach that the aforementioned authors adopted, makes a deeper understanding of the relation organisation – project possible. This paper makes moreover another strong case for the project-as-practice approach (Blomquist *et al.*, 2010; Brunet, 2019; Hodgson and Cicmil, 2006). Furthermore, it shows that the study of interaction systems in organisations has a contribution of its own to understanding organisations, and in this case understanding the functioning of projects. The excellent contributions that have been made by Seidl (Seidl, 2006), Cour (Cour, 2018), and Hendry & Seidl (Hendry and Seidl, 2003), should be followed-up by studies of the intermediation between interaction and organisation systems.

As a closing remark, is it necessarily problematic if the world views of the organisation and the project diverge? Not necessarily, as the divergent world view of the project can ultimately result in a better project outcome (Kreiner, 2020). On the other hand, considering the uncertainty that often surrounds the decisions that have to be made in and with respect to projects, such divergent world views need a sufficient degree of reconciliation in order to come to effective decisions. Reflexivity is needed to achieve this, and this is a basic task for the governance of projects. The author has proposed an outline of such project governance in a previous paper (Aal, 2022). Contextual steering (Fichter, 2003; Naujoks, 1994) in the form of structural couplings is a particularly important instrument. The essence of structural couplings is that they are reliably available for either party anytime when needed, and perceived beneficial for both sides. This can be achieved in the form of legal frameworks (PPPs), codes of conduct, standardised procedures. Structural couplings can only be very basic in scope though and should not be overcomplicated. In situational steering situation governance efforts should be addressing differences (Luhmann, 1997). Transparent metrics are an adequate reference, but steering on differences should be directed to the level of that decision premisses that are in play in a given situation. This catalyses more reflexive discussions and prevents governance actors from jumping into the project, which is generally not helpful.

As stated in the introduction, projectification implies that impact on societies is increasingly made through projects (Wagner *et al.*, 2021). Against this backdrop the responsibilities of project governance take shape as well (Munck Af Rosenschöld, 2019). In the light of Luhmann's risk-danger distinction (Luhmann, 1991a) this responsibility is even sharper visible, as projectification shifts the locus of generation of dangers increasingly into projects. Still, the observation and communication concerning these dangers, as well as eventually dealing with them, inevitably involves both the structural coupling-based steering between organisations and the project governance-based steering between organisation and project. Both levels of steering have their limitations, which ultimately adds to the complexity of society.

The critical review of the four case study accounts has of course obvious and significant limitations regarding the claims that can be made on such analysis. However, as a test of the feasibility of the proposed conceptual approach, it has served its purpose. The case study review results described here are a first step and must be further elaborated through in-depth multiple case studies in order to achieve a more profound and firm level of findings.

6 PUBLICATION 3 – ‘THE ENDUSER TAKES THE FINAL DECISION’ – AI AND DECISION COMMUNICATION IN ORGANISATIONS

Abstract

While social sciences are brimming with attention for the transformations brought about by AI and digital technology, the aspect of communication has received remarkably little attention. Niklas Luhmann’s social system theory, which conceives social systems as constituted through ongoing communication, is particularly well equipped to make a relevant contribution. This paper investigates the Impact of AI on organisations as systems of decision-communications, along the lines of four distinctions: decision premise – decision, system memory – environment, organisation system – interaction system, structural coupling – loose coupling. The deployment of AI is a reaction to the growing societal differentiation and the resulting future-related contingency, and as such contributes to the viability of organisations as systems. Nevertheless, social systems theory explains how certain impacts of AI we witness, some of them potentially harmful to the viability of the organisation, are neither incidental nor temporal, but are structurally related to the basic operations of organisations. A proposal is made how reflection loops can be introduced to counter some of these consequences.

Keywords: Artificial intelligence, social systems theory, decision-making, communication, organisational reflection

Practitioner points:

- AI influences communication in organisation in various ways and this may have unintended consequences that develop over time
- Increasing reliance on AI urges organisations to develop their capabilities to adequately reflect on their decision-making and the premisses that are used to come to decisions

6.1 Introduction

Artificial intelligence, generally described as the computational learning and solving of problems that would normally require human intelligence, is becoming our closest species (Gümüşay *et al.*, 2022), as AI is increasingly involved in the processes that organisations pertain (Iansiti and Lakhani, 2020). Some authors point even to a development that technology is the organisation (Alaimo and Kallinikos, 2021). AI can be divided into automation, i.e., AI performs complete tasks without remaining human control, and augmentation, i.e., AI is used to support human activity such as decision-making (Langer and Landers, 2021). Or alternatively, into tool, i.e., AI performs tasks that humans can do, and novelty, i.e., AI does things beyond human capabilities (Leyer and Schneider, 2021). A survey established that in 2023, 55% of organisations used AI, a figure that stood at 20% six years earlier (Maslej *et al.*, 2024).

As a technological capacity, AI has been around since the 1950s. For over three decades AI was a relatively marginal phenomenon, and its use was the domain of computer scientists, while its application was restricted to specific fields (Tien, 2017). The surge in investment and interest in AI is often attributed to the breakthrough in AI technologies, like Large Language Models (LLMs)(Gruetzemacher, 2023). While not disputing the role of LLMs in underpinning the potential, and hence attractiveness of AI, it has contributed to a discourse that on the one hand likely exaggerates the effects and capabilities of automated technologies in general (Barbour *et al.*, 2023; Rajagopal *et al.*, 2022, p. 6), whilst on the other hand emphasising that AI is there to augment and enhance human capability and keeping humans ultimately in control (Davenport and Miller, 2022). Meanwhile, the fact is that most of the AI deployed is generative AI (Gartner survey 2024). AI, even with its outstanding achievement is absorbed into normality, which is generally referred to as the ‘AI-effect’ (McCorduck).

We can view the widespread adoption of AI as a paradigm change, where organisations revert to new ways of gathering information about their environment. This paradigm change can be put in the perspective of social systems theory, which argues that as the differentiated society advances, its decision-density increases. This causes the future to be evermore contingent, thus making again more decisions necessary (Luhmann, 2019b). The dominant role of organisations in societies is also cause-and-effect of the increasing contingency (Luhmann, 2000). Thus, the paradigm change is the reaction of organisations to cope with the increasing contingency, representing both opportunities and risks, to

move to a new way of constructing their environment, i.e., a new way of representing the environment in the organisation. In fact, it represents a radical digitalisation in the sense of Bateson/Wilden (Anton, 2003; Wilden, 1972), in the establishment of hetero-reference.

Parallel to the surge in adoption of AI in organisations and in society in general, there has been ample academic interest in the causes and effects of AI. However, the aspect of communication has so far received little attention. It is specifically in this regard, that social systems theory can contribute to this field. An important contribution to the discussion has been made by Esposito (Esposito, 2017, 2022). Esposito essentially argues that AI-tools should be regarded as communicating, because AI-communications fulfil the criterium of double-contingency. The reasoning of Esposito cannot be extended into organisations though, as these are based on decision communication and a different frame of double contingency applies (Luhmann, 2019f).

Barbour et al. (Barbour *et al.*, 2023) reviewed the work being done on AI from a communication perspective. This review reveals that so far there has been hardly any attention for how AI affects what we can call the communicative constitution of organisation (Laapotti and Raappana, 2022), i.e., how organisations plough their way forward and shape processual practice through communication.

In order to address this gap, in this paper the impact of AI on organisations is analysed with social systems theory (further referred to as SST). In this paper I will demonstrate that SST provides unique and novel insights on the impact of AI on organisations. First, SST regards organisations as social systems, that are based on, and produce meaning through decision-communications. This unity of sense-making and decision-making enables an analysis that penetrates to the core of the impact of AI, which is crucial to and present on many levels of decision-making in organisations. Second, in SST there is specific interchange between structure and process. Structures channel the recursive communication process but are also produced and updated through the recursive communication process. This allows us to determine where AI is located and where its impact is located. In order to sharpen the analysis and capture a broad spectrum of AI impact, the analysis is constructed along four thematic areas, or, to use the preferred SST wording, four relevant distinctions.

- The distinction decision – decision premisses
- The distinction system memory – environment

- The distinction organisation system – interaction system
- The distinction structural coupling – loose coupling.

This paper is structured as follows. First an overview is given of how AI is currently applied in organisations, and how it will be implemented in the foreseeable future. In the following section, the above mentioned four distinctions are elaborated. In section four, it is reasoned for each of these distinctions how AI will impact on organisations and vice versa. In the fifth section, the views that emerge from SST-perspective are discussed against the results of relevant research that are currently available. The paper closes with a section of conclusions and proposes a research agenda.

6.2 A concise overview of AI developments in organisations

Dörfler (Dörfler, 2022) discriminates between three types of AI: symbolic reasoning systems, symbolic expert systems and artificial neural networks (ANNs), which is also referred to as sub-symbolic AI. The first AI that was developed was of the symbolic reasoning type. This type of AI in fact attempts to mimic the logic applied in human solving. Logical operators are applied to symbolic data rather than numeric data. Symbolic expert systems try to emulate the processes which human experts use to achieve outcomes, this is generally called knowledge engineering. The development of ANNs accelerated with the availability of larger and larger computing power, nowadays ANNs are the most common form of AI, and the basis of machine learning (ML). ANNs consist of several connected layers of artificial neurons. In each layer a computation is performed that is then propagated to the next layer. The result arriving to the output layer is compared to what was expected, and a new iteration is induced with a different set of computational weights. Due to their relative success, a lot of research has been put in further development of ANNs. Nowadays, apart from Recursive Neural Networks (RNNs), in which the layers operate sequentially, algorithms are based on Convolutional Neural Networks (CNNs), in which parallel computation occurs inside the layers, and most recently Transformer Neural Networks (TNNs), that work with attention models, which means that they can select features to be given special attention in the string of calculations.

Machine learning refers to computer programs that are able to learn and adapt without human intervention. Deep Learning (DL) uses ANNs to simulate the brains functioning (Amiri *et al.*, 2023). ANNs with many hidden layers are also called Deep Neural Networks (DNNs) ((Hassija *et al.*, 2024). DNNs can consist of thousands of layers. The term “deep” also refers to the level of representational abstraction from the input data that can be achieved in DNNs (Amoore, 2024).

ML algorithms can be categorised into four major types: supervised, unsupervised, semi-supervised and reinforcement learning (Sarker, 2021). In supervised ML, the model is set up in a way that is fixed what it has to look for, i.e., the program performs a specific data-analysis task based on sample input-output pairs. In practice, supervised ML-models are trained by feeding them with training data, and the model is iterated until a stable outcome is achieved. The model is then given a batch of test data, which it has not seen before, and if it performs well it is ready for use (LeCun *et al.*, 2015). In the case of unsupervised ML, there are no pre-defined formats and the program renders features, trends and groupings in data sets, based on performing an array of statistical operations iteratively. A classical example of unsupervised learning is the method of “topic modelling” in which the algorithm (e.g. LDA) learns about the thematic structures of large text corpora without a human operator. Semi-supervised is hybrid form of ML, which uses both labelled and unlabelled data. This type is used in cases where using labelled data alone would provide insufficient results. Reinforcement ML works with algorithms that take the effect of the generated outputs into account, in the form of a reward (positive contribution) or punishment (negative contribution), therefore this can be seen as an environment-driven approach (Mohri *et al.*, 2012).

ML learning capabilities have been significantly advanced through representation learning. Rather than humans providing data annotation, i.e., the representations governing the raw data sets the ML-algorithms can operate on, in representation learning, also called deep-learning methods, machines can automatically discover the representations needed for detection or classification (LeCun *et al.*, 2015). Strictly speaking, in case of highly extensive computations calculation capacity limitation comes into play, AI applications have to revert to heuristics, which generally produce good enough results, instead of algorithms which can compute the optimal outcome (Zweig, 2023).

Shrestha et al. (Shrestha *et al.*, 2019) present three structural categories of combining human and AI decision-making. Full delegation to AI is appropriate in case of specific issues, large amount of data and fast decisions needed, generally with high replicability. A typical example is the application of recommender systems. Hybrid decision-making, i.e., sequential decision-making of AI and humans. In this case there are two phases, where either AI or a human pre-structures the decision-making. Typical examples are hiring processes, where AI performs the initial selection of candidates (AI – human). In case human decision makers have high confidence in a small set of preferred alternatives, the sequence is reversed into human – AI. The final analysis and selection is then performed by an AI application. The third possible structure is aggregated decision-making. In this structure, both humans and an AI-based decision maker are members of a decision-making collective, in which the AI participation and the weight of its decision proposal can be bound to certain rules.

Singh (Singh, 2023) elaborates that machine-learning has three phases: data-centric ML deals with acquiring data of sufficient quality and performing data annotation in order to create the optimal platform that serves as the basis for the second phase, the model-centric ML, which is concerned with training and retraining of the algorithms. The third stage is ML-operation (MLOps) which deals with the deployment, interpretability and monitoring of the performance of the ML-models. MLOps is important because it provides crucial feedback to stage 1, data-centric ML, about possible data drift and the consequential need to update the data sets.

Davenport and Ronanki (Davenport and Ronanki, 2023) discriminate between three types of AI, depending on the particular business process the application supports: process automation, cognitive insight and cognitive engagement. Process automation primarily occurs in administrative tasks. It is relatively inexpensive and easy to implement. Cognitive insight is related to processing of big data and generating trends and patterns out of these data. This type of AI application typically involves machine learning. Cognitive engagement involves natural language processing applications. This currently still a less common application that builds on the active interaction between humans and technology.

Gümüşay et al. (Gümüşay *et al.*, 2022) classify AI according to the type of decision-making it affects. Structured decisions are decision that are made frequently, require a

large amount of data and must be taken expediently. Machine learning models are suited to support or even replace human decision-making. Semi-structured decisions are typically less frequent and are based on diverse information. Because machine learning requires large amounts of training data, AI applications face limitations with regard to being involved in semi-structured decisions. Rule-based expert systems can be used here, that in first instance render recommendations. Generative AI can support semi-structured decisions with its capability of reviewing and analysing vast amounts of text. Unstructured decisions, for example strategic decisions, do not happen often and are highly contingent. Machine-learning based applications are not of much use here, as the underlying data are lacking. However machine learning applications can be applied to generative various future scenarios, which serve a base of strategic dialogues in the organisation. Also generative AI can be used here to scan the environment and use the obtained information in strategic decision-making, for example in strategic marketing (Rajagopal *et al.*, 2022; Stone *et al.*, 2020).

The table below (Table 5) summarises the characteristics of the main types of AI applications.

The spread and development of DNNs and associated DL give rise to the issues of transparency, explainability and interpretability of these algorithms and the results they produce (Minh *et al.*, 2022). This has given rise to a distinct stream of praxis and research, called XAI (explainable AI), in which these issues are addresses and solution are developed. Various methods are used to tackle these issues, like model audits, counterfactual explanations and adversarial training (Bhatt *et al.*, 2020). Esposito (Esposito, 2023) argues that it is not a matter of intervening in the computational structure of the algorithms, but rather one of teaching the algorithms to communicate.

Concludingly, a variety of decision-making situations is affected by different types of AI, associated with their own dominant human-AI interaction. We need to understand how AI affects organisations as a whole if we want to steer the application of AI, to be able to decide in which cases to opt for changing computational structures, or revert to XAI approaches, or teach algorithms to communicate. This paper seeks to contribute to this understanding by making a broad assessment that is based on the very centrality of decision-making.

Table 5. Characteristics of typical AI applications in organisations

	Type A	Type B	Type C
Business Process	Process Automation	Cognitive Insight	Cognitive Engagement
Decision-making	Structured	Semi-structured	Unstructured and semi-structured
Possible decision-making structure	Full delegation to hybrid structures	Hybrid structure	If any, aggregated structure
Type of AI	Mainly ANNs	Symbolic expert systems and ANNs	Symbolic reasoning systems and ANNs
Dominant orientation	Predictive ML	Predictive ML and Generative AI	Generative AI
Dominant learning	Supervised	Semi-supervised and unsupervised	LLMs
Most critical phase	MLOps	ML Model	(ML) Data

Source: author

6.3 Relevant distinctions of Social Systems Theory

Before commencing the outline of the distinctions, it is useful to provide a context by addressing some basic aspects of SST. In SST the distinction itself is at the core of its concept of organisations, as it defines systems as the difference between the system and its environment, hence the organisation as the difference between the organisation and the environment. This difference is produced and upheld as long as an organisation engages in its basic operation, which is recursive decision communication, i.e., each decision communication has a recursor in a previous communication and is a precursor

for the next. Organisations build up internal structures to guide and facilitate decision communication. Organisations are operationally closed as only their own communications and structures serve as the context for their operation. Operational closure enables organisations to relate and respond to their environment. Through framing a decision, i.e., reducing the complexity of the environment to a number of alternatives out of which one is to be selected, meaning is established. In order to communicate meaning, the selection has to be effectuated, this is the essence of decision communication. Through the selection itself, the decision communication, the organisation achieves two things. First, it absorbs uncertainty in the sense that an uncertainty is transformed into another uncertainty which is deemed more beneficial for the organisation at the particular moment in time. Second, given its operational closure, with decisions the organisation can vary its internal structures, in other words, vary its internal complexity.

6.3.1 Decision and decision premisses

SST emphasises that framing a decision necessarily implies making the selected alternative contingent, i.e. a decision is a decision by stipulating that other alternatives would have been possible as well (Luhmann, 2000a, p. 141ff). This makes any decision vulnerable to being rejected and poses a time and effort problem at each decision. Organisations need structures to efficiently tackle the issues of the self-referential connectivity and the contingent nature of a decision. This task is accomplished through decision premisses. Decision premisses are structural elements of an organisation that provide connectivity and redundancy, i.e. patterns that enable the organisation to construct decisions with limited information and within limited time (Luhmann, 2009, p. 227). There are three types of decision premisses defining the organisation: decision programmes, communication channels and persons. Decision programmes (Luhmann, 2000a, pp. 256–278) are rules, procedures, heuristic schedules that serve the factual evaluation of the inputs and outputs related to the decision. It is useful to distinguish between mainly input-oriented programs and mainly output-oriented programs. The input-oriented condition-programs select a specific output to a set of specific inputs, these are basically if-then algorithms. The output-oriented purpose-programs select a set of specific means to (achieve) a specific goal, and this schemata guides the information processing. Purpose-programs are more open and have more intrinsic uncertainty than

condition-programs. Purpose-programs therefore need more scrutiny in terms of monitoring whether they actually work as envisaged. Decision-programmes usually do not operate alone, but in combinations, often purpose-programs are linked or trigger condition-programs (Grothe-Hammer and Berthod, 2017). They can only be invoked as communication and will therefore always be subject to some simplification. As no program can possibly cover the contingencies of the situations it will be applied in, the consideration whether to apply the program or not, or regarding the correctness of the application, will present itself to a lesser or larger degree (Luhmann, 2000a, p. 258).

For a decision to be acknowledged as a decision-communication, specific communication channels need to be observed: who is entitled to make a decision? who should be consulted in advance? who can communicate to external partners? what can be delegated to whom? etc. Persons are also a form of decision premisses because individuals are selected on their basis of assumed sufficient acumen to perform a specific position (pp. 225-226).

Decision premisses are typically merged into positions: a position is filled by a capable individual, it is a structural node in a communication network, and it is endowed with decision programmes. The phenomenon, that if a wrong decision is made, not only the involved programs are questioned, but also often communications and competencies are scrutinised, also illustrates that decision premisses do not operate in isolation (p. 259).

Luhmann regards organisation culture as a specific set of organisation-defining decision premisses, which are not based on decisions. This conceptualisation gives organisation culture a pluriform, possibly ambiguous and evolutionary character. Organisation culture principally eludes “culture engineering” efforts. Organisation culture as a decision premise interferes with the decision-based decision premisses and may latently alter their rationality assumptions (pp. 240-249).

For the analysis of AI in organisations the distinction between decisions and decision premisses is valuable, because it enables us to discriminate between the structural role of AI (through decision premisses) and the operational role of AI (through decisions in the communication autopoiesis). Additionally, it allows us to investigate how AI affects the creating of meaning.

6.3.2 *System memory and environment*

System memory is a social memory and thus constituted of past decision communications. It has a certain structure in the sense that it consists of general content and distributed content. The general content is given by self-descriptions, which are those contents of the memory that are related to the system as the unity of all its operations. Self-descriptions are vital for the organisation as they ensure that it can unambiguously refer to itself as the same invariant unity. In the self-description the system memory remembers itself (Luhmann, 2000a, p. 420ff). Distributed content is the content that is more specific to a particular part of the organisation, on the one hand the decision premisses that are usually more tightly coupled to certain types of decisions and on the other hand a more loosely coupled memory of past decision communications that is typically organised into themes.

The recursive decision communication process could not exist without this memory, and it necessarily engages in all decision-operations. It serves the coordination and sense-making between past and future in every actual situation (442). An important aspect is that the relation between the decision operation and system memory is one of double closure (Von Foerster, 1984). The system memory moderates the decision operation, and the decision operation moderates the actualisations of system memory. The system memory running along with the ongoing decision communication does not imply that its content is constantly increasing, on the contrary, with every decision communication there is a selection of what should be kept and what can be forgotten. Only what has future-value is retained in the system memory, and thus can be re-impregnated by follow-up decisions (114) and enables the transformation of decisions in decision premisses (193).

We can now look more closely to the distinction system memory – environment. SST posits that a decision always involves self-reference and hetero-reference (referencing to the environment). As these mutually moderate each other, an oscillation between the two takes place that needs to be stabilised in order to form a decision. It was explained in the previous section that decision premisses are designed to accomplish or facilitate this stabilisation, in a broader sense we can say that it is the system memory that is active here, through superimposing a past – future oscillation on the oscillation between self-reference and hetero-reference. While system memory refers always to the organisation's own states and not to actual factualities in its environment, it will contain hetero-

references as substrates of past decision communication. These are present in the form of perceptions and assumptions and more fundamentally as cognitive routines, which are loosely coupled, and therefore highly redundant constructs of the organisation regarding elements of its environment that have ‘reality credit’ assigned to them (Luhmann, 2000a, pp. 250–252). As a result, environmental references located in the system memory enter into the primary oscillation which may shortcut or crowd-out actual hetero-referencing. The extent to which organisations test these hetero-references in the system memory is closely related to SST’s concept of rationality which I will discuss later in this paper.

There are some further aspects of system memory that are relevant for our analysis. Texts form the core of system memory either in written or in verbal form, with written texts being the strongest, such texts are a functional equivalent of observation (418). System memory has also directional elements in the form of motives that play a prominent role in moderating decision operation. Motives regulate the interrelation between past and future (95). Strategic motives contribute to the construction of self-descriptions as identity is created through distinguishing action (439). Because of the presence of such strategic or tactical motives, self-description are not fully objectively anchored, but the possibilities to ‘design’ self-descriptions are limited. (439-440). System memory is highly streamlined as it extracted from decision communication. Thus, organisations will at times also be dependent on the much richer personal memory of its members. This personal memory can be valuable as it can fill in gaps of the system memory, but obviously its status is also more arbitrary.

The distinction system memory - environment allows us to analyse how AI can structurally influence the way how organisations perceive and relate to their environment.

6.3.3 Organisation system and interaction system

Particularly relevant for the study of AI in organisations with SST is the distinction between organisation systems (organisations) and interaction systems (interactions). Interaction systems are constantly forming and dissolving, self-referential social systems based on those present observing each other. Interaction systems can apply only limited structure and complexity and typically move sequentially from one theme to another (Luhmann, 2019d, pp. 13–14). The distinction between interaction system and organisation system is different from the distinction between informal and formal

organisation. Meetings, in person or online, highly formalised or loosely arranged, chats at the copier or in the coffee/tea kitchen are all interactions. There are various views amongst SST scholars on the exact nature of the relation between organisation and interaction (Grothe-Hammer, 2022; Jäger and Coffin, 2011; Kieserling, 1994; Seidl, 2006). The distinction organisation-interaction in observing organisational reality sets decision communications aside from interaction communications. This brings up the question which communications that involve members of the organisation are interaction communications and which ones are decision (organisation) communications, as well as how are the two possibly connected. A workable view is that interaction communication may get tagged as decision and routed into the organisation system. From that moment on this communication can only connect to other decision communications, and is subject to the structures of the organisation, which support, and hence also direct and limit the self-referential decision communication through providing redundancy and connectivity.

Apart from their practical functions, interactions system can also serve the organisation as a place to sort out issues that cannot be solved on the level of decision communication. Apart from that, they can be the source of transformational impulses for the organisation. Moreover, in interaction system trust can be built, which then can be coded into the system memory and affect decision communication, while trust does also to keep a wider range decidable possibilities open without significant time and information cost (Luhmann, 2000b).

6.3.4 Structural coupling and loose coupling

We speak of coupling in the case of consequential interrelationships. SST uses the concept structural coupling to describe relations between systems, providing an answer to the question of how social systems can form their relations to their environment, despite being operationally closed, i.e. their communications being confined in an internal recursive network (Luhmann, 2021b, p. 100). Maturana, who proposed the concept, sees structural coupling as an evolutionary process, the “dynamics of congruent structural changes that take place spontaneously between systems in recurrent (in fact recursive) interactions, as well as the coherent structural dynamics that result” (Maturana Romesín, 2002, p. 17). .

Generally, we can speak of structural coupling between social systems if the following applies.

- a) When a system experiences an irritation/perturbance that is an event belonging to a structural coupling, then always a specific part of the structure of the system will be activated; important is that there is still redundancy, i.e., the reaction of the system is contingent within the limitation
- b) Structural couplings arrange a degree of encoding to the irritation/perturbance, which the system can decode (the digitalisation of analogue relations)
- c) Structural couplings are highly stable, have a high degree of non-conditional availability; a violation of structural couplings can have grave consequences for a system
- d) Structural couplings are identifiable as highly exclusive, i.e., they allow only particular elements to function as irritators/perturbators (Luhmann, 2021b, pp. 100–103)

In SST, the primordial structural coupling is the one between social systems and psychic systems, which runs over the medium language. This is the structural coupling that is extensively and repeatedly discussed in Luhmann's works. SST argues that societies are differentiated into functional subsystems, that cover the various functional areas, thus there is, amongst others, a political system, a legal system, an economic system, a science system. The next level of structural couplings that stand out, also evolutionary, are those between these functional subsystems of society (e.g., legal - political system: constitution, economic – political system: taxation, economic – education system: diplomas and certificates) (Luhmann, 2002, 2021c). These structural coupling provide integration between the functional subsystems. In addition, and importantly, there are the functional subsystems structurally coupled through organisations. This is possible because organisations, as decision-based social systems, operate with loose couplings, and this allows the nesting of functional subsystems in the organisations (Luhmann, 2002, pp. 391–401). Another structural coupling of evolutionary nature, that stands out, is the structural coupling between social systems and technology. This is a strong coupling that causes a structural drift in social systems which makes social systems increasingly operating on the presumptions of the present technology, that needs not to be questioned (Luhmann, 1991a, pp. 108–110).

The concept of loose couplings is readily applicable to relations inside systems. If elements or parts of systems are loosely coupled, they operate relatively independent of

each other, there are no or only weak ripple-effects inside the system. This in contrast to tight couplings, which are characterised by dedicated responses. Couplings can be turned into loose coupling by inserting a decision, where a selection is made from various follow-up alternatives. Loose couplings require a memory function and must have higher redundancy. Loose couplings render higher response flexibility but are in their setup less efficient than tight couplings (Luhmann, 2009; Orton and Weick, 1990).

The line of investigation is to establish whether AI is associated with structural couplings, and, inside organisations, shows an inclination towards loose couplings or tight couplings.

6.4 Social system distinctions applied to AI in organisations

6.4.1 Decision – decision premisses

From an SST perspective, the primary role of AI is to substitute existing decision premisses with AI-based decision premisses. The main reasons being time gains, i.e., time pressure relief, and increased uncertainty reduction, i.e., more information involved in the decision that is not forwarded in the communication chain. AI is most suited to substitute existing decision-programmes, because these are repetitively used, often formalised or documented to a degree and transparent. Within decision-programmes the input-oriented conditional programmes can be fully replaced by AI, as well as the combined conditional-purpose programmes, as with these programs the openness of the purpose-programs is limited. Pure purpose-programs are least suited to be replaced by AI, as they are to a much lesser extent based on past patterns.

AI also substitutes communication-channels as decision premisses. The time-saving imperative will favour one-stop AI-applications that will combine multiple programmes and thus reduce the communication channels involved.

AI will put the concept of the position, in SST conceived as alloy of the three types of decision premisses, under significant pressure. AI, as a matter of speaking, increases the decision-programme intensity of the decision-communication, and this will dilute the concept of role as we know it. New roles are created around the AI-residuals, i.e., decision premisses and decisions connected to humans. This does not follow the principles of organisation that are used to far.

On a principal level therefore, from the perspective of an organisation consisting of decision-communications, AI in organisations does not fundamentally change things. Decisions were already based on decision premisses and still are, just different ones. Nevertheless, there is an impact on the operational process, in the sense that it is being compacted, because the decision premisses have become more powerful. In terms of loose vs tight coupling, one can say that the relation between premise and decision shifts towards the tight coupling end of the spectrum.

The decision-premise person is related to qualities like experience, creativity, quality of judgement under uncertainty, tacit knowledge, or ability to take common-sense into account. AI can so far replace these to a limited extent only. In case AI replaces a complete position, this decision-premise will be lost. The consequences of this loss depend on the type of position. To prevent this loss, organisations may opt just to keep the position in place, but this is not a viable option, as the position itself has changed in terms of contributing decision premisses.

A further matter concerns the decision about decision premisses, and particularly keeping the decision premisses communicable, i.e., pull the decision premisses back into the recursive decision-making of the organisation. I will deal with this aspect in part 2 and part 4 of this section too, as it is related to system memory and structural coupling, respectively. As for the communicative aspect, we can distinguish between communication about a concrete outcome, i.e. questioning the decision-premise for a particular case, and communication about the decision-premise, i.e., questioning the decision-premise in general. SST points to the aspects of connectivity and reduction of uncertainty in this regard. What appears as a good decision, i.e., the informativeness of the XAI process that is performed depends on how it can fit into the existing communicative trail; secondly, questioning decision premisses is a reversal of uncertainty absorption. Therefore, a substantial amount of distrust in the respective decision-premise is required to trigger this.

There is the fundamental issue whether AI in fact takes decisions, which after all is the dominant view in the discourse on AI. My view is, that within the framework of SST, AI cannot be said to take decisions. I will illustrate this with an example. Suppose a bank changes its fraud-detection AI system in such a way that, where previously a fraud-alert was flagged to an employee who then handled the case, in the new system the AI

application is extended in such way that, certain parameters being met, accounts will be automatically blocked, and communications will be generated. In the current discourse, the language would be that AI has taken a decision that replaced a decision of a human. For clarity, while the latter part of this statement is true the first is not. Let's take a further example. In machining industry, producing components from steel bars, production operations are usually performed by so called CNC-machines, computer-controlled machining stations. These machines replaced many decisions from traditional workers using lathes, who would stop the machining at times, check the progression, and decide how to continue. CNC-machines are still supervised by operators, because there may be odd factors the CNC-machine cannot take into account. This is why the latest generations of CNC-machines have AI built in, that can check for excessive wear of the cutting tool, or the off-behaviour of the steel being machined, which so far were the discretion and task of the operator. In these cases, are we inclined to say that the older and the newest CNC-machines make decisions? Probably not, as this is about materials and standardised physical processes. Perceived from a technological abstraction however, there is no material difference between the fraud-detection and the CNC-AI.

When AI is about tangible data, language and communication we may be lured into the anthropomorphic view that we are rather looking at "decisions", whereas in the case of the CNC-workstation we conceive a piece of machinery programmed to do a job. Whatever the case may be, as far as SST is concerned AI does not make decisions, because the condition of double contingency is not met. Although the Luhmann position on contingency in organisations is somewhat problematic, as it is not sufficiently explanatory, once we conceive organisations as consisting of a network of recursive decision-communications. Still, it maintains its validity, as part of the explanation. As Luhmann argues, double contingency in organisations pertains to rules themselves being contingent and rules being contingent on whether they are being followed or not (Luhmann, 2019f). AI, and technology in general, does not meet the latter criterium. In fact a major reason for using technology is that it does not opt for not sticking to the rules (Jasanoff and Kim, 2015). Even ML cannot be considered to be not sticking to the rules, because changes in its algorithms are applied according to rules. Not sticking to the rules would occur in the case that the application does not adjust weights of individual calculations while the algorithm commands that they should be adapted.

In SST, decisions resolve around oscillation between self-reference and hetero-reference. With wide applications of AI, the question comes up, what are the hetero-references available to a group of employees involved in making a decision. Luhmann uses the term “adequate complexity” to point to an effective reconstruction of the environment in the system’s operations (Luhmann, 2000a, p. 314). This concept is closely related to system rationality. Groupthink is typically an example of establishing connectivity with low system rationality, as new information is not allowed in, i.e., hetero-references are ignored and connectivity collapses to self-reference. SST sees groupthink as functionally solving the problem that connectivity is improbable, while time constraints pressure connectivity to progress to the next decision. AI may make hetero-references obscure or inaccessible, making AI-generated information vulnerable to being ignored or discarded in decision making, which consequently could lead to impoverished hetero-reference and induce a groupthink process.

As a concluding point, I would like to address the communicative bifurcation between rationality and motivation when communicating decisions. With a higher AI-component in decisions, it can be expected that the rationality path will dominate. At the same time communicating motivation is important for the engagement and the conduct of the employees (structural couplings between psychic systems). This brings up the issue how the employees (psychic systems) will contribute to the future that is created through these decisions (Luhmann, 2019e).

6.4.2 System memory – environment

Two introductory remarks, before I discuss the role of AI. First, in a practical manner, the system memory is not simply equal to the total amount of data and information somehow stored in the organisation. The system memory concerns that part which is instantly available for communication. As an example, if an organisation would store minutes of past management meetings digitally or in hardcopy, this is not necessarily a part of system memory. We can say that, for the minutes of a management meeting of five years earlier to be a part of the system memory, it will have to be recognised as relevant in content and context, not only to the person who dug it up, but also by the other people involved in the communication. If this is not the case (“yes, but that was five years ago, but since then we have moved on”), a (re)learning process is needed to bring it into system memory.

Second, we should be aware of the part of system memory that is not physically stored because it was only communicated verbally, i.e., the establishing or recognition of common-sense (to the organisation) which is for that reason not recorded, and in meetings often does not meet more response than the nodding of some of those present (e.g., “well, with the new manager now in place, it is clear that we all have to try harder”, or, “it is clear, that it will be tough job to have this new process implemented”). Still, this part essentially contributes to shaping decision communications.

It is obvious that AI-capability has a profound impact on the system memory capacity. In that sense, the forgetting becomes less important as there is a lesser need to free up capacity. It is also obvious that the quality of learning can be higher and occur in shorter cycles. The function of system memory in providing a base for constructing alternatives is vastly elevated. On the other hand, as elaborated earlier, system memory and the ongoing recursive communication are in an organic and dynamic relationship. Therefore, what functions as system memory is also influenced by the ongoing communication. The potential of AI in terms of providing system memory is restrained by what has proven itself as successful or has future-value, as well as by what is going on in other parts of the organisation.

As for the distinction system memory – environment, the presence of AI will add new and more complex cognitive routines (see 3.2) to the system memory. The significance of these AI-facilitated cognitive routines will increase as the whole purpose of implementing AI is to fight time pressure and react faster, to avoid making mistakes and to reduce uncertainty, i.e., reduction and improved control of (perceived) risks. A significant part of the blessing and the curse of AI, seems to be related to this phenomenon. How much disappointment or controversy is needed to abandon a cognitive routine? If cognitive routines appears to mismatch, given their depth and the way they are constructed, it is not so easy to decide on what should be changed: is the model algorithm wrong, or are the input data wrong, or is the annotation wrong, or is the learning algorithm wrong? Or, has the environment simply changed?

SST can provide valuable clues in these issues, because of the fact that it takes the oscillation between self-reference and hetero-reference as the basis for operations. It matters what ultimately functions as self-reference and what as hetero-reference. Moreover, for an organisation to keep its autopoiesis going the oscillation has to come to

a point of resolution, or in more mathematical terms, move towards a point of relaxation, where an eigenvalue will appear. Principally this is the function of decision premisses, but what counts as self-reference and as hetero-reference also plays a role. While AI is of great value for hetero-reference enabling more external data taken into account and identifying patterns, it can shortcut the oscillation in case of much reliance on AI-generated content and crowding out other channels of hetero-reference. Algorithms are just another way of representing the environment and ML refines and cultivates this representation but cannot immanently challenge it. which afterwards turns out to be productive or counterproductive. Also, it can lead to situations in which the triplet of decision-premise, self-reference and hetero-reference will not gravitate towards an eigenvalue. Particularly for more strategic decisions this can be case, when there is a lack communicative trail leading up to the strategic decision situation.

This last point brings us to the point of self-descriptions and the role AI can have here. This goes beyond AI making internal processes and employee performance measurable to an extend previously not possible, and thereby adding more defined and quantified information to the system memory to be used for future referencing. Self-descriptions are the condensed parts of the system memory, that make up the organisational identity. AI can be used to develop self-descriptions, that describe the organisation in a more articulated way to itself, which can be supportive particularly in the case of strategic decisions. However, there is still the element of the common-sensical verbal part of the system memory, which needs to be included to make self-descriptions coherent.

6.4.3 Organisation system – interaction system

As was stated earlier, we can conceive the communicative reality of an organisation as consisting of an ongoing recursive networking of recursive decision-communication in conjunction with sets of discrete interaction systems, which come and go, and are connected to the recursive decision-communication network to a higher or lesser degree. Closely connected interaction systems, e.g., highly structured meetings, are called technified interaction systems (Kieserling, 1999, p. 191). Luhmann regards interaction systems to have a major role in dealing with ambiguity around decision premisses (Luhmann, 2000a, p. 254). Interaction systems equip the organisation system with flexibility and adaptive capability. Issues that cannot be solved within the structural

limitations of the organisation system can be transferred to interaction system (Kieserling, 1994, 1999). They support the organisation in adapting its decision premisses and contribute strongly to its transformative abilities (Jäger and Coffin, 2011). Neither system can control the other and hence the flow of irritations/perturbances between the systems is delicate, particularly in case of the not so technified interaction systems.

While AI principally leaves this co-existence in place, it may nevertheless have an impact on the dynamic between the two systems. There are four major reasons why AI may lessen the role of interaction systems in the overall communicative configuration.

First, when AI integrates tasks there were previously performed by more people, provides information that previously was obtained from a colleague, reduces the need for consultation with supervisors or peers, as a result communication channels will be rendered superfluous and subsequently be eliminated. Such channels are often sided with interaction systems in the form of meetings, informative discussions or exchanges, which will disappear out of the communicative landscape. Second, related to the previous point, the depth of decision premisses increases, because what was previously a decision-point is now incorporated in the decision-premise, thus, other things being equal, there are less decisions to be taken. Hence, less occasion for interaction systems to emerge around a decision. Third, I argued that the coupling between the premise and the decision increases. More tight coupling increased the specification and the prescriptiveness of the premise towards the decision. Hence, there is lesser precondition for discussion and argumentation around the decision, which would for that matter take place within an interaction system (more or less technified). Fourth, and this is an XAI aspect, the premise may simply not be open for argumentation, as it is a black box. Moreover, with regard to explainability, it is not only about explaining an outcome to an individual, but about explaining it to the organisation, in other words, communicating about it.

I would like to shortly address organisational culture, as the set of decision premisses not originating from decisions (Luhmann, 2000a, pp. 239–248). Whilst AI and organisational culture will have reciprocal influence on each other, it is too contingent to make general statements about it, apart from the one that it will make unexpected things occur. A point that I would like to make is that arguably a fair amount of the impact that organisational culture can have on the organisation, runs over interactions system. So, if we argue that AI, other things being equal, cause the contribution of interaction systems to diminish,

the same will be true for the role of organisational culture, independently of whether that will have a positive, neutral or negative effect on the (adequate rationality of) the organisation.

What I argued above, refers to the expectable effects of AI on interactions systems. This does not imply organisational determinism though, as organisations can freely decide to schedule meetings, gatherings or exchanges, possibly also in response to the tendencies I laid out above.

6.4.4 Structural coupling – loose coupling

Below the tighter coupling between decision-premise and decision as effectuated by AI, there is the more fundamental structural coupling between technology and social systems. As a structural coupling, the presence of technology is orthogonal to the communication (both in the organisation and interaction system). As Luhmann has extensively pointed out ((Luhmann, 1991a, 2000a), this structural coupling will assign a taken-for-granted status to technology in social systems like organisations. This implies a great dependency and will make organisations vulnerable to disruptions. Loose couplings can be inserted in processes to contain these risks and provide redundancy. The structural coupling with technology as an evolutionary dynamic will exert its own influence on establishing unquestioned AI-based routines, a force that is opposite to striving to loose couplings, particularly when AI has become bread-and-butter technology, which is not far away. This structural coupling can be seen as a drone dynamic on which the other developments I sketched so far are superimposed.

The aspect of couplings is of relevance for the societal role organisations. As mentioned earlier societies are differentiated into functional subsystems, which are, as social systems, operationally closed with their internal networks of recursive communication. SST argues for various reasons that this limits the possibilities of public governance, A vital element in achieving some level of coordination and possibly even steering between the functional subsystems are the structural couplings between organisations belonging to different functional subsystems. These structural couplings are possible because of the presence of loose couplings in organisations: they provide flexibility in orientation, enable to take information into account out of a wider context, make it possible to insert intermediary exchange and/or decision points. For example, a business organisation is

dominantly oriented towards the logic of the economic subsystem but has interfaces with other systems too. Its loose couplings enable it to signal and respond to impulses that originate in these other subsystems. While structural coupling of technology is by no means a new phenomenon, AI differs from traditional technologies in that it directly affects decision-support and decision-making (Leyer and Schneider, 2021). If AI indeed reduces loose couplings in organisations, and particularly in those structures of the organisation which are triggered by the structural couplings, this would imply a loss of steering and coordination potential between functional subsystems. Given the understanding that differentiation of society continues, such a loss may have significant consequences for societal development.

6.5 Research on AI in organisations – discussion in the light of the applied SST distinctions

In this chapter I will discuss recent relevant literature relating to each of the four distinctions. Mostly the results of empirical studies are presented, but also some important conceptual research contributions are included. A particular useful study is that of Davenport and Miller (Davenport and Miller, 2022) that gives an excellent insight in how AI is implemented in various types of organisations. The study contains reports on 29 case studies, that offer rich accounts of how AI is used. The limitation of this study is the lack of a rigorous methodology, adoption of a management-oriented narrative and the lack of a deeper analysis of consequences (Duke, 2022).

Still for the purpose of this paper it is a very useful publication, and 26 case study reports contained findings that can be related to the analysis of this paper. In the next sections I will repeatedly refer to this study, the results of which have been summarised in appendix A (Table 5).

6.5.1 *Decision – decision-premise*

In 20 case studies of the Davenport/Miller report, the account points to the decision premisses transferred to AI. Mostly this concerns decision-programmes, but to a lesser extent also communication channels and persons are eliminated (Table 4). A review of the literature by Lei and Kim confirms this picture (Lei and Kim, 2024). The authors highlight the frustration caused by users not being able to override the AI-based

assessments. Lower situational awareness is connected to a higher propensity of managers to delegate decisions to AI (Schneider and Leyer, 2019).

A case study concerning the implementation of AI in a call centre (Bader and Kaiser, 2019) concluded that algorithmic decision-making led to spatial and temporal separation and rational distancing, as well as increased reliance on algorithmic decisions. The attachment to AI-outcomes resulted in deferred decisions, workarounds and manipulation when they could not be reconciled with human judgement. This points to the tight coupling of the decision premisses that are difficult to question because of their depth and relative opacity. Similar findings are reported in a literature review concerning the effects of decision automation and augmentation (Langer and Landers, 2021).

A classical study into the usage of decision support systems showed that such systems were mainly used ways that facilitated reduced problem-solving effort rather than achieving a higher quality result (Todd and Benbasat, 1991). Langer and Landers (Langer and Landers, 2021) conclude in their literature review that there is a general scholarly consensus that AI is reductionist in the sense that it neglects unique decisions, qualitative information and cannot not effectively take contexts into account.

A qualitative research into the implementation of an AI loan-granting application in a financial institution (Strich *et al.*, 2021) showed how the transfer of decision premisses to AI effected role identities of employees. The new system equalised the jobs of loan-consultants and loan-assistants. The loan-consultants lost the decision-premise person and defined their new role as data entrants. On the contrary, the loan-assistant were equipped with decision premisses that enabled them to interact with customers which was experienced as a job upgrade. The assimilation of high-skill and low-skill workers is confirmed by other studies (Brynjolfsson *et al.*, 2023). These results confirm the pressure on the concept of the position as pointed out in section 4.1.

6.5.2 *System memory – environment*

The Davenport/Miller study (Table 5) shows that AI can cause significant changes into system memory and the working of system memory. Generally, it enhances the system memory, makes it more unequivocal, and offers increased possibilities for retrieval. Still, not all information AI applications are accessible. The criterium for system memory content is that it is engageable in communication. Therefore, certain types of AI only create locked-down system memory. For example in the earlier mentioned study of Strich

et al. (Strich *et al.*, 2021), there was no interaction possible with the AI system, it is therefore not communicatively accessible. In such a case we can argue that we cannot speak about decision premisses as part of the system memory, but we are dealing with routines as elements of a technical system.

AI brings up issues with regard to the hetero-reference that is available for the organisation. A study of how well LLM model can predict risk-related choices, demonstrated that, while LLMs outputs aligned well with consumer decisions on an aggregate level, their accuracy at the individual was relatively low (Qiu *et al.*, 2023). This connects to the earlier evidence that AI does not perform well when contexts have to be taken into consideration. The study further showed that LLMs exhibit inconsistent risk preferences, often showing aversion to select extreme options.

AI can radically change the parts of system memory that are important for the recursive communication going on. In a case study concerning the implementation of an AI sales application, Pachidi et al. (Pachidi *et al.*, 2021) showed how the introduction of the AI-system made parts of the system memory redundant, and replaced it with new system memory. An interesting feature was that these parts were connected to different groups within the organisation, the salespeople and the data science people. Ultimately with the redundancy of that part of system memory also the salespeople were made redundant and their function in the process was taken over by the data department.

Azzam and Beckmann (Azzam and Beckmann, 2024) present a valuable and innovative approach on how AI can make enhance system memory and make it communicable. Their model, which is based on experience in a research organisation, uses text mining on the organisation's corpus to represent what is of the organisation's interest or what is a sphere of (potential) competence. These representations can then be used to scan the environment with LLM or DL applications. The authors propose to structure this information into a knowledge graph, which can be related to the internal fields of interest and competence. The knowledge is routed to a dedicated company platform and strategic network, whose task it is to enact the communicative circulation. Effectively, this process is an oscillation between self-reference and hetero-reference which is guided and informed through AI. The authors particularly recommend this approach for strategy development.

A qualitative research of Alaimo and Kallinikos (Alaimo and Kallinikos, 2021) showed how the use of algorithms reconfigures organizations and their environments as a data

order, the underlying process of categorization is considerably hardwired to technologies and technological operations.

6.5.3 *Organisation system – interaction system*

The Miller/Davenport report (Annex A, Table 5) enables several observations. AI facilitates remote work, which consequently reduces the occurrence of interactions systems at the workplace. AI facilitates that employee receive instructions directly from AI, which reduces the need for meetings or one-on-ones with supervisors. AI facilitates the standardisation of communication. Other studies appear to confirm this trend of standardisation (Brynjolfsson *et al.*, 2023). Endacott and Leonardi calls this the emergence of algorithmic isomorphisms (Endacott and Leonardi, 2024). Kellogg *et al.* (Kellogg *et al.*, 2020) found that AI can restrict employees by preventing them from communicating with managers and with one another.

Several research contributions establish that AI, particular AI that operates more autonomous or is opaque, can give rise to experience of unfairness, resentment and disengagement (De Cremer and McGuire, 2022; Lei and Kim, 2024; Lichtenthaler, 2019). Although the actual impact on communication practice is not research in detail, I believe it is a reasonable assumption that under these conditions communication in organisation will suffer in general. If employees have no emotional relation with AI, they will be less inclined to talk about it in interaction systems in a constructive and reflective way, which prohibits possible improvement through interactions systems.

6.5.4 *Structural coupling – loose coupling*

The Davenport/Miller study does only for a few cases provide information regarding this issue. In those cases though, it points to an increasing reliance on AI, particularly expressed by the phenomenon that the task of humans is to deal with “exceptions” (Annex A, Table 5). A study conducted into the effect of AI-usage by students (Ahmad *et al.*, 2023) confirms this. The authors found that the taken-for-granted reliance on AI led to increased laziness and loss of decision-making power. An indication for taken-for-granted of AI emerges also from a study concerning the delegation of strategic decision-making to AI, in which Leyer and Schneider (Leyer and Schneider, 2021) observed that

those who had delegated to AI were less elated when experiencing positive outcomes and less angry when hearing about negative outcomes than those who had delegated to a colleague. This points to the structural coupling with technology. In a similar vein, Endacott found in a research concerning AI-scheduling applications that users legitimized the applications' authority to allocate resources, whilst in fact a structure of machine agency was possible to opt for (Endacott, 2024). On the other hand, it appears there is the opportunity of people actually choosing how to relate to AI-applications. In their study, Dell'Acqua et al. found two strategies of how individuals relate to AI (Dell'Acqua *et al.*, 2023). Cyborgs integrate AI and human capabilities at a granular, sub-task level, while centaurs strategically delegate between human and AI sub-tasks. It is clear that the best approaches to using AI are not fully understood and need to be more deeply examined by scholars and practitioners.

6.5.5 Overview

The table below summarises the main concepts and propositions of SST that relevant in analysing the impact of AI in organisations, as well as the possible consequences that can be inferred from the theoretical framework of SST. Those impacts, for which indications have been found in research, are presented in **bold**.

Table 6. Main concepts and impacts of AI from SST perspective

Distinction	Main SST concepts	AI impact
Decision Decision-premise	Decision as a construct of alternatives for selection	AI is decision-premise not decision-maker
	Decision programmes: conditional and purpose type	Transfer of all types of decision premisses to AI
	Communication channels, persons as decision-premise	Tight coupling to AI-based decision premisses with decision more premise-dense
	Position as alloy of premisses	Limitation with regard to decisions on decision premisses
	Rationality vs motivation anchoring of decisions	Role incompatibilities
System Environment	Capacity of system memory – learning/forgetting	Increase of rationality anchoring Vast extension of system memory but communicative accessibility may be problematic

Distinction	Main SST concepts	AI impact
	Self-descriptions Self-reference and hetero-reference Cognitive routines	Variety of hetero-referential issues may occur Loss of verbal and common-sense content of system memory
Organisation Interaction	Decision communications Interaction communications Routing of interaction communications into organisation system	Decrease of interaction communication Standardisation of communication Interaction systems may suffer from emotional disengagement Lesser scope for interaction systems to act as source of correction/transformation/trust
Loose coupling Structural coupling	Structural coupling between technology and social systems Loose couplings in organisations enabling structural coupling between functional subsystems Loose couplings have decision moment inserted	Taken-for-granted attitudes Indications for tight/structural coupling, loss of loose couplings in decision-making People can choose how to relate to AI Possible limitation of scope of public governance

Source. Author

6.6 Conclusions

“The end user makes the final decision” is a recurring theme in the current narrative advocating AI, which makes sense as serving the protection of the myth of the decision-maker. It is indeed fully correct to say that the (end) users always make the final decision for the plain reason that AI does not and cannot make decisions. At the same time of course, precisely that makes this frame for addressing the possible impact on AI mostly irrelevant. The relevant issue is how AI acts on the structural and operational aspects of decision-communication in organisations.

In this paper I have analysed these possible effects of AI from an SST perspective. SST contributes to the understanding of the impact that AI can have on organisations. This contribution is found in the fact that SST explains that certain effects we witness are not incidental, nor should they be considered as temporal, as SST shows that they are structurally related to the basic operations of organisations.

AI is a natural reaction to the growing societal differentiation and the resulting future-related contingency. The number of decisions increases and organisations need the decision premisses and information to deal with that. Hence, we can see AI as contributing to viability of the organisation and structural adaption to keep the autopoiesis going. Nevertheless, there is an argument for worry, which is the combined effect of: general trend towards less questionable, deeper AI-based decision premisses, the cultivation of system memory by AI-algorithms leading to hetero-reference being replaced by opaque algorithmic outcomes, the reduction of interaction systems as an ambiguity solving and possible transcendental force for the organisation, and the creeping advance of structural coupling to AI, manifesting itself in a taken-for-granted attitude and increasing reliance. The generation of alternatives is at the core of all this. To repeat, it was argued that organisations establish meaning by framing decisions, i.e., by creating a set of alternatives for the purpose of selection, that appears as valid in the self-hetero and the past-future oscillation. AI, in the way it is dominantly used in organisations, may increasingly limit the generation of alternatives, and consequently the crafting of meaning and sense-making. First, AI evaluates a huge number of alternatives, but these are 'hidden' in the decision-premise function of AI. Although this represents an exceptional uncertainty absorption, it simultaneously tapers the decision communication. The structural/tight coupling to AI as a decision-premise may prevent the questioning or active testing of premisses, which may impede the generation of alternatives. Interaction systems can positively contribute to framing decisions as they build trust and give impulses for change and reflection. Therefore, a loss or lesser role of interaction systems is likely to have a detrimental impact. As the system memory of organisations grows through AI capability, they will show a tendency to rely on self-referential components rather than hetero-referential ones. Since organisations are constituted by decisions taken in face of an unknown future, a decision represents in principle an occasion for reviewing existing premisses and perceptions, which keeps the orientation towards an easily assumed reality, the 'taking for granted' in check. AI may make organisations less inclined to engage in such reviews.

Currently the knowledge and productivity gains that can be achieved with AI may outweigh its disadvantages. Gains in knowledge and productivity will flatten out over time, while the impact of decision communication of less viability will increase over time. Knowledge can positively support decision-making, but they are not the same thing. What

can be said for certain is that organisations should use AI not only to reduce alternatives but also to generate alternatives. This is how AI is often used in innovation and R&D (Rammer *et al.*, 2022; Verganti *et al.*, 2020; Viberg and Eslami, 2020).

Approaching this from an SST perspective, it seems important that organisation should deal more intensively with planning, i.e., deal more intensively with deciding on decision premisses. This in fact implies a reversal and reset of established managerial mindset that has become habitual in cutting so-called non-productive staff. What's more, in the further future this non-productive might be the only staff that is truly productive. In order to mitigate or even avoid the potential detrimental effects and pitfalls of more evasive presence of AI, organisations need to engage in second-order observations and build reflective loops.

Teodorescu et al. proposed a typology for addressing the issue of fairness of AI outcomes (Teodorescu *et al.*, 2021), which can be given a wider application. Teodorescu et al. propose a typology of four quadrants, that is given by the locus of decision, AI or human, and the difficulty of the fairness issue (low/high). For each of the quadrants they suggest a particular approach to check for fairness and possible ways to intervene. The reach of this matrix can be extended if we substitute fairness with the concept of “adequate complexity”. Adequate complexity is in my view the concept that can be used to manage the fundamental issues that AI poses to the organisation. Adequate complexity points to an effective reconstruction of the environment in the system's operations (Luhmann, 2000a, p. 314). This concept is closely related to system rationality. This reconstruction is not a static mapping as the system can never be certain about its environment. Rationality also implies the ability to set aside rules and be guided by situational contexts (p. 318). This results in the following matrix.

Figure 5. Typology for assuring adequate complexity

Adequate complexity	Mostly untransparent	Business Oversight	Supervised Reliance
	Mostly transparent	Technical Oversight	Informed Reliance
		AI application	Human
		Locus of Decision	

Source: author, after Teodorescu et al, (2021)

The lower left quadrant refers to situations in which AI applications operate autonomously, and a limited number of factors is involved in assessing adequate complexity. In this case regular checks are made for the various factors assigned to comprehend the adequate complexity. In case the checks render results that are deemed problematic, interventions in the AI application are made. In the upper left quadrant, we also have the operation of an autonomous AI application, but in this case any assessment of adequate complexity involves a higher number of factors that can also be interrelated. Here as well, there are regular checks, but these involve a wider variety of staff. Apart from data science, non-technical staff from the respective business areas is also involved. In the lower right quadrant, we have the situation of an AI application that makes recommendations which pend on a decision of a human, in the context of relatively few variables comprising the assessment of adequate complexity. The essence of the informed reliance approach is that the involved decision-makers keep a critical attitude, i.e., keep the taken-for-granted status at arm's length. Within the organisation respective staff is incentivised to enact this attitude, and regular meetings are held to communicate about this. The respective decision-makers ought to have a certain level of understanding regarding how the application gets to its recommendations. In the upper right quadrant, we have the situation in which humans act as decision-maker augmented by AI applications and there is a less straightforward way to assess adequate complexity. Here supervised reliance is the approach, the essence of which is that the decision-makers

regularly subjected to extensive reviews, in which series of decisions are analysed in-depth. On such reviews the AI-human partnership is given a 360-degree assessment.

The building of these reflective loops will be essential to prevent drift of organisations, that can adversely affect its success and even lead to its collapse. The AI-based socio-technical support system proposed by Azzam and Beckmann (Azzam and Beckmann, 2024), which was discussed in section 5.2, can be helpful guiding the selection of adequate complexity factors for various business processes and be of value in its assessment along the typology elaborated above. The approach the authors suggest gives insight into for which elements and aspect of the environment the organisation has stronger or weaker representations, and at the same time reveals potentially salient developments in the environment.

I believe the arguments presented in this paper along the lines of the four distinctions, promote some clear topics for future research. I will give a few examples.

As for the distinction decision-premise – decision, interesting research questions can be crafted around the preserving of the alternative or alternativity in general in decision-communication. The essential difference between the decision-premise and the decision is that a decision by nature communicates alternativity, whereas decision premisses do not. We can argue that the sustenance of alternativity enables an organisation to keep options open or to review decisions at a later point in time. The shift towards decision premisses as I argued in this paper, can expected to be associated with a decrease in presence of alternativity in decision-communication.

With regard to the distinction system memory – environment, the formation of new cognitive routines is a key research topic. Bias as a result of AI is already frequently researched. Research into the formation of cognitive routines is more fundamental though and goes well beyond the bias phenomenon. The communicative availability of system memory is a relevant research topic. Here for example, comparative research can be conducted into organisations that dominantly work with non-addressable AI-applications and organisations in which AI-applications are dominantly available for explanations. This research can shed light on the impact of AI on the learning-forgetting process which is a core function of the system memory.

As for the distinction organisation system – interaction system, it appears from the literature that the impact of AI on the conduct of meetings and meeting culture in general

is highly under-researched. Specially we can think of tendencies towards groupthink, or the changes in the anchoring of decision-communications in rationality or motivation.

Finally, and this would be more a task for sociologists primarily concerned with societal issues, a relevant topic for a research agenda concerns the issue of indirect possible impact of AI on public governance and steering capacities between the functional subsystems of society, by inhibiting their intermediate structural coupling through loss of loose coupling in organisations (see 4.4). Particularly if we add to this the possibility that AI will lead to a sharp concentration of decision-making and power ((Brynjolfsson and Ng, 2023), this poses a serious concern. Such a research could for example address how organisations in the economic subsystem react to communications from the political or educational system. A potential setup could be to involve firms in the economic with dominant AI as one group and compare to firms with less dominant AI as another group.

7 CONCLUSIONS

7.1 Main conclusions, synthesis of the results and conceptual integration

The first article, which applied Luhmann's theory of organisations, resulted in several relevant contributions to the study of project governance. The concept of autopoietic organisations has so far not been systematically applied to projects. The paper laid out that it is key to pay attention to the distinction between the organisation. The paper introduced a project distinction concept that is more radical than the previous contributions of Pemsel et al. (2014) and Sydow et al. (2004), because it shows how project differentiation may lead to a situation in which a project is no longer embedded in the organisation, and how we can thus discriminate between organisation-bound and autopoietic projects. The paper explains how this greatly affects the influence channels that are available for the steering of projects, in other words, for the "management of project-management" (Too and Weaver, 2014), which is deemed as a more accurate term than the term project governance. The paper makes the proposition that organisation-bound and autopoietic projects are each associated with their own mode in the management of project management. It was argued that in the governance mode, the organisation faces additional criticalities and limitations compared to the management mode. The intent of the paper was not to suggest new instruments of project governance. Project governance research has sufficiently described and analysed the means and methods employed by project governance, or go under the flag of project governance. Instead, the paper outlined a framework for governance of autopoietic projects and reviewed how it resonates with some of the more significant conclusions from earlier research. The potential destructive effect that direct intervention into autopoietic organisations can have was addressed by Teubner and Willke (1984), Willke (2014), and Naujoks (1994) adapted this view and elaborated the concept of context steering for the corporate sphere. In the framework, trust plays a positive role in project governance, in line with research performed by Müller (2014, 2017c). The function of trust is to keep options for decisions open; without trust, the choice of decidable possibilities implodes (Luhmann, 1988). The context that governance provides to a project is a key factor in the model presented in this paper. Studies by Turner and Simister (2001) and Miller and

Hobbs (2005), underline that project governance should adapt to the specific project context in order to be effective. Also, the time dependence is addressed as an influencing factor. Regarding the structural aspects of context, a contribution of Locatelli and associates offers valuable insights (2014). The framework can also be adopted to agile projects and points out that in agile projects context is easily defined too narrow, thereby limiting the scope for contextual governance, which the authors see as a point of attention (Lappi et al, 2018). The framework also serves as a warning against a maximalist approach to governance. The quality of governance practice rather manifests itself in selectivity, and the granular framework of project governance proposed in the paper is intended to contribute to that.

The second paper addresses the organisational and interactional components of the communicative reality of projects. The paper builds on several notions elaborated in the first paper, notably the 5-dimensional concept of distinction, as well as the associated identification of organisation-bound and autopoietic projects. The paper reviewed four published case study accounts to assess whether this conceptual lens offers relevant insights to the study of projects. This approach rendered some valuable and specific interpretations. The analysis indicates that the presence of distinction on the five dimensions can be related to the organisation-bound or self-referential operation of a project. Differences in worldview between the organisation and the project were much more pronounced in the case of a self-referential project. This paper extended the analysis of the first paper by providing support for the thesis that interaction systems have an important role in the project dynamics, partially mediated through their connection with decision premisses. The conceptual framework makes a significant contribution to the explanation of “contextuality” as is put forward by several scholars on temporary organisations (Bakker, 2010; Burke and Morley, 2016; Koch and Sydow, 2013; Sydow *et al.*, 2004; Sydow and Braun, 2018). In particular, the deployment of the concepts of decision premisses and interaction systems constitutes a fine-grained analytical level. In addition, the concept of distinction dimensions is a useful alternative to the seminal taxonomy of Lundin and Söderholm (Lundin and Söderholm, 1995). The lack of transfer of decision premisses from projects to the organisation is the subject of the studies of Grothe-Hammer and Schoeneborn (Grothe-Hammer and Schoeneborn, 2019) and Scarbrough et al. (Scarbrough *et al.*, 2004). One of case study reinterpretations pointed to a fundamental element of Luhmann’s theory, namely, that organisations are the only

social systems that can communicate on behalf of themselves (Luhmann, 2000a, pp. 388–394). This implies that projects can also communicate with their environment, whether they are organisation-bound or self-referential projects. In the latter case, although the project then communicates on its own behalf, from the perspective of the environment, it may appear that the organisation is communicating, as institutionally the project is perceived as belonging to the organisation. In this regard, a *The Matrix*-like parallel communicative reality is established. This “disguise” actually facilitates the self-referential project in maintaining its autopoiesis. In the case of one of the projects, this “matrix” was broken when the project owner organisation started negotiations with the client and thus effectively took over the communication with the environment from the project organisation. The social systems theory framework would predict this resulting in severe damage to the self-referential capability of the project. The intense cynicism, disbelief, and individualistic conduct that took hold of the project team are typical of such loss. While the paper points out how divergent world views between the organisation and the project may emerge, it acknowledges that a divergent world view of the project can ultimately result in a better project outcome (Kreiner, 2020). On the other hand, considering the uncertainty that often surrounds the decisions that have to be made in and with respect to projects, such divergent world views need a sufficient degree of reconciliation in order to come to effective decisions. Reflexivity is needed to achieve this, and this is a basic task for the governance of projects. As projectification implies that impact on societies is increasingly made through projects (Wagner *et al.*, 2021), this shapes the responsibilities of project governance too (Munck Af Rosenschöld, 2019). In the light of Luhmann’s risk-danger distinction (Luhmann, 1991a), this responsibility is even more sharply visible, as projectification shifts the locus of generation of dangers increasingly into projects. These dangers have to be dealt with on the level of structural coupling-based steering between organisations, and on the level of project governance-based steering between organisations and their projects. Both levels of steering have their limitations, which ultimately add to the complexity of society. A field study of research projects on a social system theory foundation (Besio, 2009) concludes that projects do not necessarily imply adequate or increased responsiveness to societal demands. The study further suggests that projects themselves may act as structural couplings.

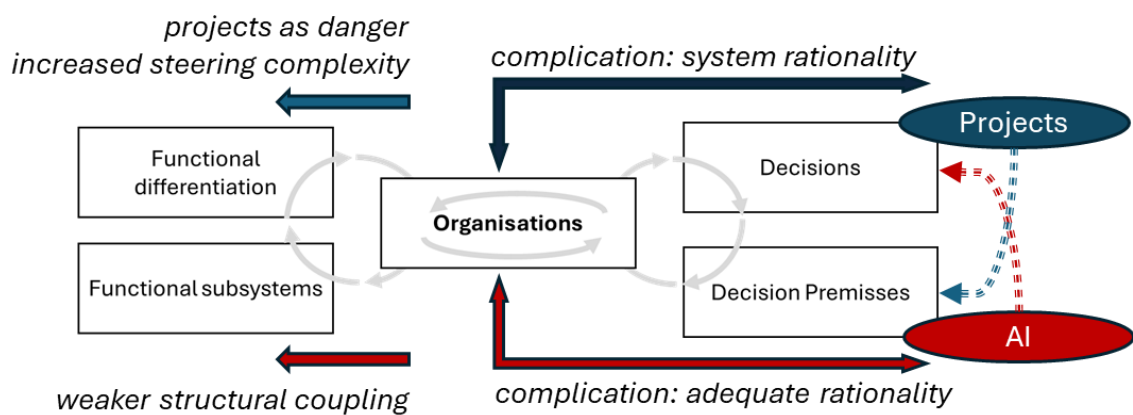
The third paper has the rhetorical title “The end user makes the final decision”, a recurring theme in the current narrative AI. The title expresses the aim of the paper, which is to

demonstrate that the relevant issue is how AI acts on the structural and operational aspects of decision-communication in organisations. Thus, the paper analyses possible effects of AI from a social systems theoretical perspective. For that purpose, the organisational impact is assessed by applying four separate distinction perspectives. The paper compared the outcomes of this analytical assessment with the results of research that has been conducted so far. AI is seen as a natural reaction to the growing societal differentiation and the resulting future-related contingency. The number of decisions increases, and organisations need the decision premisses and information to deal with that. Hence, we can see AI as contributing to the viability of the organisation and structural adaptation to keep the autopoiesis going. Nevertheless, as a general conclusion of the analysis it pursued, the paper states that there is an argument for worry, which is the combined effect of: general trend towards less questionable, deeper AI-based decision premisses, the cultivation of system memory by AI-algorithms leading to hetero-reference being replaced by opaque algorithmic outcomes, the reduction of interaction systems as an ambiguity solving and possible transcendental force for the organisation, and the creeping advance of structural coupling to AI, manifesting itself in a taken-for-granted attitude and increasing reliance. The paper reasoned on the presumption of social systems theory, that organisations establish meaning by framing decisions, i.e., by creating a set of alternatives for the purpose of selection, that appears as valid in the self-hetero and the past-future oscillation. AI, in the way it is dominantly used in organisations, may increasingly limit the generation of alternatives, and consequently, the crafting of meaning and sense-making. AI does so by ‘hiding’ the huge number of alternatives in its function as a decision-premise; further, tight coupling to AI as a decision-premise may prevent the questioning or active testing of premisses, possibly impeding the generation of alternatives; when AI reduces human-human interaction, this loss or lesser role of interaction systems, cuts down trust building mechanism and reflexion capabilities; while the system memory of organisations grows spectacularly through AI capability, they will show a tendency to rely on self-referential components rather than hetero-referential ones. The paper suggests measures to mitigate or even avoid the potential detrimental effects and pitfalls of a more pervasive presence of AI. It does so by adapting a model that was earlier developed to be able to address issues of fairness of AI outcomes (Teodorescu *et al.*, 2021), by rephrasing it in terms of the concept of “adequate complexity” (Luhmann, 2000a, p. 314). The essence of these proposed measures is the targeted building of reflective loops. An AI-based socio-technical support system (Azzam and Beckmann,

2024) can be helpful in guiding the selection of adequate complexity factors for various business processes, as it may render insight regarding the extent to which elements and aspects of the environment are represented in the organisation, and simultaneously reveal potentially salient developments in the environment.

The synergies and conceptual integration of the results of the three papers can best be discussed by integrating them into the model presented in Chapter 3.

Figure 6. Decision topologies, organisations, and the functionally differentiated society



Source: author

Although both projects and AI application can be conceived as decision topologies because organisation deploy them to stabilise decision-making in conditions of increasing decision intensity, both projects and AI being based on flexibility, changeability and decidability, while the proliferation projects (projectification) and AI shows that they are instrumentally able to keep up with a higher rate of change in the environment and in the system itself. It transpired that the decision topologies of project and AI transcend individual decisions into decision constellations, organised clusters of decisions solving particular issues, structures that represent particular decision paradigms, a primarily organisational paradigm in the case of projects, and a primarily technological paradigm in the case of AI. As decision topologies, they consist of tight couplings combined with loose couplings. In the case of projects, the tight coupling is in the basic organisational format of the project and the way of making decisions it implies. In the case of AI, the

tight coupling is in the depth of their decision premise semantics and in the connection between the decision premise and associated decisions.

As shown in Figure 6, the entry point of the project is in the decision autopoiesis. As was shown in the first and second papers, for project organising, the availability of decision premisses is a decisive factor. Zooming in on this, the papers showed that organisations cannot be treated as uniform systems that deploy projects, but that instead, the degree of distinction between the organisation and the project is of critical importance. The systemic course of a project depends on how it can build decision premisses and which references it will use for this. It was argued that in certain instances, projects themselves will operate as organisation systems, that is, as separate, operationally closed systems. The basic complication that can occur is one of system rationality, i.e., inherent rationality complications or even incompatibility as a result of a mismatch of the sets of decision premisses that the organisation uses to evaluate the projects on the one hand, and the project itself uses to propel forward on the other.

Figure 6 also indicates that, contrary to the project decision topology, the entry point of the AI decision topology is situated in the plane of decision premise semantics. From there, the paper argues that AI transforms decision communication in organisations. It does so by explaining how AI changes decision premisses and the role they have in the decision-making process. The potentially compromising effect of the AI-constituted decision premisses is, in particular, that they can distort the process of decision-making on decision-making. That is, they can clean out the second-order observation in areas and/or sequences of decision-making, where second-order observation should be triggerable without having to go at length, to sustain adequate rationality.

These decision topologies, through the medium organisations, are likely to exert influence on the operations of the functional subsystems. We can best review potential influences by distinguishing between the aspects of decision contingency, variation, and multi-functionality.

Concerning decision contingency, while projects are instrumental in coping with decision intensity, they will not cause de-contingency. On the contrary, they will increase decision contingency further. Evidence for that can be found in the advance of projectification itself. New, more flexible forms of project management have been introduced, like agile and hybrid, that are based on shorter time horizons and higher flexibility than traditional

(e.g., waterfall) approaches. One can say that the projects themselves have been made more contingent. As for variation, it is imperative to repeat that this occurs on the levels of the functional subsystems, i.e., it is a functional substrate, which is beyond the intentional acting of individual organisations. Thus, we cannot draw any conclusions based on the analysis of decision topologies. The restabilisation as a response to variation is another matter. Concerning restabilisation, we can argue that the dynamic of restabilisation through variation will be intensified by the decision topology of projects. Valuable observations touching on this were forwarded by Jean-Pierre Boutinet, who studied projects from the social-psychological perspective. Boutinet argues that by their nature of combining intention and realisation, they are prone to produce hybrid vigor (heterosis), but also *bastardisation*, which accumulates in excess or defect outcomes of a project (Boutinet, 2012, pp. 12–19). Thus, while instrumental in sustaining steering capacity, they are not only creating steering complexity, but also inherent steering unpredictability. The latter, i.e., projects that will ultimately deviate from starting points that were based on some sort of consensus of stakeholders, will lead to a societal multiplication of dangers, as the consequences of decisions that affect entities and individuals, but who are not involved in the projects. Advanced forms of stakeholder relation management will have to be tapped into in order to sustain or achieve societal acceptability. Finally, concerning multi-functionality, it is obvious that the decision topology of the project is, and will be, the instrument per se that is deployed in issues that involve a variety of functional subsystems. As social systems theory posits, inter-functional dependencies will build up, and logically, projects will be most suited to deal with resolving inter-functional steering issues. Notwithstanding that, this project-based form of steering will be subject to the limitations resulting from the double-layered steering mechanisms, as elaborated in publication 2. Concludingly, while the project decision topology will contribute to sustaining societal steering, it will have significant implications for its complexity and predictability.

The feedback effects of the decision topology AI deviate from those of projects, which were discussed above. The role of AI as a decision topology needs to be set aside from the role of AI as enhancing the semantic domain that is available in society. As long as AI increases our relevant semantic domain, it will also undoubtedly increase contingency and variation (a similar point was made in publication 3). However, as a decision topology, the tight couplings that AI generates will dominate its derivative impacts. AI

will effectively stabilise decision contingency, potentially even reduce it. Similarly, it will contain the variation resulting from restabilisation. In that respect, AI as a decision topology can act as a strong (re)stabiliser. Moreover, as was argued, AI reduces loose coupling and hence limits the impact that structural couplings between functional subsystems can mutually exert, or, for that matter, structural couplings between organisations in general. The consequences of this can be significant, particularly if it co-exists with complications in adequate rationality, which is another possible consequence of AI as a decision topology. At this moment, it is far too early to draw any conclusions, and much will depend on how organisations adapt their structures and processes to counter these potentially harmful impacts of AI.

7.2 Theoretical and methodological issues

In this section, subsequently, the following issues will be addressed: the limitations of the methodology applied in the three papers, observations with regard to the organisational part of social systems theory in its current form, and a more reflective discussion of the advantages and disadvantages of the final theoretical framework as laid out in *Organisation und Entscheidung*, compared to the pre-autopoietic one.

The wider research questions underlying the three papers concerned theory development. As a foundation, all three papers are based on the principles of social systems theory, in particular the organisational part, as elaborated in *Organisation und Entscheidung*. Therefore, it can be stated that all the conceptual work performed in the three papers is grounded in a rigorous theoretical framework developed by Luhmann. This framework has a high internal consistency and is, although not easy to understand, transparent in its inner logic. Though the developed models appear to be logically sound and clearly reflect the basic principles and coherence of social systems theory, and in that capacity contribute to the understanding of organisations, their validity is limited to validity as a theoretical construct.

The first paper has a clear lack of empirical validation of its propositions. The four foundation blocks of the model – distinction organisation/project, organisation-bound/autopoietic project, decision-making process, management/governance mode of managing project management – must be subjected, individually and in conjunction, to empirical research. The second paper addressed part of this gap by a critical review of

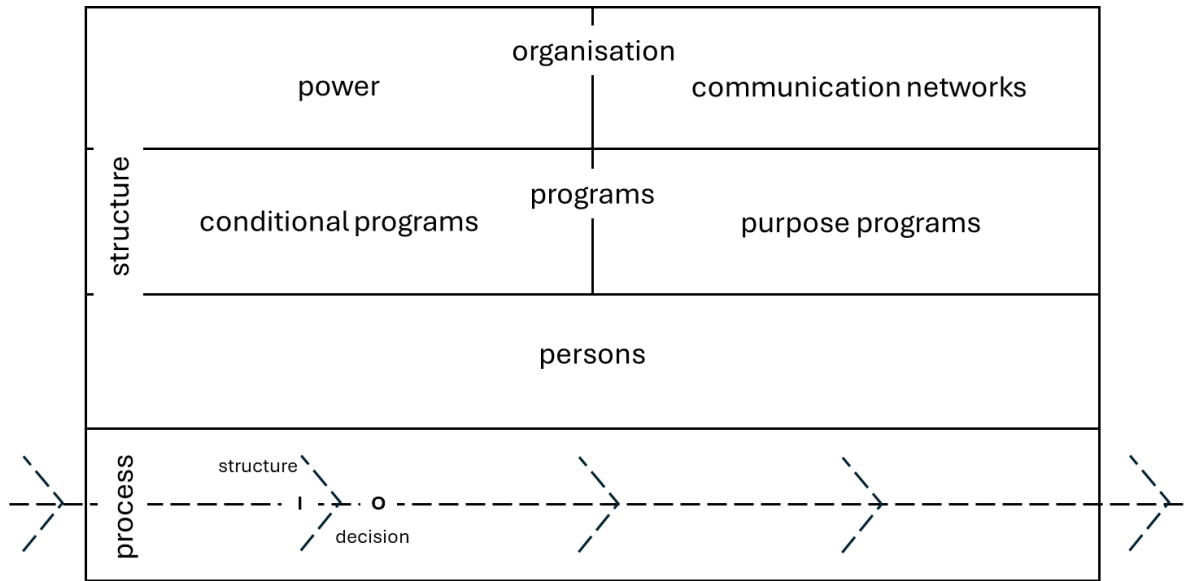
four case study accounts through the lens of social systems theory, notably along the concept of distinction organisation – project, and the distinction organisation-bound project – autopoietic project. The case studies were selected on the basis of providing ‘thick’ data and showing direct relevance to the research topic. Nevertheless, such secondary analysis of already processed and abstracted research data has obvious and significant limitations regarding the claims that can be made on such analysis. The case study review results described here are a first step and must be further elaborated through in-depth multiple case studies in order to achieve a more profound and firm level of findings. The third paper aimed at directly confronting the propositions resulting from the conceptual model with the results of research so far. Although extensive literature research was conducted through Scopus, the review of the literature was not documented as a systematic literature review, and hence is limited as an instrument of empirical validation. Concludingly, the conceptual contributions put forward in the three papers still need to be tested and validated through research that renders primary data.

Next, several observations can be made concerning the current applications of social systems theory in organisation studies. The sparse project research that has been performed in the vein of social systems theory has treated projects and systems external to the (project owner) organisation (Grothe-Hammer and Schoeneborn, 2019; Mohe and Seidl, 2011). Still, the “follow the decision premisses” approach that this research adopted sheds light on the relation between organisation and project. The relationship between interaction system and organisation system, a vital one in the second and third papers, is surrounded by question marks regarding its exact nature. Several contributions that have already been made (Cour, 2018; Hendry and Seidl, 2003; Seidl, 2006), but a satisfying theoretical solution still does not exist, which calls for further studies into the intermediation between interaction and organisation systems. The notion of ‘routing and tagging’, posited in the papers, appears to have potential as a core element of a coherent solution of this theoretical issue. Concluding from the third paper, it can be stated that the functional role of the double contingency principle in organisations is neither fully coherent in the current social systems theory framework. As long as there was no distinction between communications and decision communications, double contingency was not problematic, as it governs any communicative situation. With the introduction of decision communication constituting an operationally closed social system on its own, the organisation system, this changed. The reason is that the double contingency that

individuals experience may still be present in a situation of decision communication, but is reduced in relevance. As an example, a supervisor who is about to inform co-workers that their contracts will be terminated, will not make this communication principally dependent on the double contingency that is present in the sense that this communication is also a societal communication, next to being a decision communication. The double contingency will transpire in the ‘how’ of the communication, not in the principal ‘what’. In an essay originally published in 1975 (Luhmann, 1991b), Luhmann posits that “System formation through organisation can be understood as the reconstruction of double, relatively independently varying contingencies” (p. 40, translation by author). One of these contingencies is present in the behavioural dispositions of the members of the organisation, as members belong to the environment of the social system “in their personal cognitive and motivational structure” (p. 40, translation by author). The other contingency is contained in the rules of the organisation. Rules are contingent because they “are only justified by decision. They are positive. Their changeability is therefore implied and often regulated” (p. 40, translation by author). Luhmann reasons that this double contingency of rules/membership is superimposed on the interactional double contingency, and this, from that moment on fixated, that is, treated as non-contingent. In the autopoietic context, this reasoning becomes problematic. Fundamentally, Luhmann states that double contingency is the driver of communication as it triggers experimentation and solution-oriented acting. However, neither the basic ‘social’ double contingency nor the rules/membership double contingency can be seen as the driver behind the autopoiesis of decision communication. While there is attention for double contingency issues in the current Luhmannian literature (Drepper, 2018; Heintz and Tyrell, 2015), this particular problem is unfortunately not addressed and still remains unsolved.

To close this section, some reflection is given on what can be phrased as the advancement of Luhmann’s organisational theorising. This can best be done along the figure that was introduced in the introduction (Figure 7).

Figure 7. General model of organisation



Source: AMOS p. 128

Although this schedule stems from the pre-autopoietic context, it might as well be taken as a representation of the final framework laid out in OE. To do so, we should understand the process as a strictly operationally closed process, hinging on the oscillation between self-reference and hetero-reference. Communication should be seen more strictly as the concretely defined communication channels. For power, there is no place as a structural component, were this is a representation of the OE framework. Luhmann argues that the role of power is highly constrained by the structures regulating the decision operation of the organisation, and this manifests only, unless there is a crisis situation, in the “micro politics” of the organisation (Luhmann, 2000a, pp. 200–202).

Therefore, with all the analytical instruments present in the pre-autopoietic context, the question seems justified whether or not the addition of decision communication autopoiesis actually enriched the theoretical framework in its capability to explain organisations? Several observations can be made in an effort to answer this question. First and foremost, autopoiesis is an epistemological assumption. In research, we therefore do not set out seeking to prove autopoiesis. At most, we can use autopoiesis directly as an interpretation scheme for phenomena we encounter, but more often it will be used to direct attention to certain phenomena rather than others and subsequently organise them. Here, it may already be superfluous to explicitly refer to autopoiesis. As for organisation

research, the attention of the researcher will be attenuated to the chain of decisions and the inner logic that this chain discloses. In other words, the autopoietic context asks for super-focus on decision progression, which can reveal things that otherwise would elude us. Second, defining organisations as social systems as constituted by communications distinguishes quite explicitly between communication and action. This has several advantages. Observing action as an attribution, as social systems theory does, brings us very close to what actually takes place in reality. Actions are attributed to organisations, top management, colleagues, clients, etc. Attribution opens up the question of why and how the attribution took place. Furthermore, distinguishing between action and communication enables us to clearly reconstruct actions. For example, in the case of preparing a strategic plan or the design of a new product, we obtain a clear perspective on how the communication structures the action. Third, working from the starting point of operational closure brings up circular dependency and independence relationships as a central topic. With other paradigms, the dynamic of circularity and the simultaneousness of dependence and independence would occupy a less prominent place. Fourth, and in connection with the previous point, is the aspect of self-reference. Bringing in self-reference attenuates the status quo and the inevitability of the status quo in any organisational situation, in the perceptions of the researcher. Mistakenly, Luhmann has often been accused of system conservatism in relation to this. This criticism is not justified, as social systems theory works from the proposition that systems continuously need to adapt. Only, it emphasises that there are limits to the extent of adaptation, because systems need the constant reassurance of self-reference, otherwise their autopoiesis would become destructive. System memory is a good example of this, while the system memory is tweaked with virtually every decision and parts of it can be seriously challenged, its overall topology is slow to change.

Concludingly, the pre-autopoietic context offers a theoretical basis that in itself can be considered as complete. The autopoietic context superimposes an epistemological grid on top of it, thus enabling distinct orientations. More than anything else, this epistemological grid enables an orientation towards the “eigen”-aspects of systems, that Luhmann has referred to, amongst others, as “eigen-causality”, “eigen-states”, “eigen-selectivity”. This underlines the importance of what is there in the “now”, and that the now is an accumulation of what happened in the past, as the basic processes of systems are based on recursivity (Von Foerster, 2003, p. 101 ff).

On the other hand, there is a loss involved in the concept of studying systems as recursive communication systems. This is related to the question, why this communication and not another one? Of course, in organisations, structures are answering this question partially, but only as far as these are themselves a product of communication. When do acting individuals with their intentions come in? Individuals in social systems theory are psychic systems, which are themselves operationally closed systems, that are connected to social systems through interpenetration. Interpenetration essentially means that the systems are autonomous to each other but at the same time make their complexity available to each other. A person is a social attribute, an addressee for action (including the attribution of communication as an act). Von Foerster speaks of the social concept of persons as resulting from communicative recursivity (Von Foerster, 2003, p. 305 ff).

In his most recent book, Habermas summarised his critical position on social systems theory in three fundamental conceptual changes that Luhmann made. Firstly, the elimination of the socially acting subject, and reconceptualising it into a psychic system that exists outside social systems; secondly, the reduction of language to the transmission of information; and thirdly, the functionalist reinterpretation of all normative contents of communication, a consequence of restricting language to conveying information rather than meaning. Habermas states that “[n]one of these counter-intuitive basic operations made sense to me, but I have always admired the aesthetic effect, so to speak, of this conceptual architecture” (Habermas, 2024, pp. 98–100) (translation author). Habermas emphasises that the functionally necessary adaptation and adjustment that occurs in societies naturally involve acting subjects with their initiatives and learning process, through which they respond to the problems they observe and the associated pressure to act. He therefore views it as a conceptual mistake to cut the action-capable subject out of the social system. “I think it is counterintuitive to choose the basic concepts in such a way that societies, like a single organism or a species as a whole, can only reproduce naturally, i.e. without the contributions that we are used to attributing to the initiative and ultimately the normative orientation and freedom of decision of members of society who are capable of learning and cooperating and - if I may add this as a philosopher - should also attribute to them” (p. 100) (translation author).

7.3 Novelty and contribution to the literature

Each of the papers offers several novelties, which have been addressed already multiple times in this thesis, and therefore, it suffices to summarise these novelties as follows.

First paper novelties

- Distinction matters. A 5-dimensional framework for assessing a project is proposed, based on the distinction organisation – project
- The approach of distinguishing between organisation-bound and autopoietic projects as fundamentally different types of projects, with the associated attribution of decision-making and decision premisses
- The insight that research is conducted that is based on samples of projects, it is crucial to know which of these types of projects are represented in the sample. A mixed sample most likely produces unequivocal results
- A framework that offers a functional connection between the operational process of a project and the practice of project governance, together with a model for governance practice

Second paper novelties

- A framework for the analysis of projects that is fully based on decision communication autopoiesis
- Elaboration of the intermodulation between interaction system and organisation system
- The concept of autopoietic gravity, aiming to establish an inherent dynamic in the autopoiesis itself and thus creating a concept to describe organisational evolution

Third paper novelties

- an explanation of the impact of AI on the operation of decision communication and decision premisses, on a social systems theory foundation, including a confrontation with existing research results
- the insight that certain effects we witness in connection with the wider introduction of AI in organisations are not incidental, nor should they be

considered as temporal, as they can be shown to be structurally related to the basic operations of organisations

- a practice-oriented framework for maintaining adequate rationality in organisations in the context of increasing application of AI

7.4 Suggestions for further research

Social systems theory is not part of the mainstream in organisation research. Communication is the base operation in social systems theory. This implies a “hyper-actualisation” of studying organisation in the sense of a focus shift to what is/was actually communicated, as the main driver of the organisation’s progression. This in stark contrast to research directed to capturing perceptions, opinions, ratings, or other kinds of evaluations in retrospect. Decision-making is where social system theory can probably make its biggest contribution to organisation and project studies.

As for project studies, not only are projects particularly decision-intensive, but many decisions that have to be made in project have a significant degree of uniqueness, which usually lasts up to the final phases of a project. The concepts of decision connectivity and decision premisses offer an appropriate lens to study the decision dynamics of projects. Social systems theory directs attention to the selections that are made in projects in response to environmental complexity, while it also emphasises the contingent character of complexity and cautions against the use of generalising taxonomies.

Against this backdrop, the conceptual framework proposed in the first paper opens up a completely new research perspective of studying the governance of autopoietic projects, as well as differences with steering organisation-bound projects. So far, the empirical research and conceptual frameworks on project governance have never applied a differentiation between organisation-bound and autopoietic projects, whereas the paper argues that this differentiation is vital for understanding how an organisation can steer its projects. The second paper underpins that project practice is grounded in decision-making, together with the process elements and structural elements attached to that. From these papers, the following suggestions emerge for possible umbrella topics of a research agenda.

- The communicative constitution of the project process (field research by author ongoing)
- The formation of decision premisses in the project front-end: answering the question of why front-end loading works
- Self-reference in project critical situations
- Decision-premise shifts in projects: how and why do projects shift between the three types of decision premisses?
- How is connectivity established in projects?
- Building of project structures and project identity: system memory and self-descriptions.

Studying these topics requires qualitative research. Primarily case studies, which source data from analysing documents, participative observations, individual interviews, as well as focus groups or group interviews aimed at reconstructing situations. The research approach is akin to the suggestions by Stingl & Geraldi in their excellent contribution on studying decisions in projects (Stingl and Geraldi, 2021).

As for the third paper, too, some clear topics for future research emerge.

- Research questions can be crafted around the preservation of the alternative or alternativity in decision-communication in the context of wider application of AI
- The formation of new, AI-mediated cognitive routines is a potential key research topic. Research into the formation of cognitive routines will deepen the research that has already been done into the bias phenomenon
- The impact of AI on interaction systems in organisations; it appeared from the literature that the impact of AI in this area is highly under-researched
- Changes in the responsiveness of economic organisations to communications from other functional subsystems, e.g., the political or educational system, induced by the more dominant use of AI.

8 EPILOGUE – ESSENCE OF DECISION

Having set the stage for this thesis by referring to Allison's analytical account of the Cuban Missile Crisis, meanwhile having addressed the many facets of the quintessential concept of decision in social systems theory throughout this thesis, what remains an open issue concerns the perspective that social systems theory can add to *Essence of Decision* (Allison, 1971).

Allison analyses the events around the missile crisis with three different models: the rational actor (Model 1), organisational process (Model 2), and governmental politics (Model 3).

In Model 1, there are two national actors who pursue goals and make rational, deliberate choices in order to accomplish the associated objectives. In this model, it suffices to treat the government apparatus as a black box. In Model 2, the government is a segmented constellation of various organisations, whose output depends on standard operating procedures (SOPs), routines, and programs. Past practices, routines, and bureaucratic limitations constrain the behaviour of these organisations. Model 3 pivots around the notion that policy outcomes result from bargaining and competition among actors within the government, each with their interests ('where you stand depends on where you sit') and influence. Governmental action is a political outcome shaped by players in positions, power, the rules of the game, stakes, and deadlines.

The perspectives of *Essence of Decision* (EOD) and social systems theory partially overlap where it concerns Model 1. EOD points out the limitations of Model 1 and concludes that it alone cannot serve as a credible explanation of how the missile crisis unfolded. EOD makes a strong case for the more comprehensive and detailed research that Models 2 and 3 require (Allison, 1971, p. 245 ff). In a later edition of EOD (Allison and Zelikow, 1999), a more extensive critique of the rational actor model is added, which highlights the lack of contextuality and underlines that the model is not as predictive as is often claimed and tends to be based on post-hoc rationalisations (pp. 40-76). As was elaborated in the introduction chapter of this thesis, in ZSR, Luhmann fundamentally rejected the idea of purpose-means rationality as the foundation of action, and put forward the notion of the *Bestandsproblem*, that is, system rationality related to the persistence of the system. The common element with EOD is that an 'issue' can only be properly

analysed by involving a wider context, which can be framed as ‘system’ or as ‘organisational processes’ and ‘governmental politics’. The difference is that social system theory provides a coherent, integral framework for including the context in the analysis.

In EOD, Models 2 and 3 are used to analyse different aspects of the history of the missile crisis on the U.S. side. Model 2 focuses on the process of gathering intelligence, the elaboration of attack strategy and plans, and the execution of the naval blockade (Allison, 1971, p. 117 ff; Allison and Zelikow, 1999, p. 217 ff). Model 3 is applied to the chain of decisions directly leading to the final decision to impose a blockade and actively execute it. Practically, it mostly follows the course of events in the ExCom and what was directly related to that (Allison, 1971, p. 185 ff; Allison and Zelikow, 1999, p. 329 ff). Viewed through the lens of social systems theory, which conceives organisations as structure-determined, communication event-constituted social systems, these two perspectives can in fact be united into one. As was pointed out on several occasions in this thesis, organisations establish decision connectivity by drawing on decision-premisses. Organisations will base the decisions on decision programmes, when suitable programmes are available, which is likely to be the case for the activities the organisation regularly performs, or is programmed to perform. The account of EOD shows how the intelligence and military organisations decide along such decision programmes. It also underlines the aspects of operational closure of these organisations, that is, they can only operate on their internal logic, as it is determined by the structures and their chains of previous decisions. This is clearly brought to light, when ‘decisions’ of the Excom, or even of President Kennedy personally, are not executed at all or not executed according to the intentions of the decision itself. As for the decision of how to respond to the Russian threat, representing a unique crisis situation, there are obviously no programmes available that offer an acceptable absorption of uncertainty; thus, the standard proposals put forward by the military were either dismissed or put on hold. Instead, communication channels and persons became the dominant decision-premisses for the core response decision. This is what EOD indeed shows in its account of the events in and around the ExCom. The opinions and proposals of certain individuals were most successful in providing the level of uncertainty reduction that was needed to come to a final decision. The individuals involved extensively deployed trusted communication channels in order to shore up support and credibility of their proposals. In EOD, this process is labelled as

mainly political (“where you stand depends on where you sit”). However, from the actual account provided in EOD, the process appears to have been somewhat more contingent than that. Of course, the military lobbied strongly for the attack option, but this was based on programmes that could not gain a dominant role in the decision-making. A striking example is the fact that the estimates for the impact of the surgical airstrikes were deemed as not convincing (Allison, 1971, p. 204 ff).

The purpose of this epilogue is merely to make some connotations to this highly esteemed work on foreign policy, from the perspective of social systems theory. These, however, underline that the essence of decision is not to be seen as the outcome of organisational analysis, but as its starting point, which tells us that the essence of decision does not lie in the factuality of a decision, but rather in the counterfactuality of decisions in general.

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10 APPENDIX A

Table 7. Results of the Davenport/Miller study per distinction

Organisation	Business area	AI application	Decision/Decision Premises	System memory/Environment	Organisation/Interaction	Structural/loose coupling
Morgan Stanley	Investment Banking	Platform communication and engagement with clients and commender engine for personalized investment and wealth management	Transfer of decision-programmes; AI generates alternatives, employee decides	AI is essentially information providing and automating outbound written communication; use is highly individual; intensify customer engagement		
ChowNow	Online ordering app for restaurants	Communications platform and an analysis tool for sales		AI is essentially providing convert-support information for the salespeople; records and evaluates are salespeople communications, and general sales-tactic information for the supervisor		
Stitch Fix	Online personal styling service	Recommender for clothing, shoes or accessories	AI basically takes decisions, which are highly individual for each stylist; no incentive to override AI algorithm;	Stylist is essentially the human contact to the client, "humanising" the offered fix.	Stylist are mostly working remote, low level of interaction	
Arkansas State University	Higher education	Facilitate fundraising process		AI is essentially a information and convert-support tool used on individual basis		

Organisation	Business area	AI application	Decision/Decision Premises	System memory/Environment	Organisation/Interaction	Structural/loose coupling
Shopee	E-commerce platform	Market analysis, product recommendations, sales and customer behaviour analysis	AI is clear decision premise for marketing decisions; impact is pervasive, whilst "decisions" will still be enacted by staff, based on AI-premisses;	Relation to external environment is totally digitalised.		Clearly trends towards AI-based business model
Haven Life	Life insurance	Analysis of applications and 3rd party data	AI effectively makes decisions, whether to approve or revert to underwriter reviewer; underwriter reviewer works 100% on premisses provided by AI.		Underwriters mostly work remote; weekly meetings, with other underwriters and data science team	
Radius	Mortgage banking	CRM, robotic automation of mortgage processing, extract data from mortgage documents	Basic decision programmes are replaced by AI; also communication channels in case of complete sections of workflows;	System memory is contained in AI, and actually can be changed as a formal process, in that sense the learning and forgetting is in fact an planned intervention; on the other hand, in the case of self-learning this is obviously not the case; the human accessible, communicative part of system memory appears to contain more and more information about human performance		
DBS Bank	Financial services	Transaction surveillance	Clear case of shifting decision programmes into AI; the so called decision by the analysts is in essence following the decision-premise; in the past the decision-premise information had to be			

Organisation	Business area	AI application	Decision/Decision Premises	System memory/Environment	Organisation/Interaction	Structural/loose coupling
			assembled by the analyst, now this is done by AI			
Outsourcing medial coding	Health care	Coding of diagnoses and treatment	Decision programmes are shifted to AI; work is individualised; there is the element of parasiting the existing human knowledge, whilst AI is not adding to that knowledge (the disappearance of entry level jobs issue)		Coders mostly work remote	
Dentzu	Advertisement	Robotic automation of high-frequency , labor-intensive processes	Decision-programmes are shifted to AI, basically the rule-based ones; exception management is an issue as AI follows instructions very precisely; humans have the ability to add information to the evaluation which AI cannot (common sense).			Citizen developer points to relying increasingly on AI at grassroots levels
84.51°	Retail data analytics and data science	Market and sales analysis	Significant shifting of decision programs to AI, as well as persons as decision premise; person is still a decision premise as to support the alternatives generated by AI;	AI is knowingly used in black-box manner as well; "insight specialist" communicate and sell the outcome AI provided	Communication seems to shift to training, thereafter mainly individual work methods	AutoML indicates move towards structural coupling

Organisation	Business area	AI application	Decision/Decision Premises	System memory/Environment	Organisation/Interaction	Structural/loose coupling
Mandiant	Cybersecurity	cyberthreat assessment	Decision-programmes are transferred to AI;communication channels and person are eliminated; on the other hand new person roles as decision-premisses created			
DBS Digibank India	Financial services	Monitoring and prediction of customer behaviour		AI created ability to constantly update system memory; relation with environment is fully digitalised		
Intuit	Financial software for small business and individuals	Text generation			AI standardises written internal and external communication	
Lilt	Translation platform	Translation	AI resulted in reduction of number of communication channels; creation of spider in the web role (project managers) while translators appear to communicate solely to the project managers and the project managers are the sole channel to the customer			
Salesforce	CRM software apps			AI results in standardisation of system memory, it appears to become increasingly normative and become extremely compliant to these norms; what happens to second-order observation? the reflection on the norms?		

Organisation	Business area	AI application	Decision/Decision Premises	System memory/Environment	Organisation/Interaction	Structural/loose coupling
Good Doctor Technology	Health care	Tele-medicine platform	AI acts as a strong filtering decision premise	AI embodies system memory	AI standardises communication	
Osler Works	Legal services	Text analysis, text generation	AI acting as decision premise for persons and partially decision programmes			
PBC Linear	Engineering, bearing and component manufacture	Knowledge capture, training modules for machinists using AR-technology		AI has profound impact on system memory; unequivocal and retrievable		
Seagate	Micro-electronics	Quality inspection	AI shifted decision premisses from programmes and persons to AI	Unequivocal system memory, though by itself not retrievable		
Stanford Health Care	Health care	Robotic automation of pharmacy	Reduction in communication channels	AI created a transparent and unequivocal system memory	Communication (between staff) seems to become more and more limited to communication about exceptions, out of the ordinary (as very often defined by AI)	
Wilmington PD	Police	Predictive policing	Shift from person decision-premise to AI			
Certis	Security services	Image analysis, response recommendation, patrol scheduling			AI eliminated the need for meetings and communication, operating staff receives instructions directly from AI	Increasing reliance on AI as handling the "normal", humans handling "novel situations"
Southern California Edison	Utilities	Risk analysis, maintenance activity planning	Decision premisses on work planning and risk-assessment shift to AI, are then taken as given			

Organisation	Business area	AI application	Decision/Decision Premises	System memory/Environment	Organisation/Interaction	Structural/loose coupling
Massachusetts Bay Transportation Authority	Public transportation	ML-based data analysis of engine oils	AI as decision-premise for maintenance decisions (programme)			
Singapore Land Transportation Authority	Public transportation	Incidence response management	Strong shift from personal and programme types of premises to AI; staff involved in putting data into system memory without being involved in who the decision premises will be changed based on that.			

11 LIST OF AUTHOR'S PUBLICATIONS

The following is a list of the author's publications related to social systems theory.

2026

Roth, Steffen ; Valentinov, Vladislav ; Krönig, Franz Kasper ; Bieliauskaitė, Jolanta ; [Aal, Erik](#) ; Pennington, Mark ; Clausen, Lars
[Ideological Repurposing of Institutions of Higher Management Education: Historical Lessons and Contemporary Imperatives](#)
SYSTEMS RESEARCH AND BEHAVIORAL SCIENCE (2026)
[DOI](#) [WoS](#) [Egyéb URL](#)
Közlemény:36886341 Egyeztetett Forrás Folyóiratcikk (Szakcikk) Tudományos
Q2
Szociológiai Tudományos Bizottság IXGJO SZTB [1901-] C nemzetközi
Gazdaságtudományi Doktori Minősítő Bizottság IXGJO GMB [1901-] B nemzetközi
DOI: 10.1002/sres.70012

2025

[Aal, Erik B. W.](#)
[‘The end user takes the final decision’](#)
SYSTEMS RESEARCH AND BEHAVIORAL SCIENCE 42 : 2 pp. 455-476. , 22 p. (2025)
[DOI](#) [WoS](#) [Scopus](#)
Közlemény:35701695 Egyeztetett Forrás Idéző Folyóiratcikk (Szakcikk) Tudományos
Nyilvános idéző összesen: 1 | Független: 1 | Függő: 0 | Nem jelölt: 0 | WoS jelölt: 1 | Scopus jelölt: 1 |
WoS/Scopus jelölt: 1 | DOI jelölt: 1
Q2
Szociológiai Tudományos Bizottság IXGJO SZTB [1901-] C nemzetközi
Gazdaságtudományi Doktori Minősítő Bizottság IXGJO GMB [1901-] B nemzetközi
DOI: 10.1002/sres.3124

[Aal, Erik B. W.](#)
[The world according to the project](#)
SYSTEMS RESEARCH AND BEHAVIORAL SCIENCE 42 : 2 pp. 270-286. , 17 p. (2025)
[DOI](#) [WoS](#) [CorvinusKutatasok](#)
Közlemény:35442645 Egyeztetett Forrás Idéző Folyóiratcikk (Szakcikk) Tudományos
Nyilvános idéző összesen: 1 | Független: 1 | Függő: 0 | Nem jelölt: 0 | WoS jelölt: 1 | Scopus jelölt: 1 |
WoS/Scopus jelölt: 1 | DOI jelölt: 1
Q2
Szociológiai Tudományos Bizottság IXGJO SZTB [1901-] C nemzetközi
Gazdaságtudományi Doktori Minősítő Bizottság IXGJO GMB [1901-] B nemzetközi
DOI: 10.1002/sres.3082

[Aal, Erik B.W.](#)
[The elephant actually talks - Project organisation from a communication perspective](#)
INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT 43 : 6 Paper: 102750 , 9 p. (2025)
[DOI](#) [CorvinusKutatasok](#) [WoS](#) [Scopus](#)
Közlemény:36294042 Egyeztetett Forrás Folyóiratcikk (Szakcikk) Tudományos
Nyilvános idéző összesen: 1 | Független: 1 | Függő: 0 | Nem jelölt: 0 | WoS jelölt: 1 | WoS/Scopus jelölt: 1 |
DOI jelölt: 1
D1
Gazdaságtudományi Doktori Minősítő Bizottság IXGJO GMB [1901-] A nemzetközi
DOI: 10.1016/j.ijproman.2025.102750

2022

Aal, Erik B.W.

The significance of Luhmann's theory on organisations for project governance

Project Leadership and Society 3 Paper: 100070 , 11 p. (2022)

DOI CorvinusKutatasok WoS Scopus

Közlemény:33779012 Egyeztetett Forrás Folyóiratcikk (Szakcikk) Tudományos

Nyilvános idéző összesen: 3 | Független: 2 | Függő: 1 | Nem jelölt: 0 | WoS jelölt: 2 | Scopus jelölt: 1 |

WoS/Scopus jelölt: 3 | DOI jelölt: 3

Q1

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