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Safety Management

Jean-Christophe Le Coze · Benoît Journé
Editors

Safe Performance in a World of Global Networks

Case Studies, Collaborative
Practices and Governance
Principles



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Safety Management

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and Governance Principles

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ISSN 2191-530X ISSN 2191-5318 (electronic)
SpringerBriefs in Applied Sciences and Technology
ISSN 2520-8004 ISSN 2520-8012 (electronic)
SpringerBriefs in Safety Management
ISBN 978-3-031-35162-4 ISBN 978-3-031-35163-1 (eBook)
<https://doi.org/10.1007/978-3-031-35163-1>

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This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

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Chapter 1

Safety and Subcontracting



Jean-Christophe Le Coze

Abstract The aim of this introductory chapter is to provide a description of the evolving operating landscape of safety-critical systems (e.g. aviation, chemical and nuclear industries, railway) in the past two to three decades, towards network configurations based on contracting out. The topic of this book is strongly connected to this evolution and our understanding of its consequences for safety. The chapter situates the rise of these network configurations in the context of the advent of what has been described as globalisation, a phenomenon shaped by the liberalisation of trade and finance; privatisation and deregulation and the development of technology (communication, transport). A distinction between occupational safety and process safety is introduced to remain aware of different situations, depending on their nature, and positions within such networks. The chapter then summarises the different contributions to this book by a range of authors who bring unique lenses to this topic from a diversity of angles.

Keywords Safety · Contracting out · Networks · Globalisation · Implications

1.1 Diversity, Ambiguity and Caution

When asked to express and to formulate their views about the relationship between subcontracting and safety, people—with regulatory or managerial roles in various safety-critical industries which employ subcontractors and operate, for some of them, across the world (e.g. aviation, railway, oil and gas, health care, nuclear)—come up with a diversity, sometimes ambiguous but also careful answers. These diversity, ambiguity and caution translate the complexity but also sensitivity of this topic.

Some describe cases of activities in their business which are fully subcontracted while attaining excellent safety performance. They add that they do not need to teach anything to these subcontractors regarding safety (offshore). Others are more cautious about what they depict as concerns associated with subcontracting some

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© The Author(s) 2024
J.-C. Le Coze and B. Journé (eds.), *Safe Performance in a World of Global Networks*,
SpringerBriefs in Safety Management, https://doi.org/10.1007/978-3-031-35163-1_1

activities in international contexts, in other countries in which cultural approach of safety is different (aviation). They are cautious, remain suspicious or alert about compliance in these cultural contexts, and what it might mean, for the likelihood of an incident, to be ‘compliant’ in a country with a different approach.

Others mention design projects relying on multiple subcontracted companies which must share information as if they were part of the same organisation. This requires trust in relationships, including the ability to speak up (aircraft manufacturer). They emphasise the difficulty of creating this successful environment because of the existence of contracts. Contracts indeed imply a degree of dependence of the subcontractors or power asymmetry which might impede their ability to express their opinions or views in conflicting situations. Because there is a large consensus about the importance of being able to do so for safety purpose, this situation can become an issue.

Some add in other contexts that they are concerned by the different ways of handling contracts by two branches of their organisation when these two branches must collaborate on the same project (railway). If these two branches subcontract each a portion of the work to be done but with different contractual requirements, what are the implications when the subcontractors, each with their different contracts, meet on site to carry out their tasks? They also wonder about the maturity of the subcontractors who have not yet much experience in the domain and the time and resources it will take for the company to nurture them to reach the expected maturity (railway).

As these few examples show, issues of *contract*, of *trust*, of *standard*, of *compliance*, of *international context*, of *speaking up*, of *supervision*, of *competence*, of *culture*, of *boundaries*, of *asymmetries*, of *power* and of *relationships* play a key role in the link between subcontracting and safety. What these answers express is the deeply organisational realities of subcontracting and their complex operational, managerial, social and political dimension in safety-critical contexts. But, what these views expressed by a handful of people from different organisations also highlight is one key feature of contemporary businesses: their network properties and their range of configurations across industries.

1.2 The Network Organisation: A Brief Description

Considered from a historical point of view, subcontracting comes indeed as a result and as one aspect of some profound transformations of the operating landscape of safety-critical industries in the past two to three decades (Le Coze 2020a, 2020b, 2021). Such companies followed indeed the major changes experienced in many other business areas brought by globalisation, whose consequences were already clearly felt and described at the turn of twenty-first century (Castells 2000; Veltz 2000). These changes were thus translated in the literature into the core notion of networks.

Through the information and communication technology (ICT) and transport revolution (aircrafts, ships), the liberalisation of trade and finance and the privatisation and deregulation of industries (e.g. telecoms, aviation, electricity) of the 1980s and 1990s, businesses and states evolved, adapted to but also created a new operating landscape. Globalisation was not a new phenomenon at the end of the twentieth century, but its intensity, speed, specific nature (e.g. growing significance of finance) and resulting level of interconnectedness across continents clearly were (Osterhammer and Peterson 2005).

The development of global production networks (GPNs) which characterises the new networked configuration of so many companies today, including some safety-critical ones (e.g. aviation), is one of the most visible economic consequences of globalisation (Baldwin 2016; Dicken 2015). With ICT, affordable transports and liberalisation of trade came indeed the possibility of offshoring tasks in geographic areas with cheaper labour, or wherever expertise was available, creating complex networked configurations of businesses, generating extended supply chains.

After two to three decades of development, GPNs exhibit a diversity of configurations across industries from 'open' markets in which companies compete to deliver services or products to lead firms, to more structured networks of stronger relationships based on specialised organisations which provide unique expertise to each other in joint ventures, partnerships or selective subcontracting schemes opened to only few companies.

Notions of subcontracting along with outsourcing (or sourcing) but also offshoring have been introduced to describe various situations and a continuum of complex options ranging from internalised to externalised activities creating multiple intra- and inter-organisational interfaces now exists in a range of industries across firms. Such GPNs do not thrive in a vacuum and depend on complex relationships with states and geographical regions with various attributes, regulations and dynamics, within geopolitical contexts.

In this highly complex new landscape of the past two to three decades, GPN of the automobile, food, clothing, service, logistics or extractive industries strongly differ in their configurations but many of them being today parts, at the head or in the middle, of 'networks of networks' (Dicken 2015; Veltz 2017). For multinationals, these 'networks of networks' mean regular adaptation of their organisational structure and processes in a world of shifting opportunities and threats (Pananond et al. 2020). One way among others of adapting is to organise their operations by creating business units (BU) operating in different geographic areas.

The range of operational, administrative and legal degree of autonomy of this BU in relation to headquarters varies in this respect across industries and companies (Morgan and Whitley 2014). But these evolutions of businesses in the context of globalisation also reflect the liberalisation of finance and its subsequent growing power and influence in strategic decision-making of firms (Auvray et al. 2016; Lazonick 2006). Thus, previously integrated companies were also pushed to externalise, to subcontract activities considered not to be any longer core to their businesses by a financialisation of their strategies (Weil 2014).

One consequence of globalisation, including subcontracting, outsourcing and offshoring, is also the increase of standards. As businesses operate more and more across borders within networks of contracted activities with an array of other organisations, standardisation followed by audits (of such standards) by third parties brings the assurance that activities are performed according to expectations (Busch 2013). In a world of networks, standards are core dimensions of the ‘glue’ which binds the nodes of the networks together across continents (Sturgeon 2001).

The genesis of these standards is complex and varied, at the crossroads of many different constituents among which the states, civil societies (non-governmental associations) and private companies (including international organisations such as ISO). Standards are one facets of a self-regulated side of businesses which developed with this globalised operating landscape, along with traditional laws of states and regions into hybrid governance practices (Graz 2012) multiplying the number of intermediaries (Abbott et al. 2017).

Moreover, as indicated above regarding main globalisation’s drivers, deregulation and privatisation of different sectors (telecoms, transport, energy) in many countries have led to a breaking down of the old monopolistic state organisations, with the intent to favour consumers. By creating a market for newcomers to compete and with the intention to drive prices down while driving quality of service up, deregulation transformed the operating landscape of core infrastructures which used to be exclusively owned by states.

These are now shared with private organisations, producing a networked, or also sometimes described (more negatively) as fragmented, configurations. The end of this monopolistic era of core infrastructure meant also the creation and a new role for states’ agencies in charge of supervising the tendering process and control of the companies making up this network, including areas such as price, quality of service but also safety.

To this picture, one needs to add the growing importance of consulting and the role it has been increasingly playing in different activities of companies, from legal, financial to engineering, IT, environment or safety domains, many of them acting as support of regulation (Clark and Kipping 2012). This dimension of an increase of prominence of external advice also contributes to the network configuration of businesses. Strongly connected to the trend of standardisation, some consulting firms have developed an activity consisting in auditing companies’ compliance to standards but also developing the standards themselves (Van der Heijden 2017).

But consulting can also be a form of subcontracting which is sometimes an intrinsic feature of safety regulation regimes which require safety cases to be produced by companies (Owen 2021). These safety cases need indeed a level expertise in risk analysis that companies do not possess and must subcontract to consulting organisations specialised in this domain. This leads us back to the topic of safety.

1.3 Subcontracting, Occupational (Health) and Safety

One question about this change of operating landscape of safety-critical systems in the past decades is its consequences on safety (Le Coze 2017, 2020b, 2021). It seems important to distinguish two aspects: occupational (health) and safety, and process safety. Clearly, there is an established literature in this domain which correlates subcontracting with degraded occupational (health and) safety conditions (Hasle 2019; Mayhew and Quinlan 2006; Quinlan et al. 2001; Quinlan and Thébaud-Mony 2015; Weil 2014). Two broad contexts can be distinguished. The first one is the exploitation by lead firms in GPN of opportunities to offshore manufacturing in poorly regulated, cheaper geographic areas. The emblematic case is the Rana Plaza disaster in 2013 in Bangladesh, in the garment and fast fashion industry (Anner et al. 2013). In 2013, a building collapsed, and 1200 people died.

In the background of this event is the cheap labour of a developing country working in poor conditions (because insufficiently regulated) which multinationals rely on to produce clothes for markets of developed countries. Reputational consequences for the companies combined with civil society uproar triggered in the aftermath of Rana Plaza reinforced expectations from such multinationals (Anner et al. 2013). Other examples are available, for instance in ship decommissioning, in South Asia, with exposure to (health and) safety risks of workers without sufficient regulation to prevent, for instance, gas explosions (Heidegger et al. 2015). Without generalising, what could be described as a *'dark side of globalisation'* can equate offshoring to countries with degraded working conditions and poor (health) and safety performances as a result.

But Weil also describes a similar pattern, although not to the same extent, in a developed country, the USA, in the context of subcontracting. He illustrates his point in selected cases in mining or telecoms for instance which show higher levels of incidents and accidents in these subcontracted areas (Weil 2014). For this reason, Weil prefers the more negative notion of 'fissured' organisation to the rather widespread and neutral notion of network. This is a second context in which subcontracting has been empirically reported to lead to lower (health and) safety performance.

One reason is that by externalising several of what used to be in-house activities, companies leave to other the role of managing occupational (health and) safety. Because subcontracting can come with several layers of companies with self-employed people at the lowest level, pressures to perform work at the bottom of such subcontracting structures often mean lesser considerations for (health and) safety when work must be performed 'no matter what'. Indeed, when bargaining power against tough or poor working conditions is low in such structural and contractual arrangements, 'job needs to get done' anyway and considerations for (health) and safety not imperative anymore (see the case of labour in the UK in the fast fashion industry, Hammer and Plugor 2019).

Unless regulations are designed to make lead companies accountable for the working constraints that they generate all the way down, whether in the case of offshoring abroad or in the case of subcontracting/outsourcing in national borders of

developed countries, improvements are limited. Of course, it is always contentious to overly generalise, and there is a diversity of situations which must be acknowledged, more virtuous than others, depending on sectors and companies involved. Yet, as established in the literature, the business structure relying on externalising work is intrinsically unfavourable if strong legal requirements are not in place (Anner et al. 2013; Weil 2014). Occupational (health and) safety performance in the context of subcontracting is clearly a question of power asymmetries between lead firms and smaller ones (sometimes all the way down to self-employed individuals) in diverse industries across and within countries.

Such asymmetries can create unfavourable working conditions if not corrected through regulation, and this could hardly be missed in a book on safety and subcontracting and should not be left unaddressed. But, at the same time, although very real, subcontracting is not only and necessarily about asymmetry, degraded working conditions and exploitation of small companies by bigger ones, so nuanced descriptions should also be granted (Tillement and Leuridan 2022). When it comes to process safety for instance, there seems to be a range of other situations which limit some of the drawback of the relationship between occupational (health and) safety and subcontracting. Because of their hazardous processes and their (regulatory) environment, such as in nuclear, aviation or chemical industries, subcontracted activities directly connected to such hazardous processes appear to be tightly managed (and regulated), perhaps more than in the case of tasks unconnected to them, as it is the case with occupational (health and) safety in other domains (garment or construction industries for instance). Let us further develop this comment.

1.4 Safety-Critical Systems, Networks and Process Safety

Designing, assembling, flying or maintaining aircrafts are tasks which require a high level of commitment to quality, time schedule and safety, among other aspects. Drilling, operating and securing a well in an oil and gas exploration also entail a high commitment to process safety, time schedule and quality. The same could be said about trains or nuclear power plants, from design to operation through inspection and maintenance. Yet, many of these activities are performed while being subcontracted, outsourced or offshored to many different organisations. In other words, if one considers aviation, nuclear, oil and gas or railways as examples of safety-critical systems to be relatively successful, the network properties of such systems including subcontracting (outsourcing, or offshoring) show a positive correlation with process safety.

The major players of the aviation industry (e.g. Airbus, Boeing) are classic examples of a 'network of networks' described by Dicken (2015). Airbus' activities rely on the contribution of a myriad of companies with different roles (from designing to assembling) across the world. A list of the number of key partners contributing to the design of core features of an Airbus aircraft is a testimony of such '*network of networks*'. These include Latécoère, Thales Avionics, Liebherr Aerospace and

Rockwell Collins France (Mazaud and Lagasse 2006). These key partners themselves outsource, subcontract or offshore to other companies, and this shortlist represents only a fraction of those other subcontracted companies which work for Airbus (see for instance the case of the provider Axon, in Bourginat 2015). Indeed, beyond the design of aircraft, which is considered to be the core business activity of Airbus, an array of other activities is outsourced, subcontracted or offshored to other companies.

Offshore exploration of oil and gas companies can be equally described as a ‘network of networks’ (Bridge 2008). Key partners of major multinationals of this industry (e.g. TotalEnergies, Exxon, Shell) are also well-established companies worldwide such as Transocean, Halliburton, Schlumberger, Parker Drilling or Baker Hughes to name a few. These international companies play major roles in operating offshore platforms. Refineries in this industry also rely heavily on subcontractors which provide the workforce in maintenance activities for instance, an example of which, among others, is Jacobs Engineering. In fact, from a safety point of view, we know little, empirically, about the details of the many practices associated with these complex achievements in their operational, managerial, social and political realities. We can however comment on the fact that, most of the time, they appear to manage successfully, namely they achieve a relative level of success. However, they sometimes also fail.

When they do, these ‘*networks of networks*’ and their operational, managerial, social and political dimensions are exposed through investigations of presidential, parliamentary or agency commissions which produce reports and through other studies by journalists or scholars. Examples which come to mind are the BP Deep-Water Horizon event (Bergin 2012; Hopkins 2012; National Commission 2011) and the Boeing 737 MAX (Rodgers 2020, Final Committee Report 2022). These events can all be interpreted as *network failure accidents*, as argued by Le Coze (Le Coze 2020a). Analysis of these events reveals indeed the many inter- and intra-organisational interactions on which companies depend (Milch and Laumann 2016). They also reveal traditional issues found in disasters in the past thirty to forty years.

Why did these events happen? Are they the unavoidable products, from time to time, of these sociotechnical systems’ sheer complexity or, instead, the results of blatant lack of emphasis on safety by their leaders combined with weak regulations? Events are always a mix of operational, managerial, cultural, social, strategic and regulatory issues in now global contexts (Le Coze 2020b). In the absence of detailed descriptions of these realities in daily operations, and not only in the aftermath of exceptional events, it is not always easy to appraise the extent of an organisational failure. One problem is that these systems are so extended, complex and vast and represent so many people that it remains a challenge to produce empirical studies of practices while maintaining a big picture of the diversity of artefacts, actors, organisations and institutions involved (see Vaughan 1996 on NASA).

But research on daily operations, such as high reliability organisations, has started to pay attention to what they defined as ‘*virtual organisations*’ (Garbowski and Roberts 2019), an expression which stresses the digital dimension of these networks, while other authors have also started to acknowledge the issue of subcontracting in relation to process safety (see in the domain of pipelines, McDermott and Hayes

2017, for a collection of empirical studies, see Hayes and Tillement 2022). Research on safety regulation is also scarce on the relationship between ‘networks of networks’ and safety (Drahos 2017).

In this area, we however know that a topic such as subcontracting has a different status and treatment across safety-critical industries. Regulators are aware of the need to manage accordingly the breaking down of operations implied by subcontracting when process safety is involved. Strategies however differ between safety-critical systems in terms of legal requirement (some, as in the nuclear domain, restrict the number of subcontractors) but also inspection practices (in the nuclear domain, inspectors to do not talk directly to subcontractors during inspections). Quinlan describes how it took several years for the federal aviation administration (FAA) to realise then regulate the consequences on aircraft safety of offshoring maintenance (Quinlan et al. 2013).

A related area worth mentioning is the contribution of these ‘*networks or networks*’ to the proceduralisation, standardisation and bureaucratisation of safety (Almklov et al. 2014; Bieder and Bourrier 2013; Dekker 2014). As mentioned earlier, with global operations came standards. Standards came with auditing. Auditing came with paperwork. But with networks and subcontracting came also legal and commercial contracts. With contracts came control. With control came paperwork. In safety-critical systems, regulation also added its layer of expectations regarding the visibility of safety management processes, which are translated in additional paperwork. So with inspection by control authorities came paperwork too. This inflation of proceduralisation, standardisation and bureaucratisation is one characteristic of current practices in safety which derives partly from these networked properties of businesses and self-organisation schemes (Størkersen et al. 2020).

1.5 Advancing Knowledge

It is no surprise in relation to what has been sketched in the previous sections that people dealing with subcontracting in safety-critical companies come up with a range of formulations about the relationship between safety and subcontracting. Between caution, ambiguity and diversity, they reflect the complexity of the topic. For instance, occupational safety is not the same as process safety; offshoring simple tasks in low-wage countries is not the same as outsourcing tasks to world-class players in engineering; outsourcing design of an aircraft is not the same as subcontracting maintenance in a refinery; nuclear regulatory strategy when it comes to oversight over subcontracting is not the same as in the chemical industry.

Questioning the relationship between safety and subcontracting cannot be explored without a recognition of such profound transformations of businesses in the past two to three decades into ‘networks of networks’ (Dicken 2015) or into ‘fragmented’ or ‘fissured’ configurations (Weil 2014). Such configurations exist in many different shapes, scales and durations (e.g. temporary projects). Safety cannot simply be understood without a view, even sketched, of this context. The fact that

people refer to issues such as contract, trust, standard, compliance, competence, supervision, international context, speaking up, culture, boundaries, asymmetries and power concretely translates these realities of the operating landscape of safety-critical systems.

In this respect, the chapters of this book constitute a unique contribution to this topic. Authors bring a multitude of insightful angles of analysis on many of these issues, from theoretical, empirical and practical perspectives. They span a range of themes, practices and solutions found in companies involved in subcontracting within wider networked configurations. They address core dimensions to be considered when thinking about subcontracting and can be distinguished in two groups. The first addresses issues of organisational configurations, discussing asymmetries, power and safety; the second elaborating on boundaries, contracts, trust and ambiguities at the heart of subcontracting.

1. *Asymmetries, power and safety*

- Petter Almklov: *Work, Organisational Fragmentation and Safety*.
- Michael Quinlan: *Subcontracting, Repeat Latent Failures and Workplace Disasters*.
- Jean Pariès: *Organisational Lucidity and the Impact of Subcontracting*.
- Jorge Walter: *How to Break the Silence of Subcontractors*.
- Jean-Christophe Le Coze: *Subcontracting Safety (Cases)*.

2. *Contracts, trust, boundaries and ambiguities:*

- Bruce Pinnington: *Complementarity: Ensuring that Contracts Are Compatible with Collaborative Relationships*.
- Colin Pilbeam: *Boundaries: Their Influence on Managing Safety in Outsourcing*.
- Nadezhda Gotcheva: *Sfumato as a Metaphor for Creating a Common Understanding in Complex Projects*.
- Nicolas Lot/Benoît Journée: *The Unsung Virtues of Ambiguity in Subcontracted Work*.

1.6 Asymmetries, Power and Safety

In *Work, Organisational Fragmentation and Safety*, Almklov conceptualises the emergence of three organisational models and discusses their implications for safety brought by their power configuration: the monolithic organisation, with in-house workforce (1), outsourcing of operational work (2) and platform work (3). The three configurations exhibit different relationships of workforce and management but also different approaches to work rationalisation and standardisation, with the presence of increasingly pervasive informational infrastructures (II) in the three models. This evolution towards greater digital potentialities has led to platform configurations, the third model, a specific case of II. Almklov discusses, for the three models, the

mechanisms of work invisibility and labour relations associated and their influence on safety.

Quinlan summarises several decades of empirical research regarding the implications of the second of Almklov's organisation models, outsourcing of operational work. In *Subcontracting, Repeat Latent Failures and Workplace Disasters*, consistently with the argument of the preceding chapter, he shows that the contractual relationships and their imbalances are not favourable, across many industries, to the occupational health and safety of workers. With the help of an analytical model distinguishing Pressure, Disorganisation and Regulatory Failure (PDR), Quinlan illustrates how this situation came to be. He also indicates that this model applies, beyond OHS, to safety-critical industries, with an example of subcontracted maintenance of aircraft in the USA that degraded safety.

A similar argument is developed by Pariès with the help of an empirical study. Following a strategic decision to subcontract work considered to be outside the company's core business (in aviation), several changes were witnessed in operations. Pariès introduces the notion of organisational lucidity to address the implication of these changes from a safety management point of view. Consistent with Quinlan's PDR model and Almklov's argument, increased invisibility of work and loss of bargaining power through the asymmetrical, contractual and commercial relationships (in contrast to in-house operational work) leads to degraded work conditions for the subcontractor. To improve the situation, Pariès suggests partnership rather than domination, joint learning and interfaces at the highest levels on both sides.

It is the same topic that Walter addresses, in *How to Break the Silence of Subcontractors*, showing how the power imbalances can be corrected by structural, organisational and regulatory measures, contrasting two cases of subcontracting, one in the construction industry concerning a high-profile project for the 2012 Olympic Games and the other in the oil and gas sector.

In the last chapter of this group, Le Coze explores another facet of subcontracting and safety not addressed in the other chapters of this book. *Subcontracting Safety (Cases)* is an empirical contribution to the topic of subcontracting and safety in the context of the regulations of hazardous installations and risk analysis (process safety). Consistently with the perspective followed in the other chapters of this first group, it discusses the relationships between companies, consulting firms and the regulator. These relationships are mediated by contracts which define the conditions under which a safety case is produced, a service very often provided under time, financial and competitive pressures which characterise a market created by regulations.

1.7 Contracts, Trust, Boundaries and Ambiguities

It is precisely this core notion of contract in the context of subcontracting which is the topic of Pinnington's chapter *Complementarity: Ensuring that Contracts Are Compatible with Collaborative Relationships*. Following a definition and an explanation of the reason for contracts' centrality in subcontracting, Pinnington conceptually and empirically discusses the conditions for trust, collaboration and cooperation to develop despite their legal and commercial nature. Examples of vicious and virtuous cycles of distrust and trust illustrate his argument, situating the possibilities of increased and smooth cooperation in the presence of adequate governance processes between buyers and suppliers.

Beyond contracts, Pilbeam is further interested in a characterisation of what is happening at the level of the boundaries between organisations created by subcontracting. Reviewing several analytical frameworks, he insists on the multifaceted nature of boundaries in his chapter *Boundaries: Their Influence on Managing Safety in Outsourcing*. Over the past decades, several authors have shown how cultural, organisational and cognitive dimensions shape the quality of cooperation across boundaries. Management should therefore pay attention to these multiple aspects to facilitate interactions at the boundaries of organisations, with an important role for boundary spanners.

Temporary organisations, such as construction projects, which bring together diverse organisations for a limited period, represent specific types of subcontracting situations. Boundaries greatly matter in this case too, particularly when organisations multiply. In *Sfumato as a Metaphor for Creating a Common Understanding in Complex Projects*, Gotcheva discusses the importance of maintaining a shared understanding of operations, particularly when safety is concerned. When differences embedded in cultural assumptions collide, mutual positive distinctiveness is needed to soften sharp boundaries. She proposes the metaphor of Sfumato, borrowed from Da Vinci's painting technique, to emphasise the need for adequate handling of the boundaries in this respect.

In their chapter *The Unsung Virtues of Ambiguity in Subcontracted Work*, Lot and Journé exemplify the operational, managerial and structural conditions at the boundaries favouring the resolution of problems in practice, for safe task completion. Starting with the premise of the impossibility of covering every situation through procedures and anticipation (which characterises the ongoing, recurrent and permanent situation of ambiguity), they show the need for collaboration, in discussion spaces, between actors from the multiple organisations involved. They stress the importance of soft skills when it comes to dealing with unexpected situations, contradictions or new constraints in such spaces but also the importance of adequate structural–organisational arrangements for these discussion spaces to provide the conditions needed.

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Chapter 2

Work, Organisational Fragmentation and Safety



Petter Almklov

Abstract In this chapter, I propose the following argument: the organisational landscape of today has and is currently going through changes that can be described as different forms of fragmentation. This has consequences for organisational theory, the ways work is described, coordinated and governed, and in turn, it influences safety theory and practice. By discussing three different stereotyped “stages” in this fragmentation, I will demonstrate how current organisational changes influence work practice and safety management, and I will argue that we need to understand the boundaries through which work and safety are managed and the role of information infrastructures in these processes.

Keywords Organisational fragmentation · Safety governance · Platform work · Digitalisation

2.1 Work and Changing Organisations

A paper I have cited again and again the last decade is Barley and Kunda’s (2001) programmatic argument that organisational scientists need to “bring work back in” in order to avoid theory keep growing increasingly outdated. While organisational scholars are eagerly theorising new organisational forms and new technologies, their understanding of work and how it is changing is lagging behind and often based on studies done in the era of traditional bureaucratic and hierarchical organisations.

Even though much safety research could be said to be a sub-field of applied organisational theory, one could argue that several research traditions within safety research have indeed shown substantial interest in work practice. This is for example seen in the detailed ethnographies in the High Reliability strand of research (e.g. La Porte and Consolini 1991; Roberts 1990) and in the more recent discussions of resilience with its focus on situational variability and the terms “work as imagined” and “work as done” (Haavik et al. 2019; Hollnagel et al. 2006), in discussions of

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© The Author(s) 2024
J.-C. Le Coze and B. Journé (eds.), *Safe Performance in a World of Global Networks*,
SpringerBriefs in Safety Management, https://doi.org/10.1007/978-3-031-35163-1_2

safety rules and compliance (e.g. Bourrier 2017; Hale and Borys 2013), and not least in accident investigations. Some interest in the nitty gritty details and contextual variability of work practice has always been a deed of necessity in safety research, as it might be a matter of life and death.

Still, radical organisational changes in several sectors and industries mean that we need to continuously update our understanding not only of organisational models, but also of work practice and how it is governed.

In the following, I will discuss how some such changes affect the way work is governed and its implications for safety. I will simplify trends that are continuous and complex to three main “stages” of development. These stages, or ideal types, are concerned with the contractual relation between the organisational systems and the sharp-end workers.

- Normal, “monolithic” organisation where operational work is conducted by in-house operators. This means that the workers are employed in the organisation that oversees their operations.
- Network organisations relying on subcontracting of operational work. This means that the workers work for organisations that are in contract relationships with the system owner.
- Platform work organisations. This means that each individual worker has an individual contract for providing services and is paid per task, usually with no fixed salary or permanent relationship to the organisation.

These are, of course, stereotypical forms, not at all representing the heterogeneity of organisations out there in the real world. The term “stages” may suggest that all organisations will follow the evolutionary trajectory described here. That is not my intention with the term and not the empirical reality. Rather, they can be seen as stages or degrees of fragmentation.

Another important framing is that I will focus on subcontracting of *operational work*, and I will seek to apply a quite narrow understanding of that. This means that, for example, subcontracting of specialist services or of projects will be outside or on the fringes of the scope of the discussion.

The chapter is a theoretical discussion drawing on my own and my colleagues’ research and from the literature. The theoretical argument centres on what I call rationalistic discourses of work within these new developments and the role of digital technologies in these discourses. In a recent publication, Stian Antonsen and I connected these trends towards organisational fragmentation to digitalisation and standardisation and argue that the discourses of work inherent in these developments can be seen as important changes in “work as imagined” and that we need to consider what they mean for “work as done” in practice (Almklov and Antonsen 2019).

A penetrating topic throughout my discussion of these organisational forms will be the role of *information infrastructures* (IIs). On one hand, information infrastructures are networked computer systems through which information can move.¹

¹ Though IIs are normally discussed as digital systems today, I agree with Bowker and Star (1999) who state that for example a simple list written on paper is also an information infrastructure. It is

However, they also contain rules or standards regulating what kind of information can move. Thus, they provide mobility of information at the expense of contextual detail. Standardised descriptions of work either in procedures or different forms of reports or quantifications become mobile in IIs because they are decontextualised (Almklov and Antonsen 2019; Bowker and Star 1999; Hanseth and Monteiro 1997).

I will end the chapter with a synthesis of these approaches, arguing that IIs intersect organisational boundaries in ways that challenge our understanding of what an organisation is. Within this lies the argument that IIs change both the discourses of work and its coordination. They may lead to disempowerment of practitioners' perspectives and increasing managerial control but may also contain some possibilities for safety researchers, policymakers and practitioners to influence safety in new ways that counter that.

2.2 Monolithic Organisations, In-House Workforce

To describe normal monolithic organisations, in all their variety, in a couple of pages of a slim chapter is a daunting task. However, focusing on how they differ from network organisations and some current changes in managerial ideology caused by technological change may be possible.

First of all, an organisation where the operational work is undertaken in-house can be expected to have a relatively stable workforce and will typically develop an organisational culture. In institutional theory, an important strand of organisational research, a typical observation is that the organisation is not only a rational system with a purpose, a division of labour and some coordinating mechanisms,² but also becomes a social system, with a culture, values, informal interactions and other social qualities (e.g. Christensen et al. 2020; Selznick 1957). An organisation is more than charts and diagrams; it is a social system, not only a set of functions or a collection of individuals. The (organisational) map is rationalistic, but the terrain contains institutionalised social dimensions and the material conditions in which work is conducted. In practice, for safety researchers, it means that we need to understand the sociology within the organisation and how it affects safety. The informal aspects of organisations with relevance for safety are often discussed using the umbrella term safety culture: the shared values, norms and basic assumptions that influence safety. As Antonsen (2009) reminds us, this should never lead us to forget that power struggles and fragmentation are important aspects of these social dimensions.³

a structuring of information according to some rules or categories. For this discussion, however, an understanding of IIs as networked computer systems is sufficient.

² This minimal essential definition of organisation is loosely based on my reading of Mintzberg (1993).

³ And though power struggles within an organisation might intuitively give negative associations, the assumption being that harmony is better, they can in some cases be constructive for safety as well, contributing to the maintenance of a plurality of perspectives and alternate voices, as illustrated

The positive side of viewing organisations as social systems is that it provides us with a well-stocked toolbox for working constructively with the social dimensions towards safety. This is one of the cornerstones of the HRO literature (e.g. Weick and Sutcliffe 2015). It is indeed hard to develop a sound safety culture, or more generally influence the informal traits of an organisation, but in comparison with the other organisational forms discussed in this chapter, managers of “normal” organisations have much leverage to do it, by training and culture programmes, by hiring decisions and by setting a good example. Controlling the boundaries of the organisation, having the operational personnel in-house over time, makes it possible to influence safety with a broad spectrum of organisational tools, through formal systems and in informal and indirect ways. It allows for safety-enhancing social and cultural traits to emerge over time. As Weick (1987) noted, the social dimensions of an organisation, including what we call organisational culture, can be a source of high reliability.

But there are also changes in the ways these traditional organisations are organised and operate that affect how work is described, prescribed and governed that affect the way safety is produced. One may argue that the last few decades have been characterised by more rationalistic discourses of work and more detailed management in terms of reporting and procedural control also within traditional organisations.⁴ This can, on one hand, be attributed to the doctrines of managerialism: that management has become a discipline of its own and the adage that a good manager can lead any organisation. This transition from managers being specialists in specific industries and systems, to generations of managers that manage mainly by standardised measured output, e.g. through management by objectives, increases the importance of formal systems of accountability and audit also within organisations (see Power 2007). This again means more standardisation of how work is prescribed, more reporting, all in more detail. This goes hand in hand with digitalisation. Indeed, the transaction costs of detailed control through such auditing mechanisms would be prohibitive, were it not for the possibilities afforded by digital systems. When an operational worker gets an updated list of detailed procedural steps on his smartphone or tablet and reports back instantly when the task is complete, it changes the leverage for control, also for managers who do not understand the work itself but who can measure the production of pre-specified output. Thus, the information infrastructures through which work is prescribed and described, the organisational discourse of work, moves towards more detailed specification and towards more standardised descriptions.

This change has many advantages, also in terms of safety, but the increasing level of detailed standardisation and control of operational work also reduces workers’ freedom to conduct on-site situational adaptations that can be very important in some cases (Almklov and Antonsen 2019). It also changes the organisational discourse of

by Rosness and Forseth’s (2013) discussion of “Boxing and dancing” in the Norwegian petroleum industry.

⁴ The ways in which organisations are influenced by such developments is often discussed in the so-called neo-institutional theory (see DiMaggio and Powell 1983; Røvik 2011). A part of this is the spread of organisational ideas, such as managerialism, from the private to the public sector.

work in a rationalistic and more instrumental way, potentially suppressing its social dimensions, such as the networks of learning and collaboration within communities of practice (Lave and Wenger 1991), personal expertise, conceptual slack (Schulman 1993), some of which are often found to be important in HRO studies (Weick and Sutcliffe 2015) and in resilience theory (see, e.g. Haavik et al. 2019; Wiig and Fahlbruch 2019).

To summarise: If we consider a typical monolithic organisation which has its operational work in-house, this is a system where the tools for managers and workers for influencing safety in the sharp end are within the walls of the organisation. Moreover, it can be seen as a social system with both formal and informal traits.

2.3 Outsourcing of Operational Work

Much of my work the last decade has been focused on how outsourcing and organisational models where a market is a key coordinating mechanism (such as internal buyer–supplier models) lead to changes in how work is represented and managed. Where organisational research and theory, and particularly several ethnographic studies of work have highlighted the importance of informal social dimensions of the workplace, outsourcing and market-based coordination entail a more rationalistic way of describing work. Put simply, in the discourse of work in systems where it is outsourced, there is a conflation between work as imagined and work as done. When a buyer orders a task from a supplier, the procedure is the specification of the “product” he pays for. He does not pay for “social dimensions” and what have you.

When studying outsourcing of operational work in critical infrastructure sectors, a key observation was that outsourcing led to such a discourse of work. When operational work was outsourced, it was typically seen as standardised products described in detail. To be bought and sold on a market work was “commoditised”, broken down to manageable entities that were standardised. Though standardisation makes the transaction simpler and lowers the transaction costs involved, it also decontextualises the descriptions of work. This, we observed, renders certain aspects of work organisationally “invisible” (Almklov and Antonsen 2010, 2014). That which would be a procedure in a traditional organisation, would be a product specification in an economic transaction in the outsourced model.

Though work is often understood as “those activities that are sold on a market for a price”, as argued by Wadel (1979) and Orr (1991:12), this does not at all cover the activities that comprise work when it is studied ethnographically. Work is a situationally contingent and social activity, and decontextualised descriptions of it cannot capture all of this. The fact that parts of practice or aspects of it are invisible to people outside the community of practice is not necessarily a problem in itself as this can be a source of power and flexibility for the workers (see Star and Strauss 1999). When work becomes embedded in market-based or market-imitating transactions, however, this invisibility is more problematic. What typically gets lost when work is represented in rationalistic discourses and transactional logics, are aspects linked to

situational adjustments, ad hoc coordination, informal relationships among workers and learning in a community of practitioners. Many of these qualities are known to be relevant for safety and resilience.

2.4 Platform Work

Platform work, work in the “sharing” or gig economy has become a topic of much academic interest recently.⁵ Though it arguably still comprises a limited part of the economy in most countries, it has spurred debate as it challenges our notions of working life and of the employer–employee relationship. It has also faced several legal challenges as it circumvents several protections afforded by labour regulation in many countries. A worker in the platform economy, an Uber driver or a food delivery cyclist, is typically not employed by the organisation he works for, but conducts tasks that are assigned by an app, and is paid for each trip or task. All their activities are governed by the app.

If we start with a classical instrumental understanding of an organisation as an entity with a goal and which relies on division of labour and coordination to reach it, one can argue that the technological platform, or information infrastructure, has taken the role of the organisation. The app is the manager and the organisational system. As argued by several authors,⁶ some discourses on the platform economy tend to portray platforms as matchmakers, as technologies primarily. Conversely, Pujadas and Curto-Millet (2019) argue that they should be seen as socio-technical infrastructures, non-neutral inscriptions of practice. As is the case for information infrastructures more generally, the information infrastructures regulating platform work are also heavily based on standardised descriptions of work. In the previous section, I described a development towards commoditisation of work in network organisations: for the buyers of outsourced operational work, good control often hinges on detailed, standardised descriptions of atomistic tasks. This lowers transaction costs, since it makes it easier to decide prices and to control whether the task has been executed as ordered. In the platform economy, this commoditisation of work is taken to the extreme and controlled by an algorithm. For an electricity grid operator (in the outsourced model), commoditisation can, for example, mean standardising the periodic maintenance of a specific type of transformers to a delimited, standardised task, making it easier to compare tenders from different suppliers for this task. For platform workers, such processes are inscribed in the apps and automated.

⁵ See Kalleberg and Dunn (2016) for a short summary of different forms of work in the platform economy. Some of the types of platform work described by them, such as specialist freelancing, are characterised by more freedom and power for the workers, than the what I describe here as the typical app-work.

⁶ Including my colleagues Marie Nilsen and Trond Kongsvik (Nilsen et al. 2020, 2022).

What this means is that the organisation is enfolded in the app. But it is only the functional, rationalistic part of it. The organisation as a social system is eliminated or suppressed. An illustrative example of this is how Uber drivers complained when visiting the offices of Uber in San Francisco that they were not allowed to use employee restroom. This symbolises the fact that they are not parts of the organisation, they are not members of Uber as a social system. The app regulates their interaction with the company, and the app does not have a restroom.

There are several counterforces to the gig economy, particularly in the social democratic economies in Europe, such as my native Norway. Recently, food delivery cyclists won a court case recognising them as employees of the company they work for. However, if we consider this trend towards platform-regulated work more broadly, it poses some interesting questions regarding how we, as safety researchers and practitioners, can contribute to maintaining and improving acceptable safety and working conditions in industries where the operational work is moved outside the organisation as a social entity, and where “organisation” becomes pure essence, a matter of coordination and payment through a computer system. Platform work is an illustrative example, an extreme case, of information infrastructures replacing the organisation as we are used to thinking of it: as a company where people are employed, where managers lead and employees collaborate.

There are clearly safety-relevant power dimensions to be investigated within this development. In a classic study in sociology of work, Lysgaard describes how the “worker collectivity” (Lysgaard 1961 in Norwegian; see also Karlsson et al. 2015), the community of factory workers, represented a joint counter force against the relentless, insatiable demands of the management and technical systems. The individual app worker is largely on his own and has little ability to respond to these pressures to work ever harder and more efficiently. This has implications for general well-being at work, but also for safety in work execution. For example, Nilsen et al. (2020; 2022) discuss this app-driven efficiency pressure in the light of Rasmussen’s (1997: p. 1990) drift-to-danger model, suggesting that the pressure for efficiency is poorly countered by safety measures that are found within traditional organisations, possibly leading to a drift towards unsafe situations and unacceptable workloads. While some of these counter-gradients may be recognised organisational safety measures, such as OHS training, also more general organisational traits such as the development of communities of practice, general professional training and a collective identity as well as more general medical and social support services can also counteract the efficiency pressure and the detrimental effects it might have on health and safety.

2.5 Discussion: Infrastructures and Fragmentation

The three stereotypical organisational forms I describe here clearly differ in the location of the formal organisational boundaries. This is illustrated in Fig. 2.1.

Governance of work increasingly transcends organisational boundaries. Figuratively, the boundaries around the “blobs” become less relevant, and the information

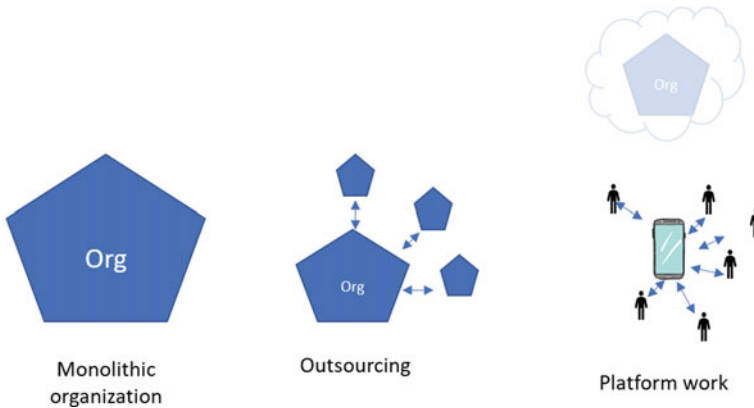


Fig. 2.1 Three stages of fragmentation

flow symbolised by the arrows, and the power exerted through them, becomes more important to understand how work is governed.

In both the monolithic organisations, networked organisations and in platform models, work is increasingly regulated through digital systems. This means that it is a general development in most sectors of working life of today that work is specified in more detail, both in terms of procedures and reports. Information infrastructures are fundamental in this development. They make it possible to govern work in more detail, with greater mobility of reports and procedures. This mode of governance depends on standardisation and leads to a more rationalistic discourse of work. Work, even for university professors, is increasingly viewed as consisting of a set of atomistic commensurable tasks and as producing measurable output (credits, students, journal papers). This is the mode of governance in the audit society of Michael Power (1997). This development occurs within all three stages discussed above. However, it is more pronounced and somewhat different in the two latter.

When operational work is outsourced, the standardised tasks are entities that are traded among the buyers and suppliers. This further emphasises the rationalism of the standardised representations. The work you order is what you specified in the tender. To do more is wasteful, to do less is breach of contract. Thus, the contractual dimensions of the regulation of work actively suppresses those aspects of work that are not specified. Serious buyers, who understand that it is more to work than in the specifications of it, will often want to incentivise a good working environment among their suppliers, but it is not easy to do it without specifying exactly what they want.⁷

⁷ This is a traditional principal-agent dilemma. If, for example, the buyer wants the supplier to have extra capacity and redundancy, they need to pay for it. But the supplier, striving to be effective may cut corners and reduce it, as it will be profitable for them to do so.

However, in contrast to platform work, the workers in a supplier within an outsourced model will belong to an organisation and have colleagues and a management that has an obligation to take care of their rights according to labour laws and regulations. In some cases, as we for example saw among outsourced electricity fitters (Almklov and Antonsen 2014), the workers in outsourced companies also became more specialised and attained a more distinct professional identity. Their work situation may, as in the case of platform workers, be more precarious and stressful because their employment depends on their ability to get the next contract, but this pressure rarely hinges on the single individual.

Platform work, on the other hand, is a form of work that is purely rationalistic. The procedure, or order, is the work. The outcome is the measured and reported result. And typically, there is no organisation in the sense of a social system that counteracts efficiency pressures that may lead to unsafe and unhealthy work situations. Moreover, since many of them are self-employed, the labour laws and regulations do not protect them in the same ways as they do traditional employees. In my discussion of platform workers, I have focused on transport and delivery services. These work alone, and the extent of interaction with other workers is highly limited as well, so the informal protection provided by belonging to a community of practitioners is rudimentary at best.

However, as I will discuss in the concluding section, the digital technologies may also be appropriated to improve OHS in the platform industry.

2.6 Conclusion and Implications

Many of the readers of this book will be managers. Many will also be in roles where they can influence safety. Few will, however, be placed so high in the hierarchy that they can influence the key strategic decisions regarding the business model or organisational strategy, e.g. on whether the organisation should outsource operational work. So, the challenge is, for most of us, how to work constructively with safety within different business models.

Within these constraints, I see two takeaways from this discussion, areas where researchers and practitioners can influence safety.

First of all: I believe that there is a never-ending and ongoing struggle of always nuancing and elaborating rationalistic conceptions of work in organisational models. As managers and researchers, we need to go beyond standardised formal descriptions of work and seek to understand it, as much as possible, in the context of its execution. Furthermore, as resilience theory reminds us, variability (where the terrain of execution deviates from procedures and plans) is not necessarily a problem. It can also be a resource for safety and resilience. Managers and safety professionals must have a keen eye for what is beyond standardised representations of work and accept that

non-standard variation and imperfections in work execution are not only necessary for safety, but often for efficiency.⁸

Secondly, as we see new organisational boundaries emerge between system owners and practitioners, we should also see the new pathways of communication across them, in the forms of ICT systems, as resources not only for rigid control, but also as resources for more diverse and dynamic ways to influence safety. Though ICT systems are extremely well suited for control through standardisation, rigid accountability and audit-based control, they can also provide avenues for worker empowerment and collaboration. An implication of this is that actors with an interest or mandate for improving OHS, such as unions or regulators, can seek to establish new digital (or physical) arenas, or support those who emerge among workers, to replace what is lost in the traditional organisational models.

In the case of platform workers, these may contribute to exchange of information and experience, inspire collective action against unreasonable demands, lead to professional development and for example give opportunities for collective insurance bargaining. Many of the OHS problems associated with this model lie in the power difference between a large corporation and an individual worker. This may be somewhat improved by establishing arenas seeking to nurture some sort of community among them.

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⁸ Interestingly, safety management systems, often heavily based on standardisation, can also lead to a disempowerment of practitioners' perspectives and suppress the discourse regarding situational adaptation (Almklov et al. 2014).

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Chapter 3

Subcontracting, Repeat Latent Failures and Workplace Disasters



Michael Quinlan

Abstract Subcontracting, the subletting of work tasks creating a hierarchy of contractual relationships (especially multi-tiered subcontracting), is a centuries-old form of work organisation but has grown substantially since the mid-1970s, including Uber-type arrangements facilitated by digital surveillance and platforms and global supply chains (Nossar in *The regulation and management of workplace health and safety: historical and emerging trends*, 100–122, 2020). Evidence that subcontracting arrangements can exacerbate health and safety risks (including injury rates, exposures to harmful substances and worker mental wellbeing) is also not new, being extensively documented by government reports and research from the late nineteenth century (see for example Gregson and Quinlan in *Labor Hist.* 62:534–550, 2020; Quinlan in *Int. J. Health Serv.* 43:721–744, 2013; Quinlan et al. in *Saf. Sci.* 57:283–292, 2013)). This paper focuses on the connection between subcontracting and workplace disasters, how to understand their causation and what remedial measures can be taken to minimise such incidents. To do this, it draws on the Pressure, Disorganisation and Regulatory Failure (PDR) model (Bohle et al. in *Work Stress* 29:114–127, 2015) and the Ten Pathways framework for analysing death and disaster (Quinlan in *Ten pathways to death and disaster: learning from fatal incidents in mines and other high hazard workplaces*, Federation Press, Sydney, 2014).

Keywords Subcontracting · Outsourcing · Safety · Occupational accidents · Disasters · Latent failures · Organisation

3.1 Subcontracting and Serious Workplace Incidents

Subcontracting refers to the subletting of tasks (or parts thereof) to third parties which may be undertaken within the initial employer's workplace or outside (outsourcing). It can entail a pyramid succession of contracts as those contracted further sublet

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work (multi-tiered subcontracting) and can take on a variety of forms or contractual arrangements ranging from simple exchanges through to more structured types like Uber. It can involve both short-term and long-term agreements between contracted parties (e.g. employment agencies do both). Subcontracting is both a business and work arrangement, and supply chains typically consist of a succession of contracts for the provision of goods and services that in essence amounts to structured subcontracting. Over the past two decades, a growing body of international research has linked subcontracting to adverse occupational health and safety (OHS) effects, including higher injury rates, disease exposure and mental health problems across a wide range of industries, including trucking, aviation, construction, mining, health services and manufacturing (Mayhew and Quinlan 2006; Thebaud-Mony 2011; Underhill and Quinlan 2011). Given the complex array of subcontracting arrangements identified above, it is possible that the extent of risks may vary, for example being higher where subcontracting is multi-tiered and entails more hazardous activities. There is also a question as to whether risks arise from vulnerable workgroups rather than subcontracting itself, but the bulk of research suggests vulnerable groups magnify risks intrinsic to the subcontracting process not vice versa (Bamford 2015).

In order to address the threats posed, it is important to understand how subcontracting arrangements can undermine OHS. While PDR is a general model on how work organisation affects OHS, its development was grounded strongly in evidence drawn from numerous incidents, including those where subcontracting played a pivotal role. Table 3.1 provides a summary of the key risk factors under each category of PDR. Before elaborating, it is important to note that the PDR model applies to OHS outcomes more generally (including physical and mental health), not just to injury/fatal incidents. Nor does it simply constitute a grid approach as might be implied by Table 3.1. The model also uses a validated survey instrument which has successfully been applied (see for example Bohle et al. 2015 and Knox et al. 2017). It has also been used by a number of European studies of the risks associated with agency labour and outsourcing (Pilbeam et al. 2020; Strauss-Raats 2019). There is certainly scope for further research exploring these and other nuances/complexities, such as how boundary-setting operates in relations between large firms and their successive rings of contractors/subcontractors (for a recent Swedish study doing this, see Nygren 2018). Nonetheless, evidence for the overall effect of weakening OHS identified in earlier studies has been overwhelmingly reinforced by subsequent research.

The PDR model has specifically been applied to a number of incidents and industries to test its explanatory power and what light it sheds on their causation and remedial measures. An examination of US civil aviation incidents between 1995 and 2010 involving the outsourcing of maintenance and sufficiently serious to warrant a formal National Transportation Safety Board (NTSB) investigation (five were examined although a sixth was later identified) found the three PDR drivers were present in all (see ValuJet 1996 example in Table 3.2). In terms of economic/reward pressures, outsourcing of maintenance was driven by cost pressures as low-cost carriers entered aviation, but this encouraged cost minimisation in repair work including doing maintenance at night under tight time pressures by lower paid and less qualified workers,

Table 3.1 Pressure, disorganisation and regulatory failure model elements

<i>Economic/Reward pressures</i>	<i>Disorganisation</i>	<i>Regulatory failure</i>
Economic/financial pressures on work effort/cost-cutting	Short tenure, inexperience	Poor knowledge of legal rights, obligations
Contingent, irregular payment and job insecurity	Poor induction, training and supervision	Limited access to OHS, workers comp rights
Long or irregular work hours	Ineffective procedures and communication	Fractured or disputed legal obligations
Multiple jobs/ underemployment	Ineffective OHSMS/ inability to organise	Non-compliance and weak regulatory oversight (stretched resources)

a focus on “break and fix” rather than investigative maintenance [which wasn’t paid for], moving work to locations/countries with poorer safety records and unauthorised subletting of work to third parties (Quinlan et al. 2013). In terms of disorganisation, the insertion of a remotely located party into maintenance increased potential for disarticulation and breakdowns in communication/supervision, maintenance repair organisation (MRO) staffing was marked by greater inexperience, staff turnover and poorer induction/training especially given regular staff movement compared to in-house maintenance, safety management systems were compromised, and there was little ‘worker voice’ to raise safety issues (this spread to in-house facilities where remaining maintenance staff were threatened with further outsourcing). Third, regulatory failure was evident in legislative gaps covering maintenance, regulatory oversight that failed to identify major deficiencies found in other audits, failure to respond effectively to deficiencies that were identified, an overstretched inspectorate and a slow-moving regulator, the US Federal Aviation Administration (see also Quinlan et al. 2014). These findings have been mirrored by research in other countries like Australia where the economics of outsourcing were found to be overstated by the need to rectify ‘repairs’ when aircraft arrived back from overseas MROs (Gregson et al. 2015).

Research has identified similar scenarios across a range of other industries. When they are paid for the tasks they do rather than the time spent on them, there is an incentive for subcontractors to finish tasks as quickly as possible, which can be conducive to error/corner-cutting and other practices that can undermine health and safety. Multi-tiered subcontracting can exacerbate this as rewards for work tasks are progressively lower at each tier, creating incentives for evasion which—given the complexity—can be difficult to manage, with potentially catastrophic consequences in high-hazard workplaces (Loos and Le Deaut 2002; Mayhew and Quinlan 2006; Quinlan and Wright 2008). Similarly, disorganisation and regulatory failure have been repeatedly identified in subcontracting-related serious incidents including the Petrobras oil rig sinking (2001), Texas City refinery explosion (2005) and Rana Plaza building collapse (2013). We can only provide a few illustrative examples in this chapter, but the key point is that these problems/risks are not industry specific but generic and should inform measures aimed at preventing such incidents.

Table 3.2 Subcontracting, workplace disasters and ten pathways: examples

Pattern-cause	Valujet crash (1996)	Petrobras oil rig sinking (2001)	Texas City refinery fire (2005)	Hangzhou subway collapse (2008)	Rana Plaza collapse (2013)
Engineering, design and maintenance flaws	Yes, outsourcing of maintenance (led to later crashes too)	Yes, poor design and location of safety equipment	Yes, second-best technology used amongst other flaws	Yes, route revisions impacted on design integrity	Yes, building illegally extended
Warning signals ignored	Yes, two previous serious incidents	Yes, history of large spills from rig	Yes, prior incidents	Yes, many similar incidents	Yes, signs of cracking and previous incidents
Risk assessment flaws	Yes	Yes	Yes	Yes	Yes
OHS management flaws	Yes, outsourcing maintenance, disorganisation/miscommunication re-term 'expired'	Yes, downsizing, poor training and use of contractors	Yes, BP system flawed including devolved decision-making and focus on personal safety	Yes, fragmented/complex web of disarticulated contracts	Yes
System auditing failures	Yes	Probably but need more evidence	Yes	Yes	Yes
Economic/production pressures compromise	Yes, low-cost carrier cost-cutting	Yes, focus on cost-cutting and production	Yes	Yes, govt. cost-cutting, subcontractors pressured and labourers working 16 h	Yes, huge pressure on costs in the supply chain
Regulatory failure	Yes, FAA should have acted sooner	Yes, government control/conflict	Yes	Yes, contractor offloaded responsibility and numerous violations	Yes, regulation symbolic and global supply chain picked for this
Supervisor and others concerned	Yes, Sabretech mechanics raised absence of caps	Yes, union concerns prior to accident	Not investigated	Not investigated	Yes
Poor worker management communication/trust	Non-union operator and workers' pay for training	Yes, union undermined by subcontractor use	Yes, communication gap between subcontractors and other workers	Yes, problem reports ignored but no clear mechanisms for raising concerns	Yes, little if any union representation and workers threatened

(continued)

Table 3.2 (continued)

Pattern-cause	Valujet crash (1996)	Petrobras oil rig sinking (2001)	Texas City refinery fire (2005)	Hangzhou subway collapse (2008)	Rana Plaza collapse (2013)
Emergency and rescue system failures	No	Yes	Yes	Yes, problematic effectiveness examined in report	Yes

Table 3.2 takes the examination a step further, detailing a number of subcontracting-related disasters in terms of the Ten Pathways framework. This framework was developed from an examination of death and disasters in mines and other high-hazard workplaces, identifying ten latent failures that were repeatedly evident in these incidents (Quinlan 2014). There are synergies between PDR and Ten Pathways. Two PDR elements, namely economic pressures and regulatory failure, are arguably pivotal in Ten Pathways. The difference is that Ten Pathways is less generic, focusing on health/safety disasters and their origins, including specific failure mechanisms, and thereby providing a framework for informed interventions, including auditing and training (it is being used this way by the mining industry in Australia). Within Ten Pathways, subcontracting is largely located in the category of management systems, although it will also affect other latent failures, notably economic/production pressures, regulatory failure and poor worker/management communication or trust.

The explanatory value of the Ten Pathways framework is evident in five cases examined in Table 3.2. Subcontracting played a critical role in all five incidents which can be briefly summarised as follows. In 1996, ValuJet Flight 592—a low-cost carrier—crashed into a Florida swamp killing all on-board after time-expired oxygen cylinders placed in the hold contrary to safety guidelines by a maintenance contractor (SabreTech) ignited. In 2001, the Brazilian Petrobras oil rig caught fire, with ten members of the fire-fighting team dying. Safety on the rig, including emergency procedures, had been compromised by the simultaneous boosting of production with downsizing of staffing levels and shift to using subcontractors. In 2005, an explosion at BP's Texas City oil refinery resulted in the death of 15 workers (all contractors), with subsequent investigations revealing substantial flaws in the company's safety system and procedures (for more details on these events, see Quinlan 2014). In 2008, a subway tunnel under contraction in Hangzhou China collapsed, killing 21 workers immediately (Ma et al. 2012). In 2013, the Rana Plaza building in Bangladesh collapsed due to being overloaded and flagrant breaches of building codes killing 1129 workers and injuring over 2,000 others—the majority women producing clothing for retailers based in Europe and elsewhere (Quinlan 2013). These cases are merely illustrative. Subcontracting has contributed to numerous other small and large workplace incidents, as well as contributing to the spread of infectious diseases, and there is evidence of this stretching back well over a century (Gregson and Quinlan 2020).

Elaborate supply chains have extended subcontracting risks globally, leading to a shift of production to countries marked by vulnerable workers, low wages and labour standards, minimal levels of OHS management and weak and under-enforced regulatory regimes. In addition to the Rana Plaza building collapse (Table 3.2), these risks have manifested in a repetitive cycle of fatal factory fires in Bangladesh, Thailand, China, Vietnam, Pakistan and other poor countries—the products destined for rich countries. A number of private quasi-regulatory schemes have been introduced to improve OHS outcomes in subcontracting and supply chains including contract-compliance provisions, labelling and codes of conduct that form part of the broader rubric of corporate social responsibility (CSR) by top-of-chain organisations. There

is evidence that some initiatives can have positive effects in specific areas and regions but only where several critical contingent conditions prevail or circumstances apply, including the extent that the primary supply chain driver is cost-cutting as well as the degree of community pressure and potential/actual reputational damage (Short et al. 2020; Walters and James 2011). Common limitations with these CSR-type programmes include their restricted coverage/voluntary basis, deficiencies in monitoring/oversight/auditing and unauthorised subletting of work (Brown 2017). The negotiation of international framework agreements (IFA) with unions constitutes one means of extending the coverage of OSH and other labour standards and providing more effective means of overseeing compliance. However, progress developing IFAs has been slow (Papadakis 2008). A study of the conduct of 30 companies involved in international framework agreements (IFA) benchmarked against 38 multinational corporations in comparable industries found IFA codes addressing OSH were more likely amongst firms in the European Union (the leading region in terms of ratifying ILO conventions). Van Tulder et al. (2009) concluded that there appeared to be a relationship ‘between home country regulation and international supply chain strategy’. The Rana Plaza incident enabled international unions to negotiate an accord on safety conditions in Bangladesh factories with a number of major garment purchasers in North America, Europe and Australia, which included review of the implementation process (Quinlan 2013). Overall, while CSR and framework agreements can have value, they are not a substitute for mandatory regulation—indeed the latter helps drive more effective measures as already indicated.

OHS management systems have repeatedly proved vulnerable to changes that the system did not accommodate, including changes in work organisation such as the introduction/expansion of subcontracting, downsizing or relocation of key staff as at Esso Longford in 1998 (Quinlan 2014). One factor here is that systems have been too geared to routine hazards rather than low frequency–high impact events which require an entirely different set of KPIs and controls. While more organisations have recognised this, moving beyond KPIs like lost time injury rates that essentially measure routine risks has proved remarkably difficult (especially given influential notions of behaviour-based safety). There is an argument that it thus warrants recognition as a distinct pathway rather than being incorporated under management systems and change as it is in Ten Pathways.

3.2 Remedies/Preventative Measures

To minimise the risks associated with subcontracting, organisations—especially those with high-hazard facilities—need to make careful strategic assessments of whether particular activities can be subcontracted, thoroughly considering all the associated risks (including long-term workforce and community risks) and factoring in the full costs of control measures ensuring safety and health are not compromised (including rigorous monitoring and auditing and union/worker safety representative involvement). This assessment will sometimes preclude subcontracting of particular

activities and will entail assessment of the cumulative effects of the additional disorganisation/regulatory failure risks of multi-tiered subcontracting. Key principles in effective subcontractor management regimes include careful site-specific induction/training (every site differs in ways that can compromise safety to those unfamiliar with them), ensuring full hazard knowledge and ready communication amongst both organisation employees and contractors (and their employees), having a single OHS management system for the site (to which all including contractors must abide), rigorous monitoring, treating employees and ongoing contractors as core parts of the workforce, encouraging worker feedback (with representative/union involvement to facilitate this) and developing a preferred contractor engagement model (based on the contractor's known commitment to OHS, not just statistics, as these are subject to biases and manipulation) and episodic rigorous independent auditing. The equal treatment of employees and contractors (including agency workers) not only means their full integration into all safety systems and procedures, but taking specific additional measures to ensure their security/readiness to report problems. The importance of the latter was demonstrated by an inquiry into a May 2020 coalmine explosion (Queensland Coal Mining Board of Inquiry 2021) and a number of jurisdictions including France and Germany (see for example Erol and Schulten 2021) have introduced laws to try to ensure this.

Regulatory oversight also plays a critical role, with a growing preference for mandatory regimes given failures of voluntary 'light touch' regulation. Some key principles in this regard are developing legislation that regulates work (not employment) and covers all parties that influence work arrangements while targeting the party with the most power to affect outcomes (typically at the top, except for Uber-type arrangements). The Road Safety Remuneration Tribunal (RSRT) legislation in Australia was one example of this targeting that also placed proactive requirements on all parties. This model was adopted for some truck drivers in South Korea, and while the RSRT was subsequently abolished, a recent Senate Inquiry has recommended an essentially identical solution (Australian Senate 2021). Note the potential for digital tracking mechanisms and app-enabled enforcement where the onus lies on top-of-chain firms to identify/report on all lower contracts. There will be growing pressure for global agreements mandating labour standards in supply chains as prerequisite for commercial arrangements. In the meantime, it should be noted that governance provisions in existing contracts can be used to extend global reach and regulatory controls to top-of-chain firms (Nossar 2020). While targeting the top of supply/subcontracting chains remains critical in most circumstances, the rise of Uber-type app-enabled subcontracting regimes in food delivery and a range of other services in the gig-economy warrants some tweaking because these organisations are key drivers but not at the pinnacle of some supply chains (Rawling and Riley 2021).

Finally, the Ten Pathways framework—the latent failures that have repeatedly led to death and disaster at work—provides a useful template for organisations, unions and government to assess the robustness of existing safety systems and contract-related decisions, to investigate incidents (including high-potential incidents where fatalities were narrowly avoided) and to design more effective interventions. There

is also a need to recognise that the COVID-19 pandemic has highlighted the vulnerability of highly articulated systems dependent on long supply chains and contingent work arrangements (van Barneveld et al. 2020).

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Chapter 4

Organisational Lucidity and the Impact of Subcontracting



Jean Pariès

Abstract Trying to assess the impact of subcontracting on safety implies grasping how subcontracting can affect the main ingredients of organisational safety. One of these ingredients is what we will call ‘organisational lucidity’: the ability of an organisation to perceive, at its different levels, what really happens within its operation processes. After listing both lucidity enabling and preventing factors, we discuss the impact of subcontracting on these factors, with reference to a study recently undertaken within a major airline concerning the impact of subcontracting on flight safety.

Keywords Subcontracting · Organisational lucidity · Safety · Awareness · Organisational silence

4.1 Organisational Lucidity

Counterintuitively, there is no stable correlation between individual competence and safety performance. Safety performance at a given risk exposure level is rather strongly influenced by the proper tuning of one’s self-confidence level, the correct matching between real skills and self-perception, in other words by the clear-sightedness or the ‘lucidity’ of the person.

Something comparable happens at the scale of a whole organisation (Amalberti 2000). One of the fundamental conditions of risk management is the ‘lucidity’ of the organisation on what is really happening on the ‘shop floor’. This feedback about what really goes on at the front line of operations allows control loops to be closed and allows the organisation as a whole, at its different levels and within its different departments, to manage its operational processes as homeostatic ones, in a stable, efficient and safe manner. It directs real-time monitoring to the sensitive points of activity. Upstream, it modulates the preparation of the work, taking into account the risks actually observed or deduced from real-life observations. Downstream, it

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J.-C. Le Coze and B. Journé (eds.), *Safe Performance in a World of Global Networks*,
SpringerBriefs in Safety Management, https://doi.org/10.1007/978-3-031-35163-1_4

allows the design of future tasks to be adapted to the relevant context, resources to be matched to needs and targets and ambitions to be reconsidered in the light of real conditions.

Organisational lucidity refers to three main domains of awareness. The first one concerns the distance between the real activity (or the work as done), as opposed to the specified tasks (or the work as specified and prescribed) (following Hollnagel). The second one concerns the awareness of the trade-offs between the different dimensions of performance (quality, speed, productivity, finances...) and the different dimensions of risk (various occupational safety risks, various industrial safety risks...). The third one concerns the awareness of the efforts needed to achieve the performance which is achieved. The next sections will briefly review these three domains of awareness.

Organisational awareness of the **distance between work as done and work as specified** is determined by the degree of knowledge that line managers, and then the hierarchical line, have of the way in which the real operations actually unfold. This knowledge results from an upward information flow, starting with the cues provided by front line operators during—whenever they exist—the briefings preparing the activities, the debriefings of the activities, the reporting of anomalies and incidents, as well as during the more or less informal discussions that front line operators may have with their line management. It also results from incident analyses and from observations made by the different management layers during their operational presence or during their visits to the front line.

The limitations of the upward information process have been the subject of numerous studies and publications, particularly the various mechanisms which can limit or prevent the reporting and transmission of information by front line operators. The notion of ‘organisational silence’ nicely captures the issue. According to Daniellou (2017), ‘Organisational silence is a situation where important information—for example for safety—is available at the field level, but does not go up, and therefore cannot be taken into account in strategic decisions’. Morrison and Milliken (2000) argue that

there are powerful forces in many organisations that cause widespread withholding of information about potential problems or issues by employees. We refer to this collective-level phenomenon as ‘organisational silence’. In our model we identify contextual variables that create conditions conducive to silence and explore the collective sensemaking dynamics that can create the shared perception that speaking up is unwise.

Reversely, upwards information flow is facilitated by the establishment of a ‘just and fair culture’, involving systematic and positive feedback from managers to the operators on the follow-up given to incidents that they report, and more generally on the trust that reigns between these operators and their hierarchy, the sharing of common objectives and the absence of fear of penalties for errors or discrepancies.

However, front line reporting reluctance is not the only component of organisational silence. Daniellou (2017) states that

Defenses of the same nature can also develop with managers, when they are ‘sheared’ by the contradictions between the information that comes from their own management and that which comes back from the field. They can, unconsciously, interrupt the upward flow to protect themselves from the contradiction. They thus contribute to organisational silence.

Hence, what is at stake is the whole process of enaction which filters, selects, amplifies, rejects, in short synthesises the bottom-up information flow to make sense of it, and symmetrically transmits, decodes, interprets and instantiates the top-down information flow, to generate decisions and instructions and implement them in actions.

The second key component of organisational lucidity is the awareness of the trade-off management process, which is permanently seeking an acceptable balance between the different dimensions of performance (quality, speed, productivity, financial...) and the different dimensions of risk (various occupational safety risks, various industrial safety risks...). This process is usually underspecified, poorly formalised, and it takes place at the different hierarchical levels of the organisation within meetings and other interaction and communication opportunities. The trade-off consensus is generated through discussions and arguments between different rationales or even conflicts. It is influenced by many factors: the current conjuncture, power ratios and relationships between different departments, horizontal and vertical team dynamics, the company's culture and its dominant values, history of past decisions and the like. Even if part of this process is neither traced nor explicit, or even a taboo (Pariès 2019), it always exists. When a necessary trade-off is not properly addressed at the relevant level of the organisation, it will have to be handled at lower levels, by people less entitled and equipped to do so, which will generate more stress and a higher risk of poor decisions (Pariès 2011). Finally, the awareness of trade-offs and their recognition throughout the organisation is a key dimension of organisational lucidity.

The third dimension of organisational lucidity is the awareness of the level of effort and stress needed to obtain the performance which is actually obtained and the awareness of the margins of manoeuvre left before saturation of the safety management capacity.

As stated by Daniellou et al. (2011),¹

[...] performance achieved does not reflect the human cost required to achieve it. Excellent results (from the point of view of the company's criteria) may have been obtained at a very high cost for certain operators. The fact that they have managed to do what was asked of them says nothing about the personal costs this generated. If reporting only concerned compliance between results and objectives, there would be "nothing to report". Yet this situation is loaded with risks: if the performance has been reached this time but the operators had great difficulty in achieving it, it is probable that a slight variation in the context or a change in person would lead to a non-compliant result.

This is true for safety performance as well, and it does not relate only to what is happening at the front line: it concerns all levels of the operational hierarchy. As a matter of fact, most safety indicators such as the frequency of incidents are lagging, output oriented and refer to past safety performance, while the 'human cost' to achieve overall performance can be seen as one of the potential leading safety indicators.

¹ Reproduced from (Daniellou et al. 2011), released under a CC BY license: <https://doi.org/10.57071/429dze>.

From a safety perspective, what is at stake beyond this assessment of the effort needed to 'do the job' is the notion of leeway, or margins of manoeuvre. Metaphorically, it would be very difficult, if not impossible, to drive a car, or even worse an aircraft, without any feedback about the efforts applied to controls, and without a perception of the level of these efforts versus the maximum ones. According to Stephens et al. (2011):

One strategy that systems employ to remain resilient in the face of shifting demands is the creation and maintenance of margins of manoeuvre, cushions of potential actions and additional resources that allows the system to continue functioning despite unexpected demands.

This strategy includes several means such as reorganisation, changing the pace of actions, borrowing resources or cooperation from other units, changing the goals and the like. This kind of capacity is essential to keep control of safety in a moving and partially unexpected environment (Weick and Sutcliffe 2001). Hence, it is important to understand how, and through which indicators, an organisation is creating and maintaining a proper awareness about this capacity.

4.2 The Impact of Subcontracting on Organisational Lucidity

The aim of this section is to try to estimate the impact of subcontracting on the three dimensions of organisational lucidity presented above. It is based on a study recently undertaken at the request of a major airline on the effects of subcontracting on flight safety. For reasons that are economic (looking for cheaper labour), geographic (providing services in other countries, far from its base) and strategic (refocusing on its core business), airlines subcontract a growing part of their activity. This concerns various activities and services such as documentary systems, information and communication systems, aircraft maintenance, ground handling and ground operations around the aircraft. Some of these activities are closely regulated by international safety regulations and controlled by certification bodies and national authorities dedicated to flight safety, whereas others are still poorly standardised or regulated and are subject to in-house safety management systems.

The study was carried out by conducting around thirty semi-structured interviews of about one hour, by reviewing subcontracting processes and documents and visiting one subcontracted shop floor activity. The interviews were conducted with both the airline staff and subcontractor staff. The interviewees from the airline were managers from different hierarchical levels and involved in subcontracting to different titles. They could be involved at the operational level (e.g. a maintenance or ground operations manager), or as support functions (e.g. a purchasing manager in charge of selecting and contracting subcontractors). The interviewees from subcontractors were a line manager, an HSE manager and a head of operations strategy.

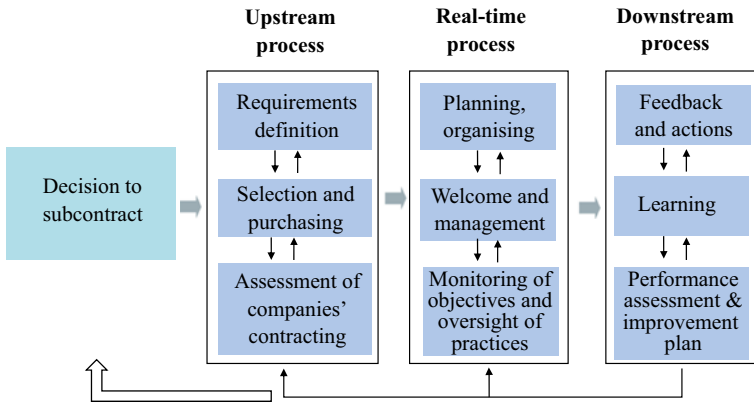


Fig. 4.1 Processes involved in managing subcontracting in an organisation

Overall, the study confirms the diagnosis made in the ‘Cahier de la Sécurité Industrielle’ (ICSI 2006)²:

On the one hand, subcontracting increases the number of interfaces between people working on the sites, which can hamper the transmission of information and therefore have a negative safety effect. On the other hand, subcontracting allows the development of more specialized skills in certain activities, facilitates the transfer of good practices between industrial sectors, and allows more flexibility in the face of peaks in labour [...].

However, the more specific effects of subcontracting on organisational lucidity can be appreciated in more detail by referring to the overall management system for subcontracting. The overall management of subcontracting is achieved through an upstream, a real-time and a downstream process with reference to the subcontracted activities, as shown in Fig. 4.1.

The study highlighted the following effects on organisational lucidity:

- **A first effect** of the above processes is to increase the specification of the expected outcomes in terms of production, quality and safety. The activity to be subcontracted is accurately defined, and what has been kept implicit until now is made explicit. It leads to more clarity, to more KPIs and more accurate ones. It also leads to a tendency for activities to be monitored more closely, for example by field supervisors who would not be present in non-contracted activities. However, these efforts to increase the knowledge of what is happening on the shop floor are offset by the complexification of relations between the operational management of the company and the actual activities at the front line. The overall result is that lucidity is higher for measurable performance components and lower for non-measurable or non-measured ones, such as the level of effort and stress imposed on workers at the front line. There is a tendency to generate a hypertrophy of performance (outcome) indicators, and an atrophy of effort indicators. Risk-based oversight

² Reproduced from (ICSI 2006), released under a CC BY license; <https://icsi-eu.org/>.

is based on risk perception, which is based on safety outcome indicators, which aggravates the phenomenon. The consequence for the airline is a loss of awareness of the degree of effort, stress and the associated margins of manoeuvre. As already stated above, the performance achieved does not reflect the human cost required to achieve it nor the margins to loss of control. In terms of safety, the consequence is better control of low severity/high-frequency—quality related—events and lower visibility on high severity/low-frequency—loss of control related—events. This is similar to the effects of automation, which improves control within the boundaries of the designed (including for discrepancies) operational domain and decreases it outside.

- **A second effect** of the above processes concerns the management of trade-offs. When the specifications are drawn up with a view to subcontracting a specific activity, the operational managers concerned by this activity are involved in the drafting, and they obviously express the highest possible requirements on the aspects of performance they are concerned with, like quality, deadlines, reliability, all the more so given their wariness of the capacities of the subcontractors. The same goes for the purchasing department, which will seek to obtain the best possible deal, even if given instructions not to systematically choose the lowest bidder. And finally, safety managers will also be very demanding and fussy, probably more than they were before the subcontracting.

Finally, the arbitrations that used to take place within the contracting company in the form of meetings, arguments, power games and the like are now frozen, crystallised in the requirements, not necessarily adapted to the subcontractor's practices and no longer updated or 'thawed' in the daily activity.

The result is that the subcontracting (client) company's goals, constraints and values are expressed by a set of requirements which are partially incompatible with one another and which are not, or only slightly, arbitrated. There is no longer an internal process to generate a trade-off consensus through cultural references and arguments at different levels of the hierarchy. The requirements are addressed to top management of the contracted company, which does not really have the flexibility to discuss them. The trade-offs will therefore be managed by the subcontractor company, within the framework of its own goals, constraints and values, which definitely include pleasing the client company to get the contract and keep it. It follows that the necessary trade-offs may not be properly addressed at the relevant level of the organisation. As discussed above, it will then have to be handled at lower levels, by people less entitled and equipped to do so, not to mention that work environments, tools and procedures may remain dependent on the contractor, while they are not necessarily adapted to the skills and the work habits of the contracted staff. This will generate more stress and a higher risk of poor decisions. This will be all the more challenging for safety when the initial reason for subcontracting is financial, meaning more pressure on front line staff, especially when the saving effort has to accommodate the extra cost of dual monitoring (subcontractor + subcontracted) of operations.

Finally, the effect on organisational lucidity may be a further worsening of the usual situation of poor knowledge of the levels of effort deployed to obtain performance and of residual margins. Indeed, the information feedback mechanisms on this subject in the subcontractor company will surely be affected by symptoms of organisational silence, and the contracting company will only have indirect access to it, filtered by the management of the commercial relationship. If direct cooperation is not instituted for the sharing of this information, the subcontracting relationship behaves like a pink filter in an image-processing tool, which embellishes images and removes wrinkles.

4.3 Conclusion

From a systemic point of view, subcontracting introduces a dissociation in the means-goals hierarchy. While within the same organisation, the different levels of functional decomposition are taken care of by the corresponding levels/components of the organisation, in the subcontracted activities the contracting company says ‘what’ and the contractor says ‘how’. This requires a very precise *dialogue*, not a one-way communication based on domination by one party. In this dialogue, organisational lucidity on the three major points—which are knowledge of real activity, management of trade-offs, and knowledge of effort levels and margins—is essential. It implies partnership rather than domination, joint learning, integration of operational processes, interfaces at the right levels between the contracting and the contractor companies. It should include a long-term vision of the relationship within the ‘ecosystem’ at stake.

Ethics Statement Informed consent was obtained from all informants interviewed for this work, and their identity has been anonymised. Ethics approval is not required for this type of study in France.

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Chapter 5

How to Break the Silence of Subcontractors



Jorge Walter

Abstract Research on risk management in subcontracting networks has emphasized the analysis of abuses committed and their consequences on the health and safety of workers. In this chapter, we pay special attention to experiments that have attempted—successfully—to mitigate, or even revert said abuses. They have achieved that in a “projects industry”, as it is the case for construction, a subcontracting-intensive activity. Our goal was to find some common traits between the experiments, beyond the different contexts in which they were embedded, to obtain some general guidelines that can be applied in different contexts with identical results. The most important of these guidelines is in the title of the present text: to overcome the silence of workers and managers in contracted companies, building bonds of trust, based on a real delegation of responsibilities and on the active listening of their perspectives and recommendations.

Keywords Subcontracting networks · Safety management · Construction industry · Subcontractors silence

5.1 Introduction

The first articles on the issue of organizational silence published in specialized management journals date back to the early 2000s (Morrison and Milliken 2000; Pinder and Harlos 2001). Pinder and Harlos define “organizational silence” as “...the withholding of any form of genuine expression about the individual’s behavioral, cognitive and/or affective evaluations of his or her organizational circumstances to persons who are perceived to be capable of effecting change or redress”. The term has since been applied to the study of various intra-organizational problems and, more recently, to safety management (Dekker 2007; Rocha 2014). Who are those persons capable of influencing changes in the organizational conditions of their work? To what extent can they influence those changes?

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J.-C. Le Coze and B. Journé (eds.), *Safe Performance in a World of Global Networks*,
SpringerBriefs in Safety Management, https://doi.org/10.1007/978-3-031-35163-1_5

Before answering the question, it is useful to remember that, in terms of safety (but also productivity and quality), “sharp end” operators are the first and main victims of organizational problems. Our perspective in this matter is as follows: it is at the front line where the latent conditions originated in the organizational design take their toll (Reason 1997). In the case of subcontracting networks, the design refers to the boundaries between organizations (Sabel et al. 1997).¹ Secondly, the experience of frontline operators is crucial to identify and correct these flaws on time, since these operators generally act as the last barrier.²

The reasons that make listening to the operators advisable at the organizational level are also relevant at the inter-organizational level for those activities that resort to hiring people and companies. Our goal is to prove that, up to now, those voices are yet unheard and that it is crucial to do so if real and lasting changes are to be made.

We will tackle the issue at hand in two extremes of a continuum spanning from subcontracting meaning labor precarization, on one hand, and the attempts to revert the trend through the development of cooperative relationships between the different links in the subcontracting chain on the other. We will pay special attention to the reaches and limitations of the research available on the latter form.

Dominant negative trends in the fields of safety and health at work are connected, as we will observe, with the forms that outsourcing processes have historically adopted—and which, according to recent literature, they continue to adopt.³ The experiences for the improvement of work conditions at the regulatory and safety management levels in subcontracting networks will be examined in a multi-sector industry which undertakes high-risk activities and makes intensive use of subcontracting: the construction industry.⁴

Construction activities are organized as projects. In their design, management and execution, a myriad of companies of different sizes act simultaneously and sequentially. Their negative indicators in safety and health of their workers increase in inverse proportion to the size of the companies involved, and as a direct function of

¹ Also, for this reason, and from the safety point of view, management tools such as contracts and work permits (a term coined by the gendarmes, evidencing a certain border management idea), play a crucial part, together with their correspondent risk analysis.

² Hence, the concern about empowerment (that allows operators to stop production as soon as the failure appears), the continuous improvement groups (so many times discouraged because they question the organization), the famous seven quality tools, made available to continuous improvement groups thanks to the improvement of the educational level of operators after WWII (Ishikawa 1985).

³ The first papers that revealed the issue date from the late 1990s and refer to several sectors of a Commonwealth country: Australia (Mayhew et al. 1997). A later article then confirmed the international reach of those problems (Quinlan et al. 2001). Ten years after the first publication, an article referring to the UK has the unequivocal title: “Subcontracting versus health and safety: an inverse relationship” (Manu et al. 2009). Twenty years later, an extensive review of literature confirms the same trend (Valluru et al. 2017).

⁴ “Out of 4,779 worker fatalities in (USA) private industry in calendar year 2018, 1,008 or 21.1% were in construction—that is, one in five death workers were in construction” (www.osha.gov/data/commonstats).

their location in the last ranks of the—sometimes highly informal—subcontracting networks.

We will focus on the construction industry in the UK, where the most advanced attempts to mitigate the negative aspects of subcontracting have taken place and have been the object of research. The texts cited come from a broad review of the literature on the connections between subcontracting and safety management, paying special attention to the construction industry. As we will see, we have identified literature reviews on the subject from different periods. We have paid particular attention to the rare articles based on empirical research on our topic.

5.2 The Reaction Facing the Abuses of Subcontracting

Donaghy (2009: 11) notes that “...as we emerge from a recession when the number of fatalities tends to rise [...] We should aim to raise the profile of these tragedies so that a construction fatality becomes socially unacceptable”, referring to the intention to influence the acceptability of risk in the British construction industry in a time of recovery after the 2008 crisis. The quote is extracted from a report written upon The Crown’s request for the Secretary of Labor and Pensions of the UK titled *One death is too many*. In fact, as Walker underlines in his book about project management in the British construction industry: “The traditions and conventions of the United Kingdom have had a particularly wide significance as they have been exported to many parts of the world over the last two centuries” (Walker 2015: 3). The book describes the way in which the organization of UK construction projects has evolved and its influence on practices in other countries.

Like Shelley Marshall in her recent research (Marshall 2019) about innovative regulatory attempts to combat abuses of subcontracting in several countries with different development levels, we find it appropriate to take the British experience as a reference, given the empirical research undertaken there.

5.2.1 *Advances in British Legislation*

A first, brief and clear introduction of the background behind the progress made in British legislation is presented by Walker when he mentions in the book a series of valuable reports about the state of the construction industry in the UK, written after the Second World War on request of the government,⁵ that ended in 1998 with the publication of the Egan Report, titled *Rethinking Construction*. This report stands

⁵ The Simon Report (1944), the Phillips Report (1950) and the Emmerson Report in 1962, all centered upon the need for greater cooperation between all parties to the construction process (op.cit., pag. 5), followed by the Banwell Report (1964) and its review Action on the Banwell Report (1967). It then clarifies that “The 1980s saw a shift from the government-sponsored reports of the 1960s and 1970s to initiatives from the private sector”, a trend confirmed by the publication in

out among the previous ones because it “...argued for a radically changed industry with higher margins for contractors, better value for money for clients, improved welfare (particularly safety) and better training. Many of these benefits were seen to be achievable through supply chain management using long-term partnerships” (underlining by this chapter’s author).

Private initiative soon followed, in particular with the creation in 2001 of the Strategic Forum for Construction (SFfC), whose mandate was to coordinate private efforts toward achieving the Egan Report objectives: “The SFfC’s (2002) major publication was *Accelerating Change*, which identified progress since the Egan Report, including innovation, key performance indicators and, most importantly, demonstration projects which ‘provide the opportunity for leading edge organizations from whatever part of construction to bring forward projects that demonstrate innovation and change that can be measured and evaluated’” [...] The long-term challenge is for the initiatives to percolate to all levels of the industry rather than remain with the more progressive, usually large, firms”. Walker notes (2015) this industry evolution has been accompanied by significant academic work, including the creation of a number of respected journals.

Due to the effectiveness of previous regulations and the inverse relation between outsourcing and safety, the changes in British legislation were finally reflected in the CDM 2007, briefly summarized in a diagram (Manu et al. 2009: 5),⁶ with the intention of preparing for future research about its efficiency. According to the authors, “...the underperformance of the CDM 1994 finally yielded the Construction (Design and Management) Regulations 2007 (CDM 2007) which seeks to address the shortfalls of the CDM 1994 so as to achieve improved levels of H&S in Construction”.

Before analyzing in the next section progress made in research that Walker referred to, and the changes proposed by Manu and his colleagues, we should take note of the double movement (top-down/bottom-up) that took place in the British construction industry to promote the change, following a new supplementary way (private demonstration projects that aim to implement the public mitigation measures). This is a form of co-regulation—that we will later address at its micro-level—that one author has also called collaborative governance, networked governance or new governance (Blomgren Bingham 2010). A great step forward at the macro-level that, as we will see, research is only starting to take at the micro-level. Let us also remember the

1994 of the Latham Report “... which reinforced the pragmatic tone of the 1980s” (op. cit., page 6, underlined by the author of the present paper).

⁶ The diagram, whose content we transcribe next, relates “the causative factors of the adverse H&S outcomes of subcontracting” and the regulations foreseen by the CDM 2007 to mitigate them. Causative factors: (1) lack of resources by small subcontractors, differences in safety cultures, economic survival being prioritized over H&S. Regulation: competence assessment (Regulations 4/1a and 4/2); (2) less familiarity of subcontract personnel with the inherent safety issues of all site activities. Regulation: training and induction (13/4a and 5); (3) ambiguity about responsibilities. Regulation: clear duties of duty holders under CDM 2007; (4) inadequate communication and teamwork. Regulation: coordination and cooperation. Regulations 5 and 6; (5) inadequate regulatory control. Regulation: enforcement of CDM 2007.

long-term vision that guides the double movement of private and public actors in the UK: “supply chain management using long term partnerships”.

5.2.2 *The Silence of Subcontractors*

Paradoxically, in the substantial body of research that Walker refers to concerning the development of partnerships in subcontracting networks, subcontractors have rarely had a voice. And when they did (Valluru et al. 2017), it was to understand—it is the title of the article—“How and why do subcontractors experience different safety on high-risk work sites”.

In fact, Valluru and colleagues state—and we agree with them—that “Existing research on subcontractors, which focuses on the role of the prime contractor in selecting and managing subcontractors, fails to explain why subcontractors continue to experience higher rates of serious injury even where subcontractor management systems are in place”. Unfortunately, the conclusions of the article, reached through focus groups with subcontractors in the Australian construction industry, though not irrelevant, are exiguous and negative in nature. According to them, the problem is caused, “with several links”, by the form of the subcontracting, since “...extending the responsibilities of site owners and operators to cover subcontractors is insufficient to ensure equal treatment, even where safety policies and procedures appear to be written and applied uniformly”.

Accounting for the point of view of subcontractors (as happens at a higher level with the industry’s contribution to changes in regulations) is quintessential if one wants to achieve the development of effective and lasting cooperation bonds between the different members of the subcontracting networks thanks to top-down and bottom-up movements, based in the “control regulation” of the contracting parties and in the “autonomous regulation” of the contracted parties (Reynaud 1979), or, in other words, based on *securité réglée et à la fois gerée*⁷ (Daniellou et al. 2010).

What happened in that regard in the research on the attempts to innovate carried out by British companies interested in accelerating the changes proposed by the Egan Report? Have Manu and colleagues managed to take into practice their intention to examine such attempts to evaluate the efficacy of the new legislation?

Two years after the first article was published, Manu et al. presented work titled “Managing the adverse health and safety influence of subcontracting: findings of a qualitative inquiry” (Manu et al. 2011). How did they carry out that research? “Using semi-structured interviews⁸ with key management personnel of 6 UK contractors, the research question,—how do main contractors manage the adverse H&S influence of subcontracting, in terms of their in-house H&S practices? was investigated” (excerpt

⁷ Regulated and simultaneously managed safety.

⁸ A procedure similar to the axial codification used by Valluru and colleagues, consisting of pre-defining an agenda of items to be discussed. When allowing someone to speak who has never had a voice before, it is convenient, methodologically, to begin the discussion with an open agenda.

from the abstract). Once again, the main targets of such policies were not invited to take part in the research.

The main conclusion of the research is that “beyond the legal requirements, two strategic measures adopted by the investigated contractors are: restricting the layers/tiers of subcontracting on projects; and having a regular chain of subcontractors. These measures are aimed at addressing the communication, teamwork, competence, and safety culture issues that are associated with workforce fragmentation introduced by subcontracting”. As we will see, we have reached similar conclusions in research in which we have also heard the voice of subcontractors about the solid ground of such policies.

However, the most interesting research findings on significant progress in the relation with subcontractors leading to equally significant improvements in safety results were reached in the UK in the high-profile international works for the 2012 Olympic Games, a true laboratory for the “demonstration projects” promised by The Strategic Forum for Construction (Sffc), created in 2001 by the elite of the British construction industry.

5.2.3 *The Legacy of the Olympic Games*

Through an initiative of the IOSH—the UK Association of safety professionals—a legacy learning team was formed, with researchers from the Cardiff Work Environment Research Centre. This group started a case study of the Olympic Games construction works, publishing a literature review (Walters and James 2009) then undertaking empirical research that led to preliminary findings (Wadsworth et al. 2011) then to a more comprehensive report (Walters et al. 2012), including an additional case study in a different sector. The distinctive peculiarity of this research (we will refer here to the 2011 publication⁹) is the interviews with individuals at each hierarchical level of the organizations in the contracting chain, focusing on the network managed by one of the main contractors.¹⁰

⁹ Material quoted from the UK ODA publication is reproduced with the permission of the UK Department for Digital, Culture, Media & Sport. All rights reserved.

¹⁰ They performed 20 interviews (individual and collective). Procurer: Head of Health and Safety, Deputy Head of Procurement, Director of Construction, Head of Procurement, Deputy Head of Procurement. Tier One (supplier and procurer, in charge of civil engineering): Contract Manager, Procurement Manager, Health and Safety Manager, Project Manager, Contract Manager, Supervisors (2), workers (2). Tier 2 (supplier and procurer in charge of commercial landscaping, Landscaping and engineering, Marine-based civil engineering, dredging and remediation): Manager (link to Tier One and Tier Three), Health and Safety Advisor (Tier Two but also acting for Tier Three), Procurement Manager, Project Manager, Supervisors (2, individual interviews), Workers (2, individual interviews). Tier 3 (suppliers, in charge of water features, irrigation and waste water treatment, Commercial grounds maintenance, gardening and landscaping, Civil engineering): Manager (link to Tier Two), Health and Safety Advisor (Tier Two and also for Tier Three), Project/Procurement Manager, Supervisors (2), Workers (2). Source: synthesis prepared by the author of this paper, based on Wadsworth et al. (2011).

The goal of the research was “...to assess the impact of the supply chain strategies of the procurer, the Olympic Delivery Authority (ODA), on the occupational health and safety (OHS) management and performance among its contractors”. The ODA performance stood out for the spectacular results of their management of the subcontracting network in terms of safety: “The safety record on the Park was impressive and remained significantly higher than the industry average throughout the works. In February 2011 the Park achieved its 17th set of one million man hours worked without a reportable incident since 2006. The ODA’s contribution to this has been recognized by the British Safety Council (in the form of both the five-star and Sword of Honour awards)”.

As one could expect given the specificities of the case, in their conclusion the authors emphasize two “...key factors driving the effective use of supply chain strategies for health and safety management: (a) the reputational risk associated with high profile projects and; (b) pre-existing and well-developed health and safety management systems throughout the supply chain (effectively a prerequisite for those tendering to work on the Park)”¹¹. They add: “This is a narrow set of circumstances which do not generally exist on most builds or within many of the small and medium sized enterprises that make up the majority of the UK construction sector”, in spite of which “(it) seems to be that the supply chain can be used effectively to enhance health and safety performance and management”. And they conclude: “Successful impact, therefore, is dependent on the client’s on-going determination to fully exploit their influence to ensure both clarity and transparency of governance, and worker involvement and empowerment, through effective communication up and down the supply chain”.

The interviews with members of the organizations in Tier Three of the chain confirm the aforementioned (op. cit., page 6, our underlining):

...there was an emerging feeling from the Tier One contractor, for example, of a two-way relationship with the ODA in terms of the development of health and safety procedures and systems. Similarly, it was clear that contractors at all levels had had the opportunity to learn from each other; that is from contractors at their own and at both higher and lower tiers. At an individual level, there was also evidence of worker involvement in health and safety and of the empowerment of workers by giving them the ‘authority’ to report near misses, to stop unsafe work and to discuss and contribute to the development of ways of working. The key to both these levels of communication was, again, the transparency of governance as well as the physical presence and involvement of clients on suppliers’ sites.

It is also interesting to notice some of the complaints of subcontractors regarding the requirements they had to face (page 7):

¹¹ “...Tier One and lower level contractors must use their own health and safety management systems to meet the ODA’s HS&E Standard and its corresponding key performance indicators (KPIs). In addition, Tier One contractors were responsible for cascading the approach down the supply chain and ensuring that their sub-contractors also met both the Standard and the KPIs”. ODA (2010). Design and construction: Health, Safety and Environment Standard, Fourth Edition. Available from: www.london2012.com/documents/oda-health-and-safety/oda-health-safety-and-environment-standard.pdf (accessed 7/2/2020).

...for some individuals there had been very significant increases in the levels of paperwork they were expected to complete, which was sometimes finished in workers' own time. At both the organizational and individual levels there was also some feeling of 'overkill', particularly where the reasons behind specific requirements were not clear or when rules seemed to be applied without due consideration of the circumstances.

These traits of the learning legacy of the Olympic Games are also found, as we will see next, in other studies on successful experiences in the field of safety management in subcontracting networks that were not as exceptional as the Olympic Games construction site, in which a voice was also given to members of the subcontracted companies. For instance, in an inquiry we made in the Argentine branch of a multinational oil company.

5.2.4 Safety Management at the Frontier

We will now draw on one of the two cases discussed in (Walter 2017). The case chosen shows outstanding safety results—according to the yearly audits of the safety management system of the local branch—shown by the Projects Area of the company (which we will call GEAR). This area was in charge of the supervision of the local companies hired for construction works (construction of pipelines, cabling, roads between the pits and compressing plants that pump the fluids into the oil pipelines).

We will now refer to two basic issues related to the management of subcontracting networks: the type of hiring, on one side; and the use of work permits and other management tools—such as anomaly reports (already mentioned when referring to the Olympic Games construction case)—on the other.¹²

The research consisted of a survey on the safety culture involving all staff members ($n = 1836$), both in-company (28%) and subcontracted (72%). The inclusion of subcontractors already implies a substantial difference vis-à-vis the most frequently used methodology in this type of survey.

The high proportion of subcontractor staff was due to the outsourcing of not only operational tasks but also of maintenance management (27 and 73%, respectively) and safety management (43 and 57%, respectively). The supervision of safety issues was undertaken by in-house GEAR supervisors (30 people), in charge of a larger group (51 people) of salaried supervisors of a subcontractor (MRI). Between the two, they were in charge of supervising another 37 supervisors from subcontracted companies.

¹² In the table A4 of our paper (Walter 2017: 403), we present a summary of the testimony given by GEAR's Constructions Works Director (with 17 years of experience in the company), who had been in charge of the Project Management Office since it was created. In his testimony, he referred to the hiring policy, the development of subcontracting companies in his sector which he had implemented locally and perfected through time.

MRI's supervisors were formally integrated to GEAR's structure, under the hybrid category¹³ of "organic contractors". Given their integration into the branch's organizational chart, they received the same safety training as the branch's permanent staff. The average "seniority" (we use this term to refer to the time the respondent had been working for GEAR¹⁴) of the permanent staff, of the staff integrated to the company's structure and of the subcontractor staff was virtually the same, for reasons explained by the Project Area Manager: "when we change subcontractors, the newly hired firm must rehire at least 50% of the staff that worked for the previous subcontractor".

As for the use of work permits, GEAR's Project Area used a strict control system based in a triple-tier signature¹⁵ requirement for their approval, a form of supervision of the supervision that reinforced hierarchy. Additionally, GEAR required subcontractors to be responsible for safety in the works with their own supervision, offering in exchange permanent advisory support for the supervisors integrated in GEAR's structure. The staff of subcontractors for construction works was encouraged (by means of symbolic rewards, such as items of merchandising—jackets, bags...—of the multinational company) to use the company's anomaly reporting system and advanced safety management tool whose effectiveness depends—according to front line staff—on (and contributes decisively to) a change, often radical, in the common safety culture.

Summarizing: subcontracting relationships were managed using a combination of two opposing principles: on one side, using a twofold reinforcement of hierarchies, by means of the hybrid category introduced in the company's organizational chart (whose reason was, as emerged from testimonies, to combat the bureaucratization of permanent staff) and the triple-tier signature system. On the other side, as clearly stated by the Project Area Manager and the heads, supervisors and operators from subcontractors—whose testimony is reported in the table A3 of our paper (Walter 2017: 403)—by using a type of supervision that aims to develop the autonomy of subcontractors, that is, based on nurturing trust relationships.

It is also worth mentioning that this contractor relations approach was formalized by GEAR's Argentinean branch in order to give it continuity after the retirement of the Manager who founded the Project Area.

¹³ This is not the only hybrid form (a subcontracting network inserted in GEAR's structure) observed. Also hybrid, but in the opposite way (the oiling company's hierarchy inserted in a network) is the figure of the Company Man, a part of the hiring company which is the highest level in the drilling of an oil well performed by a subcontractor. These are hybrids that combine three general coordination principles in various modes: authority in an organizational hierarchy, price (and reputation) in the market and trust in inter-organizational networks (Bradach and Eccles 1989).

¹⁴ In the most frequent category (835 people, 45% of the respondents), which was 4–10 years of tenure, we found 42% of the people hired as part of the structure and 46% of the staff of the subcontracted companies.

¹⁵ The subcontractors' supervisor signs the delivery of a finished work that also needs to bear the signature of a GEAR supervisor (staff member or hired for the structure) and, finally, the signature of one of the heads of GEAR's Project Office. This highly demanding system has also been observed in airplane maintenance workshops, in which case the third signature is that of a regulatory body official.

5.3 Conclusion

What have we learnt after this essay written with a reasoned pessimism and a cautious optimism? We will not go back to the details—except for, perhaps, the most important ones—exhibited throughout in this text nor the testimonies, two of which are cited in this footnote.¹⁶ We will follow a scheme used in organizational analysis: first, the context; then, the formal organization; and, finally, the informal one. In this way, we will try to answer the questions posed in the introduction: who are those silent subcontractors? Why could listening to them provide a relevant contribution to the safety management in subcontracting networks?

In the first place, regarding the “context”, let us say that the historic institutionalist approach that Shelley Marshall resorts to for the study of local advancements in regulation through case studies and their subsequent comparison to obtain common guidelines that go beyond differences—inspired in the methodology of grounded theory—is the same one we have used, at a different level, to establish the parallel between the legacies of the Olympic Games and of the Project Manager of the Argentine branch of the company GEAR.

It is important to know the British experience because, in the first place, it is inspired in the vision proposed by the Egan Report of moving forward with determination to the building of partnerships in subcontracting networks; in the second place, because that proposal was taken by the elite of British businessmen in the construction industry to “accelerate change” through the sponsoring of “demonstration projects”. This generated, in terms of safety, the double movement necessary for an effective fight against the abuse of outsourcing: by moving from prescriptive to autonomous regulation and to a co-regulation of safety in which public initiative works together with private initiative to obtain the desired results. Underlying this is the explicit intent, promoted by the highest authorities in the UK, of a change in risk acceptability, with a motto of “not one fewer”¹⁷ that is welcome in the very masculine construction industry.

Let us now look into the “formal organization”, which in the case of the subcontracting networks refers to the contracts between the parts. As we have seen in the GEAR case, the plural forms of coordination—conceptualized by economic sociology—allow for the reinforcement of the hierarchical principle and of the operating core of construction activities simultaneously. Literature analyzing the work processes of the construction industry is scarce, especially in terms of—according to Perrow—the interactive complexity of works, combined with the tight coupling of, for instance, persons falling from height, objects falling on people, electrocutions and

¹⁶ “I had to convince GEAR’s safety managers: ‘how can we let the wolf watch over the sheep?’ they would say. That’s not how it is—I answered—they are safety professionals, not the wolf” (GEAR’s Project Manager). “Safety changed over the years. Before there was a safety watcher from GEAR who imposed... The old imposing changed. Nowadays they are more like friends rather than safety managers. They know how to reach you, they can have a chat. You base your experience in theirs in order to find a common ground” (Worker of Subcontractor C, 6 years working for GEAR).

¹⁷ We refer here to “ni una menos”, the feminist slogan against femicides.

structural collapses. If this combination explains the potential severity of accidents in this industry, it suggests that construction activities could apply the recommendations (articulating the strict hierarchy and formalization with a strong autonomy of the core of operations) considered valid for high reliability organizations.

Let us now analyze the most important aspect, the “informal organization” in subcontracting networks. It is the most important aspect because it refers to the least visible and more silent¹⁸ traits, which are more difficult to evidence. The two quotes in footnote 13 are the testimony of a rupture in the logics of silence and show that the difficulty does not depend on the rank of workers. If today we can talk about the legacy of a Project Manager in GEAR’s branch in Argentina, it is because those responsible for safety decided to preserve that legacy, making his accomplishments sustainable. These accomplishments were achieved by means of a “risky” approach, consisting in trusting in the professionalism of subcontractors and doing what is necessary—as shown by the testimony of the worker in footnote 13—by helping subcontractors to develop the abilities necessary to act in that manner. In order to build trust in subcontracting networks—here translating the message of the now retired Project Manager—it is necessary to begin by trusting.

These conclusions have everything in common with those listed in the preliminary report about the legacy of the Olympic Games, which in fact—unsurprisingly, due to the exceptional nature of the case—went even further in terms of the actions taken and the results obtained. Let us remember the list that we detailed when we referred to the aforementioned legacy in an abundantly underlined paragraph: two-way relationships, learn from each other, empowerment of workers by giving them the authority to report near misses, transparency in governance, physical presence and involvement of clients on supplier sites.

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¹⁸ For the simple reason that in secrecy, there are power logics at stake manifested by the sociology of work long ago, since the famous writings by Donald Roy in the 1940s about the voluntary limitation of production by workers in a metal works factory in the USA.

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Chapter 6

Subcontracting Safety (Cases)



Jean-Christophe Le Coze

Abstract Companies operating high-hazard installations in the process industry call upon consultants to provide safety-related expertise. They do so voluntarily but also in specific regulatory contexts which require operating companies to assess risks and establish a safety case, a structured evidence-based demonstration that the facility will not generate unacceptable risks for society. Consulting companies have different strategies and compete to gain access to contracts, which are selected according to criteria such as costs, technical propositions, trust or reputation. This creates a specific market. National regulators play a key role in setting the level of expectation regarding safety cases, by among other things, requiring the use of a third-party expert. These preliminary outcomes show the importance of situating and understanding the contribution of these private actors in process safety regulation and governance as another facet of subcontracting in relation to safety.

Keywords Contracting · Offshoring · Safety cases · Consulting · Expertise

6.1 Introduction

Most of the chapters in this book address the issue of safety and subcontracting (or outsourcing, offshoring) from a single perspective: some subcontractors, in their daily activities, are exposed to occupational or process safety risks because of the activities that they carry for a company (Quinlan, this volume), and some subcontracting can expose third parties, when for instance contracting work around high-pressure pipelines (McDermott and Hayes 2019). This situation requires therefore a mode of management which, depending on regulations, is adapted to the contractual dimension and supervisory roles to be performed by companies' employees.

They indeed need to make sure that activities reach their target safety (Gotcheva, this volume, Pilbeam, this volume, Pariès, this volume). But companies also

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contract out work to consultants in many areas including legal, financial, engineering, human resources, environment, strategy and management (Kipping and Clark 2012). Consulting has been a growing market in the past decades as a result of many trends including transformation of work, businesses and states in a context of globalisation in which industry and services strongly interact in what Veltz describes as a hyper-industrial society (and not a post-industrial one): industry has not disappeared, and services, through consulting, are major players of industries' operations (Veltz 2017).

In this chapter, I introduce how safety has become a consulting area covering management, behavioural, engineering and legal domains. Environment, Health and Safety laws contribute to the creation of this consulting market because many companies need external expertise to respond to regulations. One example is 'safety cases' for the process industries (e.g. oil and gas, chemicals manufacturing). Based on ethnographic studies, recent focused interviews and on preliminary research outcomes, four points are sketched in this chapter on 'safety cases' from a consulting angle: the 'safety case' consulting market; the strategies of companies running high-hazard activities; the consulting activity; the role of the law and control authorities.

6.2 Safety Consulting

Safety is one topic for which consulting has also developed considerably in various areas. The author's experience in the chemical and nuclear industry reveals that many consultants bring expertise in this domain, ranging from legal, engineering, behavioural or management dimensions associated with safety. For instance, in one case, following an incident, the top management of a company hired a consultant on 'behaviour-based safety' (BBS) to train people.

The aim was to help reduce 'human error' which was identified as one of the core problems behind the event which caused much trouble for the company. The approach consisted in a series of training sessions. Managers, supervisors and workers of production, logistics, maintenance and health and safety departments of the site on which the event occurred were enrolled in this training. Knowledge derived from a mix of psychology and cognitive science was combined in a two-day session during which several ideas associated with human error, safety, incident analysis and prevention were presented, discussed and translated in operational tools for improving practices in the future.

The same company also contracted legal advice (unrelated to the event mentioned above) to support one member of the safety management team in charge of regulatory compliance. This legal advice was IT based and consisted in updating the health and safety department on work and environmental regulatory evolutions of legal texts. This was associated with compliance to keep up with regulatory changes. These are some examples. They are not commented in terms of their relevance to practices despite conflicting views among people in these two cases. Companies' use

of consultants is not homogeneous, with some making much greater use of consulting experts than others.

6.3 Regulatory Consulting (Safety Cases)

In safety, consulting has also progressively become a part of regulation regimes concerning process safety (Lindøe et al. 2013). As safety in developed economies is strongly regulated, subcontracting comes for companies very often as a need to respond and to comply with these regulations. Companies do not have the internal resources to do so (this point is further developed below). In this sense, consulting can be understood as one of the regulatory (or governance) ‘*intermediaries*’ (Abbott et al. 2017) or ‘*private facilitators*’ (Owen 2021). Safety is indeed regulated through different laws including workplace, environmental or building laws which require different type of risk assessments to be performed to make sure facility design and operational practices incorporate regulatory requirements and targets.

In Europe for instance, environmental law requires hazardous installations to provide what is described in the literature as a ‘safety case’ (Sujan et al. 2016); workplace law entails (among other) assessment of explosive atmospheres (for which a kind of safety case is also expected) and building laws require a technical fire assessment. At the European level, these laws are framed by directives which are translated at national member-state levels.¹ In France, these directives are translated in French laws in three different legal codes: labour, environment and construction codes. To comply with these regulations, companies need to assess risks related to their processes and must follow a number of technical criteria and steps defined by regulations. Among the three areas indicated here (hazardous processes, explosive atmosphere, building fire), it is the ‘safety case’ of the environment code (‘*étude de dangers*’ in French) which exhibits the highest level of sophistication in both technical criteria and administrative steps to follow. This has to do with the diversity of hazardous processes covered by these regulations but also the level of hazard of some of them.

6.3.1 Hazardous Plants

Chemical plants, agricultural silos, pyrotechnic factories, dams, refineries, oil storage and now hydrogen, carbon capture, lithium batteries and wind turbines (this is not an exhaustive list) fall under the safety case regime. These diverse activities entail different hazards and level of risks. To cover this diversity of cases, the law has been

¹ For example, directive 2012/18/EU for major accident hazards (also known as Seveso III); directive 2014/34/EU for explosive atmosphere (also known as Atex) and directive 93/68/CEE for building fires.

designed to distinguish many different criteria which allow companies to determine their obligations. In this regard, depending on criteria regarding the nature and quantity of substances and products processed, stored or transported, companies must follow increasingly stringent processes as their level of hazard (as defined by the law) goes up.

The highest level of such expectations, for upper-tier Seveso sites, requires several administrative and technical steps that lower-tier sites do not need to follow. Administrative steps include informing and interacting with the Prefect through local authorities (DREAL). The Prefect and DREAL represent the state at the regional level in France and ensure that supervising companies comply with the law. Other administrative steps include local entities representing civil society (public enquiry) or other state and local actors but also associations (Coderst, environmental authority).

Technical steps consist in providing two studies: one on environmental impact (chronic risks) and another on hazards (accidental risks which cover explosion, fire, release of toxic substances in the atmosphere). Both are very often performed by consultants who assist a company in producing these studies and, sometimes, assist in the interaction with the authorities. Technical and administrative steps are intertwined as it is the technical input which feeds the many aspects of the administrative process.

In this chapter, consulting activities associated with the hazard studies (accidental risks) are briefly discussed. This discussion is based on several years of studying high-hazard systems using an ethnographic approach, interacting with a range of actors inside (operators, engineers, environmental and safety professionals, plant managers) and outside companies (regulators, consultants) in a wide range of safety-critical organisations. A recent series of interviews with ten consulting engineers in charge of safety cases provided additional insights.

What comes out of these studies is several aspects worth pondering when studying the subcontracting of ‘safety cases’ by companies. I introduce and sketch four different points based mostly on qualitative material of observations and interviews. The first one is related to what is a market which is structured by consulting companies’ strategies in relation to their domain of expertise, a second is connected to the subcontracting strategies of hazardous companies when it comes to safety cases, a third characterises several aspects of the consulting relationships with hazardous companies (including the commercial dimension of selling services), while the fourth discusses the practices of safety authorities and the evolution of the law in relation to consulting.

6.3.2 A Market Structured by Expertise

As introduced earlier, the European Directive translated in the French law covers a wide range of hazardous processes and substances. They are organised in a document, a nomenclature which contains a great number of prescriptive rules for filtering expectations for the production of ‘safety cases’. For instance, for the substance chlorine, above 500 kg in a plant, a company must apply the most stringent level of

safety case. Between 100 and 500 kg, administrative and technical expectations and steps for the safety case are lower and therefore less demanding.

When a level of expectations is determined, a ‘safety case’ must be prepared. The range of substances and processes included in this nomenclature corresponds first to a vast domain of knowledge and, second, to various degrees of potential complexity of ‘safety cases’. If the law contains a prescriptive dimension with the thresholds established by this nomenclature (and sometimes through technical and legal requirements specified for specific processes, such as the storage of chlorine), there is a need for a specific risk analysis which relies on engineering expertise. In this respect, and from interviews with consulting engineers, the market seems to be self-structured around this diversity.

One hypothesis at this stage is that some consulting companies specialise in areas in which standardised responses can be provided but which do not require as much expertise as in other areas in which a higher level of knowledge is demanded. There is indeed a variety of consulting companies from small and local ones to multinationals. Consulting companies with higher expertise do not necessarily target the low expertise domain, for competitive reasons. Their business model is not designed to exploit standardised technology for which costs can be lowered as there is less engineering expertise involved.

6.4 Companies’ ‘Safety Case’ Subcontracting Strategies

From the customers’ point of view, hazardous companies also follow different strategies when it comes to subcontracting their safety cases depending, of course, on their resources, but not only. Multinationals with in-house HSE expertise (legal and technical) have three options: outsourcing, internalising or a mix of both. However, the trend observed over the years is, according to an engineer with a long experience with multinationals (and consistently with the evolution of capitalism, see introduction), to favour subcontracting.

One familiar reason is to consider such engineering activity not to be core of the business, but another prevalent reason is the increase in the number of safety cases to be produced which cannot be handled by internal resources only. Another one is the regulator who might prefer external analysis over internal ones, arguing about the need for independent analysis. When this is the case, the competent internal resources of the company can closely supervise studies and make sure that their approach is consistent across consulting companies and sites of the company.

Another option experienced in the industry is multinationals which provide or not their own guidance in terms of methodologies to be used and followed for the production of safety cases. Indeed, despite a form of prescriptive regulatory background with the nomenclature, the law does not specify in detail how a risk analysis in a safety case must be performed. The regulator only provides guidance. Companies can decide to produce their own standards as long as they can justify that they match the expectations of the law. This process is supervised by the authorities,

local inspectors, who follow the administrative and technical steps of the safety case process.

For small or medium-sized (SMEs) hazardous companies, the situation is quite different. They rely on consulting companies to provide the legal, technical but also relational (with authorities) competence that they do not have in-house. Some of them have no previous experience in dealing with such matters. As they change their process, expand their production or because of a change in the nomenclature, they cross a threshold and become affected by the safety case requirement. The situation is very different from multinationals, which have as much expertise as the consulting companies and can supervise, orient and manage the contracts very differently.

The activity of consulting

For consultants, the two situations are very different. Working for a multinational or working for an SME entails different commercial and technical relationships. As one engineer formulated it, about the multinational that she worked for, '*they could produce their safety cases themselves*', but safety authorities often require an external view. In contrast, an SME needs many explanations concerning the implications of the safety case process. This contractual dimension is obviously one strong dimension of consulting work. Consulting companies compete in this market to secure contracts and bid against each other, creating opportunities for their customers to opt for the one that they prefer according to their preferences.

Technical quality, delivery time and costs feature prominently as key criteria of these competitive situations, but trust established in antecedent contracts or reputation of consulting companies can also determine choices. These criteria might vary depending on contexts which range from the sensitivity of the safety case for the company whether in relation to:

- time (e.g. a safety case is needed quickly to start a new activity);
- a deadline established by the regulator;
- a higher level of scrutiny by the safety authority (e.g. a hazardous process near a city which requires an extensive detailed and robust safety case);
- previous experience (e.g. satisfaction or dissatisfaction in the way a safety case was handled before).

In any case, one important issue for the consultants is to anticipate and to quote for the right amount of time to complete the safety case within budget and according to schedule (pressure to deliver on time can be high for hazardous companies as hinted in the list above). This estimate mainly depends on the size, complexity and sensitivity of the processes involved. Size and complexity mean quite logically more time needed to complete a risk analysis. Sensitivity might also mean more time as the number of scenarios to be modelled (e.g. fire, toxic release, pressure effects) depends on context. One sensitive context is proximity of hazardous processes to public buildings (e.g. school, hospital, housing). In this respect, local authorities can also contribute to the framing of what is expected for a safety case.

6.5 Inspectors and the Law

Although they cannot prescribe a specific consultant, inspectors of hazardous companies can translate their level of expectations, by, for instance, making explicit to a hazardous company that they could ask for what is called a third-party audit of the safety case. A third-party expert is a consulting company which critically reviews a safety case produced for a company, to find potential flaws in reasoning such as missing risks and incomplete accident scenarios. By law, it is possible for inspectors to require a hazardous company to contract with a third-party expert. It is not systematic but can be triggered if the quality of the safety case is considered not be of the expected level, or for other reasons (e.g. sensitivity, uncertainty, new technology). This legal context is therefore one strong defining feature of this consulting activity. On the one hand, it depends on the content of the law which evolves over the years (e.g. one major change followed the 2001 Toulouse accident; other incremental changes concern the content of the nomenclature); on the other hand, it depends on the translation of the law in specific contexts by inspectors of local authorities who can tailor their level of expectations through interactions with hazardous companies (use of third-party audit or not, for instance).

6.6 Conclusion

Hazardous companies in the process industry subcontract expertise in the safety field in behavioural, management, legal or engineering areas. They do so voluntarily but also in specific regulatory contexts which require risk assessments and safety cases. Requirements for safety case vary according to substances, their quantities and the processes involved. To comply with the law, hazardous companies very often subcontract their safety cases to consultants, while only a few multinationals can and chose to internalise this activity. Consulting companies have different strategies and compete to gain access to contracts, which are selected according to criteria such as costs, technical propositions, trust or reputation which in turn depends on contexts of hazardous companies. This creates a specific market. Local control authorities play a key role in setting the level of expectations regarding safety cases, by among other things, requiring the use of a third-party expert. These preliminary outcomes show the importance of situating and understanding the contribution of these private actors in process safety regulation and governance as another facet of subcontracting in relation to safety.

Ethical Statement Informed consent was obtained from all informants interviewed for this work, and their identity has been anonymised. Ethics approval is not required for this type of study in France.

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Chapter 7

Complementarity: Ensuring that Contracts Are Compatible with Collaborative Relationships



Bruce Pinnington

Abstract Contracts, with their focus on safeguarding a firm's interests, traditionally, have been considered to be incompatible with collaborative relationships. This chapter explains the basis for this incompatibility and considers how it may be resolved. The key to ensuring that contracts complement collaboration is in the way the coordination function of contracts is aligned with mutuality and consequent trust development. Even dysfunctional relationships may then be repaired.

Keywords Contracts · Collaboration · Mutuality · Trust · Complementarity

7.1 Styles of Buyer–Supplier Relationship

In a world where outsourcing is a prevalent reality, health and safety need to be managed into the supply chain, especially in relationships involving joint site working. Successful collaborative interaction facilitates the integration of health and safety systems and practices, whereas failing relationships may lead to the need for previously established tacit knowledge to be built anew.

The more complex relationships are, and the higher the inter-firm dependence, the more important it is that stable long-term relationships are established and maintained. However, there are well-established problems in managing such relationships arising from the potential incompatibility between collaborative relationships and contract management practices.

Externally sourced products and services give organisations access to specialist resources to which they may not otherwise have access (Dyer and Singh 1998), as well as capacity flexibility, access to product and process innovation and financial benefits such as overhead reduction. Contracts provide important mechanisms through which terms, conditions and interaction processes are explicitly agreed at the outset.

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Buyer–supplier relationships range from arms–length relationships that are typically transactional and managed only through formal instruments (contracts, terms and conditions, etc.), to highly collaborative long-term relationships that depend heavily on social controls such as trust. No single style is appropriate to all circumstances. Arms–length relationships are highly suitable for periodic product purchases, where there is low commitment between the parties. Prices can be regulated against the market, and formal agreements provide protections to ensure that the terms of the exchange are fulfilled. Each organisation seeks to protect itself against potential opportunism by the other party. However, a collaborative, partnership style relationship becomes necessary where uncertainty and complexity in the supply are high (Carson et al. 2006).

Contracts focus on protecting a firm from potential exploitation by its partner, but this approach implies an underlying distrust between contracting partners that has long been considered to be incompatible with collaborative relationships (Ghoshal and Moran 1996). Contrastingly, collaborative partnerships are predicated on bilateral trust, so how can both coexist successfully? This chapter explains the basis for this incompatibility and considers how it may be resolved by reorienting contracts and contract management processes, through an understanding of the coordination function of contracts.

7.2 Contracts and Their Safeguarding Role

Contracts are legal instruments that define a detailed set of obligations (Zhang et al. 2017) providing firms with safeguards against opportunistic behaviour by a business partner that may negatively impact the firm. In practice, contracts are ubiquitous (Weber and Mayer 2011) and central to significant commercial relationships (Zheng et al. 2008), particularly in regulated sectors. Contracts and contracting processes are necessities in most commercial relationships for: delimiting the scope and timing of the contract, establishing a detailed requirements specification, defining constraints (such as health and safety) on how products and services are delivered, establishing each party's obligations to the other, defining stakeholder roles on each side and most importantly detailing the agreement of commercial terms. Contracts thus constitute a necessary form of due diligence by each party with respect to the other. Contract theory proposes that the more complete a contract is, the more it safeguards the focal firm.

7.2.1 *Problems with Contracts in Complex Business Environments*

However, there are also several problems with contracts, especially in a collaborative context.

Firstly, safeguarding in contracts is predicated on distrust because there is an implicit assumption that a business partner will behave opportunistically if the contract leaves such possibilities open. This starting assumption will itself inhibit trust development (Weber 2017) through negative and potentially intense emotions (Weber and Mayer 2011) that compromise genuine collaboration.

Secondly, the safeguarding approach is also flawed in complex contracts and contexts where frequent unforeseen issues are likely to occur (high uncertainty). The degree to which effective safeguards can be provided, ultimately, is constrained by humans' limitations in foreseeing all possible future circumstances (bounded rationality). Contracts become progressively more complex and expensive as uncertainty increases and where the attempt is made to cover all possibilities (Schepker et al. 2014). *Complete* contracts become impossible where complexity and uncertainty are high (Cao and Lumineau 2015). In situations of high complexity and uncertainty, firms depend on collaboration to manage unforeseen circumstances in a manner acceptable to both, including changes to the contract itself, or changes to contract management practices.

There has been extensive debate between academics on the compatibility between contracts and collaborative relationships that runs the risk of confusing managers (Cao and Lumineau 2015). However, in complex outsourcing circumstance where both need to coexist, the focus needs to be on how, rather than whether, contracts and collaboration can complement each other.

7.3 Complementarity

The premise of *complementarity* is that if the two can work together, contracts will provide a structural framework for collaboration, whilst collaboration will provide a stimulating mechanism for managing contracts (Luo 2002). Although results from studies into whether contracts can, or cannot, complement collaborative working have been mixed, such that neither viewpoint is definitively established (Rhee et al. 2014), recent studies (Weber 2017; Lumineau 2017; Howard et al. 2017; Pinnington and Ayoub 2019) present more nuanced contingency views on *how* complementarity can be achieved.

The remaining sections of this chapter explain how complementarity can be achieved through a shift in emphasis in the framing and management of contracts. Specifically, a duality is recognised in the coordination function of contracts that needs to be correctly oriented in collaborative relationships (Pinnington and Ayoub 2019). The importance of mutuality as the relationship foundation is discussed for its

impact on trust development. Research from a large maritime construction context is then briefly discussed to highlight the importance of identifying structures, processes and behaviours that inhibit mutuality and consequently inhibit trust development. The example discusses how addressing factors that impinge mutuality enables vicious cycles of distrust to be gradually supplanted with self-reinforcing virtuous cycles of trust building. The final section considers the governance implications arising in relation to complementarity and outlines some important areas where mutuality must be established and embedded.

7.3.1 Contracts and Their Coordination Role

Contracts fulfil two largely different roles (Lumineau 2017), the safeguarding role outlined above and a coordination role through which contingencies and contract change are managed. The coordination function provides the basis through which unforeseen events are managed (Zhang et al. 2017), information exchange is effected (Lumineau 2017), negative behaviour is controlled, and expectations are aligned (Argyres et al. 2007). These functions are particularly important in complex relationships featuring high uncertainty.

In collaborative relationships, safeguards are still needed, but both parties need to consider safeguards to be reasonable and acceptable. This can even increase competence trust, as long as clauses are not perceived to be opportunistic. Complementarity, however, is not as simple as shifting contract focus from safeguards to coordination clauses, as illustrated by inconsistent research findings. The key to achieving a positive relational effect lies in the coordination mechanisms selected and the way they are applied.

Studies have attributed many mechanisms to the coordination function: roles and responsibilities (Howard et al. 2017), scheduling (Oliveira and Lumineau 2017), contingency management (Zhang et al. 2017), monitoring, reporting and enforcement (Reuer and Arino 2007), interaction interfaces (Lumineau 2017) and steering committees (Reuer and Devarakonda 2016). However, these mechanisms can be used in two very different ways, with very different consequences for the relationship; a duality is evident therefore in the coordination role of contracts.

7.3.2 Duality in the Coordination Role

Where the emphasis is on monitoring, reporting and enforcement processes, then the relationship focus will be on the reinforcement of contract safeguards, the relationship will be hierarchical, and especially where enforcement measures (penalties) are applied, trust will be destroyed. Steering committees and contingency management aligned with that approach will further embed contract enforcement. The relationship will be dominated by formal controls.

However, where the emphasis is instead on mutuality (peer respect, shared expectations and mutually beneficial outcomes), then this will reinforce trust building and enable genuine collaboration. Steering committees and contingency management are then used to address issues affecting both parties, equally, and used to meet both parties' relational expectations. The relationship will be dominated by social controls (trust and norms).

Only in this second scenario are contracts complementing (rather than compromising) collaboration.

7.3.3 Mutuality

Mutuality is key to achieving complementarity. Mutuality provides a basis for trust building which in turn supports collaboration (Pinnington and Ayoub 2019). To achieve a collaborative partnership, firms must demonstrate that they value their partners' knowledge, respect partners' value objectives and deliver on their own obligations to their partners. Recognition of obligations to a partner is often lacking in buyers, especially where contracts are drafted such that only the supplier's obligations and performance are detailed. Mutuality contrasts starkly with arms-length relationships where a firm seeks only to safeguard its own position. Dysfunction in relational trust, norms and communication can each prevent genuine mutuality from emerging, and the recognition and removal of impediments to mutuality is the key to restoring trust between partners (Pinnington and Ayoub 2019).

7.3.4 Impact on Trust

Trust represents the willingness of one party to be vulnerable to the actions of another, based on positive expectations of the other's motives (Lumineau 2017) and is fundamental to collaborative relationships, but is a complex concept. Although much of the contracts literature considers trust as a homologous concept (Cao and Lumineau 2015), at least two distinct dimensions are normally recognised: trust in an organisation's competence and trust relating to commercial opportunism, also known as goodwill (Malhotra and Lumineau 2011). Competence trust and goodwill are interrelated but are each affected by different actions (Weber 2017).

Trust is also widely recognised to be reciprocal. An organisation that feels trusted is more likely to demonstrate trust in return (Doney and Cannon 1997). The reciprocal nature of trust contributes to positive, self-reinforcing cycles through which reciprocated action by a partner leads to further trust building actions by a firm. This is a virtuous cycle of trust building. Trust building occurs slowly over time, but trust destruction can be rapid and even related to a single event, especially in the case of goodwill. Trust destruction can also see reciprocated actions through which relationships can enter a vicious cycle of trust destruction (Das and Teng 1998).

7.3.5 Trust Cycles in Practice

The principles described in this chapter are distilled from an empirical case study of five dysfunctional relationships (two terminated, three ongoing) situated in maritime construction (Pinnington and Ayoub 2019). The outsourced relationships featured the provision of skilled labour resources. The project environment was technically complex with many technical design and build issues. Distrust was high with mutual blame attribution and accusations of opportunism on both sides. Although the importance of collaboration was well recognised, implementation attempts were unsuccessful. The parties had different expectations of how it should operate.

Many problems existed that compromised trust in both directions. Management was too hierarchical with too many decisions requiring escalation within the buyer organisation, leading to delays, coupled with unilateral and remote decision-making. Suppliers felt that their expertise was undervalued and were frustrated that they became aware of design and planning decisions too late to be able to manage their own schedules efficiently. Precursors to supplier tasks were often not ready for suppliers resulting in workers being idle on-site. The buyer's limited engagement with suppliers in early design and planning decisions, and root-cause problem management on-site, suggested low trust. In turn, delays that suppliers felt were avoidable reduced the suppliers' trust in the buyer's competence. Suppliers required compensation for under-utilised resources, but with limited understanding of the real operational impact, the buyer suspected its suppliers of opportunistic compensation charges, reducing goodwill trust. A self-reinforcing vicious cycle of trust destruction existed. Buyer power dominance contributed to these problems. The keys to improvement lay in greater empowerment of local decision-makers with reconstituted governance boards, earlier and more open information exchange, acceptance of the need to recognise buyer performance as well as supplier performance and the replacement of performance-based remuneration schemes with more transparent compensation schemes. Improvements in both side's trust in the other's competence further improved their inclination to collaborate. Improved interaction, faster resolution of problems and better understanding of each other's cost drivers improved efficiency, lowering charges and improving both sides' goodwill trust. A self-reinforcing virtuous cycle of trust building had been entered (Fig. 7.1).

7.4 Relationship Governance Implications

The mechanisms through which the complex framing and management of contracts can easily destabilise and compromise the trust upon which collaborative relationships depend have important implications for the governance of long-term relationships. Managers need to understand that whilst the coordination function of contracts holds the key ultimately to trusting, effective relationships, coordination mechanisms need to be correctly aligned if trust is to be achieved or relationships will deteriorate.

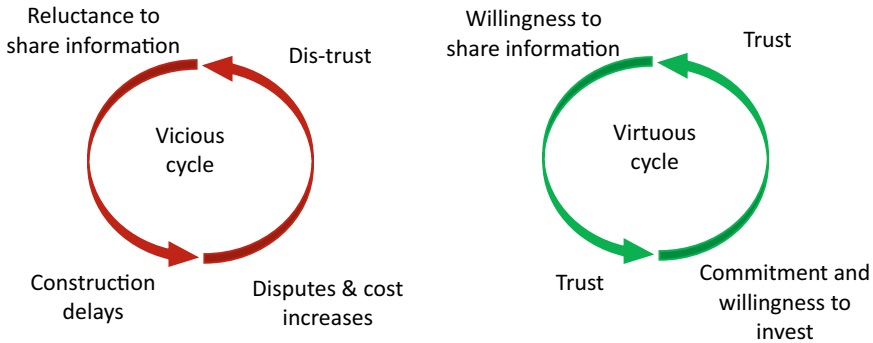


Fig. 7.1 Cycles of trust

7.4.1 Structure, Roles and Decision-Making

Relationship governance boards typically operate at different structural levels: an executive or strategic meeting that oversees the long-term relationship and commitment between organisations; a relational or contract management board through which senior stakeholders steer contract change and medium-term objectives, and an operational or programme level, through which the detailed requirements of the contract are managed through frequent interaction. The purpose and scope of each of these management boards need to be clear, and competence trust will be enhanced where both parties dedicate relevant and suitably empowered managers. Goodwill will be maintained where the focus is on joint problem solving of issues affecting either or both parties, with negotiated, reasonable compensation where appropriate to maintain relational equity (Pinnington and Scanlon 2009).

7.4.2 Provide a Foundation for Mutuality in the Relationship

Governance boards and manager relationships are key to establishing the values and behaviours that characterise the relationship. Through appropriate leadership behavioural norms based on mutual respect, trust can be developed. Buyer organisations can demonstrate peer respect and confidence in their suppliers' competence by early, close engagement in technical design discussions and planning activities. Through close interaction, the supplier will accumulate tacit knowledge of the buyer operations enabling them to demonstrate better operational competence, increasing the buyer's trust in the supplier. In parallel, the buyer will accumulate tacit knowledge of the supplier's operational and commercial challenges and will better understand the implications of its operational decisions. Where buyer decisions can be made that minimise impacts on the supplier's efficiency, then supplier trust in the buyer competence will increase. Norms need to be established through which it becomes

second nature to value a partner involve them in discussions and decision-making and the pursuit of mutually beneficial solutions to problems.

7.4.3 Buyer Obligations to Suppliers

In outsourced contracts, suppliers often have significant dependencies on buyer-provided systems and processes, standards, production equipment, and IT. In co-located arrangements, suppliers are likely to be subject to significant site-related constraints. Buyer obligations to suppliers, upon which supplier performance depends, are often under-specified in contracts and under-managed in governance processes. Governance processes in fully collaborative relationships should dedicate equal priority to the review and resolution of problems in both buyer performance (obligations) and supplier performance.

7.4.4 Alignment Checks and Contextual Customisation

Finally, many experienced practitioners may be familiar with the tensions between managing to the letter of a contract and maintaining good working relationships, but may be less aware of mechanisms at play, and their consequent effects on trust. To enable trust development, governance processes need to ensure that inhibitors to mutuality have been resolved and that relationships remain healthy and aligned:

- Are relational expectations consistent for both parties?
- Are trust perceptions (goodwill and competence) similar?
- Have all structural, procedural, behavioural and learning factors that are inhibiting mutuality, been assessed for this relationship?
- Are plans in place to address mutuality issues?
- Do suppliers feel valued, involved and trusted?

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Chapter 8

Boundaries: Their Influence on Managing Safety in Outsourcing



Colin Pilbeam

Abstract Boundaries are an essential feature of an organization and integral to the on-going process of organizing. Outsourcing not only disrupts the configuration of organizational boundaries but also compounds the safety management challenges faced by an organization. This chapter connects these two observations through an examination of the composite nature of the organizational boundary. Misalignment between organizations in one or more of the three clusters of processes (physical, mental or social) that comprise the boundary create differences which may contribute to the safety management challenges commonly experienced in outsourcing. Boundary spanning skills that manage these processes are vital for successful working relationships between organizations but are rarely taught in safety training.

Keywords Outsourcing · Organisational boundaries · Safety management · Interventions

8.1 Introduction

Contractors create safety challenges. This chapter examines this widely held view of outsourcing from the perspective of the organisational boundary. Several authors have reported that organisational boundaries are a composite of three elements and that organisations do not always differ on every element. Here I suggest that differences across the organisational boundary in one or more of these elements can account for the particular safety challenges that commonly occur. Differentiating the boundary in this way and considering the safety implications of this may have significant practical application. Effective management of the three elements of the boundary is necessary for successful safety management in outsourcing relationships.

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8.2 Outsourcing

As connectivity increases in a global world, the opportunities for outsourcing increase, making it one of the most enduring strategic initiatives adopted by organisations (Espino-Rodriguez and Padron-Robaina 2006). It occurs in many different industrial sectors across the globe, involving firms that range in size from sole traders to multinational corporations and in many different types of activity. This diversity ensures that the term ‘outsourcing’ risks becoming an ‘umbrella term’ requiring clearer specification.

Both Harland et al. (2005) and Espino-Rodriguez and Padron-Robaina (2006) identified a wide variety of definitions of outsourcing that highlight not only different activities that occur across levels of analysis but also a wide variety of working relationships between firms which have different consequences. Espino-Rodriguez and Padron-Robaina (2006) observe that while most authors agreed “that outsourcing means going outside of the firm to acquire determined activities that are not processed internally, pp. 51–52”, there are differences between their definitions. These differences are related to the nature of the relationship between parties, the types of activity or service that is outsourced and the business processes that are involved. Subsequently, Davis-Blake and Broschak (2009) defined outsourcing as “the act of obtaining goods or services from individuals or organisations outside of a firm’s boundaries when these goods or services could be created internally by a firm’s own employees and managers, pp. 322”. This definition has two important characteristics. The first is that it emphasises the strategic decision to access goods or services from beyond the firm boundary, when the firm has the capability to produce these goods or services internally, which distinguishes it from a simple purchase decision. The second is the requirement for an inter-firm relationship between a lead or client firm, purchasing the goods or service, and a contractor, supplying the goods or service. This suggests that the supplier has skills and capabilities that are superior to those of the client firm for producing that particular good or service.

Davis-Blake and Broschak (2009) suggested that outsourcing arrangements can be structured in one of three ways. First, the whole process or function can be located beyond the boundary of the client firm (i.e. inside the supplier firm). Second, only part of the process is located outside of the client firm. These may be mundane tasks or those requiring specialist skills. Third, necessary skills can be procured through an employment agency or search firm. The latter, however, is only one of four forms of contingent work (Connelly and Gallagher 2004). There are three others: ‘free-lance’ or independent contractors; ‘direct hires’ with an implicit expectation of an enduring employment relationship; and seasonal workers. Outsourcing may therefore occur either between a firm and another firm, where processes are outsourced, or between a firm and an individual, where staff resources are outsourced. There is an extensive literature on both of these levels of outsourcing; but because they operate at different levels of analysis, they rarely overlap.

Not only are there different forms of outsourcing, but there are different theoretical explanations for its occurrence, which may also contribute to the diversity

of definitions. Conventionally, the decision to outsource is explained by transaction cost economics (TCE), which focuses on the efficiency of the economic transactions conducted between the firms and considers each interaction between firms as discrete and independent of previous (or future) interactions. However, there are alternative perspectives for analysing and explaining outsourcing. The resource-based view (RBV) of the firm focuses on the internal capabilities and resources of the firm relative to others and suggests that firms should outsource those activities in which their capabilities give them no competitive advantage, because others can perform them better.

A third perspective emphasises the longitudinal and enduring relationship aspects of outsourcing. This relational perspective contrasts with the TCE approach by considering the *ex post* relationship development, not just the *ex ante* outsourcing decision (Baraldi et al. 2014). Kaipia and Turkulainen (2017) observe that the relationship perspective addresses “how to manage the outsourcing relationship after the decision to outsource has been made, p. 115”. Effective management of the relationship is critical to the future success of the outsourcing activity, but this would be overlooked through the adoption of a TCE perspective. The relationship perspective anticipates the potentially high levels of mutual dependence due to the interlinked activities and the need for close coordination that can occur in outsourcing relationships. These different theoretical perspectives inevitably affect the characterisation of the required boundary between the firms that allows separation or integration or something in between.

8.3 Safety Challenges of Outsourcing

Variations on modes of outsourcing to service a wide range of needs in many different sectors inevitably result in many different challenges to the management of safety in organisations. A series of informal focus groups with senior managers from different industries conducted as part of an IOSH-funded research project (Pilbeam 2020) identified many different challenges (Table 8.1). Here the collective synthesis of these data is aligned to the five major steps for contractor safety management developed by the Campbell Institute (National Safety Council 2015).

The selection by the client of suitable contractors to perform the task is often constrained by price considerations, and by legal or administrative rules, especially in public sector organisations. The nature of the outsourced tasks can create challenges, especially if it is complex, lengthy and likely to change as it progresses. This uncertainty creates challenges in terms of understanding what is, or will be, required and for assuring the appropriate skills are available. Cultural differences between the client and contractor organisations, especially in terms of language and values, may create further challenges for safety management, not only before the task begins, but also at subsequent changes. While contractors who have worked on different sites and with different clients are able to share safety insights because of their breadth of expertise, this is rarely done. A more common experience for the contractor is the

Table 8.1 Challenges for managing safety in outsourcing relationships identified in a series of cross-sector focus groups with senior managers aligned to best practices in contractor management (National Safety Council 2015)

Five major steps in contractor safety management (NSC 2015)	Identified safety challenges
1. Prequalification	<ul style="list-style-type: none"> • Price and quality constraints for task set by client • Constrained choice of contractors
2. Pre-job task and risk assessment	<ul style="list-style-type: none"> • Scope and complexity of the work, including likely evolution of the project • Understanding of the required task • Competence to undertake and complete the task • Cultural differences (languages, values)
3. Contractor training and orientation	<ul style="list-style-type: none"> • Different procedures and ways of working for different clients create confusion for the contractor • Inconsistent implementation of rules between sites of the same client or over time on the same site • Turnover of personnel on site
4 Monitoring of job	<ul style="list-style-type: none"> • Monitoring • Sharing of information • Communication • Awareness/coordination of who is on site
5. Post-job evaluation	–

confusion created by the need to follow different rules and ways of working for each client. This requires appropriate training and orientation. A further challenge rarely reported is the turnover of personnel on site. The contractor may not always supply the same workforce to the client site on every occasion, resulting in variation in understanding of the task, competence to perform the task and knowledge of acceptable ways of working. All of this requires close monitoring of the contractors and a keen awareness of who is present on site and which tasks they are performing. Mechanisms to capture and share this information in order to safely coordinate and control activities are essential. Echoing the wider findings from the IOSH-funded study and the research underpinning the Campbell Institute guidelines is the absence of any comment on post-job evaluation. Rarely done, this may be a significant contributor to the ongoing and persistent safety challenges arising from outsourcing.

Over two decades, Quinlan and colleagues have developed and applied a ‘Pressures, Disorganisation and Regulatory Failures’ (PDR) framework (Quinlan et al. 2001) that groups risk factors explaining the poorer health and safety performance of individual contract workers into three categories. Economic and reward pressures identify risks that favour production over safety considerations and encourage unsafe working practices. Tight financial margins on contracts or payments contingent upon performance relegate considerations of safety in favour of cutting corners and risk taking. Compressed contracts, work intensification and fast-paced work may encourage long or irregular working hours, so increasing the risk of fatigue, as will multiple job holding to secure a living wage. Disorganisation manifests itself in the

recruitment of inexperienced or under-qualified staff, who receive limited induction and little supervision. If safety policies and procedures are available, they may lack clarity and may be implemented ineffectively. Communication between firms and individuals may be ambiguous and unclear, leaving contractors isolated, particularly when there are cultural differences. Regulatory failures are especially evident for contractors with limited knowledge of their legal entitlements, for example workers from other countries deployed by a contractor on a client site.

Milch and Laumann (2016) in their review of studies investigating accident risk in inter-organisational settings identify the first two categories of Quinlan's PDR framework: economic pressure and disorganisation. Pilbeam et al. (2020) similarly identified these two categories in their literature review of safety risk factors in outsourcing for both firm-to-individual and firm-to-firm relationships. Both papers draw attention to the possible inadequacy and over-bureaucratisation of safety management systems, making safety difficult to manage in outsourcing relationships. Milch and Laumann also note two other categories that contribute to increased risk and challenges of managing safety. The first is the dilution of competence arising from an unfamiliarity with the specific working methods required on site or the particular rules that apply when operating in an unfamiliar sector. The second is organisational differences in the importance and achievement of safety. As the number of organisations involved in a particular activity increases, the chance of differences also increases. In lengthy contracting and sub-contracting chains, differences are inevitable. This encourages the fragmentation of decision-making such that local compromises are made that may not be optimal for the safety of the whole system. Greater organisational difference also ensures that trust between organisations is initially low and conflicts are likely.

8.4 Organisational Boundaries

Boundaries are an essential feature of an organisation and integral to the ongoing process of organising (Santos and Eisenhardt 2005). However, they are routinely overlooked (Heracleous 2004) and rarely considered even in the context of outsourcing where changes to organisational boundaries are inevitable.

Boundaries connect points of similarity (Abbott 1995) that separate and differentiate entities. What lies on one side of a boundary is in some way different from, and no longer the same as, that which lies on the other side. As Barth (1969) noted, this assumes an abrupt discontinuity across a boundary, where reality may involve a more gradual transition. Nevertheless, the characterisation of these boundaries depends in part on the conception of the entities that are being separated. Araujo et al. (2003) observe that organisations can be defined variously, for example as economic or legal or administrative entities. These differences in definition give rise to different conceptions of what the boundary demarcates. Santos and Eisenhardt (2005) note that organisational boundaries demarcate four mechanisms operating inside an organisation, namely economic efficiency, power, competence and identity. They demarcate

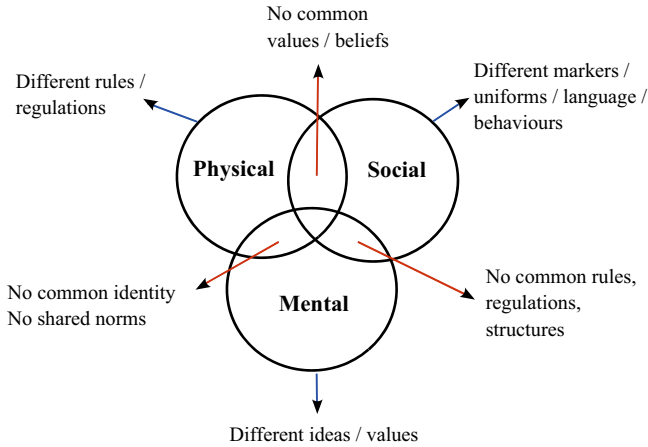


Fig. 8.1 Model of boundary types with application to outsourcing. Based on categories proposed by Hernes (2004)

the economic transactions undertaken by the organisation. They bound the extent of organisational influence. They circumscribe the resources possessed by the organisation, and they define the identity of organisational members. Clearly, these four conceptions create different boundaries that delimit different activities. Moreover, by possessing many, if not all, of these different types of boundary, it is evident that there are multiple coexisting boundaries to any single organisation (Hernes 2004). Either in combination or singly, these may influence outsourcing relationships (Fig. 8.1).

This characterisation of organisational boundaries as composite provides an important analytical framework for differentiating between entities on either side of the boundary. Hernes (2004) suggested that boundaries demarcate three clusters of processes. Physical processes include the rules, regulations and structures operating within an organisation, which specify how an organisation does things. Mental processes include ideas, values and beliefs that guide action and specify what organisations do, while social processes relate to the identity and norms that establish the loyalty and trust that define who is a member of the organisation. Together these three collectively define and delimit the organisation, differentiating it from others. In this way, the organisational boundary acts as a buffer separating one organisation from another. However, the composite nature of the boundary offers the possibility that there may be not only differences, but also similarities, between the entities on either side of the boundary. These similarities allow organisational boundaries to act also as bridges (Araujo et al. 2003) connecting one organisation to another permitting the flow of information and people between them. Despite this flow, and the apparently porous nature of the boundary between organisations that could lead to homogenisation, organisations commonly remain distinct. This suggests that there are important organisational processes operating to maintain the boundary.

The organisational capabilities that permit separation differ from those that support interaction. They are complementary, and both sets of capabilities are essential for the maintenance of a boundary. Araujo et al. (2003) suggest (p. 1256) “boundaries are determined by capabilities necessary to undertake productive activities, and by capabilities required to interact with others”. While consideration is often given to the productive (or core) capabilities of the firm in the decision to outsource, much less consideration is given to those ancillary or interactive capabilities, which likely contribute to the success, or otherwise, of the outsourcing relationship. These include the ability to create, maintain, develop and eventually exit relationships and the ability to coordinate internal and external processes.

8.5 Organisational Boundaries and Managing Safety

Outsourcing creates a range of managerial and leadership challenges at the levels of both the organisation and the individual, for example specifying coordinating activities or challenging unsafe working behaviours. As we have seen, Quinlan’s PDR framework and other literature reviews are able to categorise these challenges and provide a plausible account of their occurrence. An alternative perspective on the commonly observed safety challenges may come from the recognition that boundaries are composite. Hernes (2004) depiction of organisational boundaries comprised of three elements (physical, social and mental) suggests that attention needs to be given to all three elements for successful safe interaction across the organisational boundary. Where these elements are all aligned, the experience of working with another organisation may be like working with yourself. Absent alignment on one or more of these dimensions, difficulties arise.

Inattention to any one of the three primary boundary elements in an outsourcing context may provide the basis for a range of the safety challenges commonly experienced in these settings. Failing to align rules and procedures between organisations, which is one aspect of the physical dimension of a boundary, creates challenges for those working in a shared workspace. Similarly, differences between organisations in their prioritisation of safety and production can create confusion about how to proceed in a given situation, especially when this is time pressured. Environments that differentiate between groups, and that accentuate obvious differences, for example in language, or differences in resourcing, including the provision of PPE, create social differences, which lead to safety challenges.

Organisational boundaries necessarily, but inadvertently, create barriers to safe working. Waring et al. (2015) recognised this in the healthcare sector where interdependencies between professions and organisations are many and often complex, leading to unintended consequences that create safety issues. These boundaries in health care then become latent threats to the safety of the system. Outsourcing perhaps creates similar latent threats, in addition to active failures. The framework used by Waring et al. (2015) bears strong resemblance to that developed by Hernes (2004) (see Fig. 8.1) and identifies three important analytical dimensions of boundaries that

threaten the safety of a system. These three are organisation, culture and knowledge. Organisation embraces the formal aspects of work configuration shaping how individuals and organisations work together. It includes task allocations and resource profiles, governance arrangements and leadership. Culture typically relates to the shared values and norms which influence the meanings given to work activities, for example the value placed on collaborative working. Knowledge describes how actors make sense of or understand their work, relating for example to the sources of information that guide actual practices. These characterisations align, respectively, to the physical, social and mental dimensions of Hernes framework.

By adopting this organisation, culture, knowledge analytical framework, we can categorise the typical safety challenges encountered by managers (described above) according to which of the three dimensions are misaligned. In many of the observed challenges, there is a misalignment of either knowledge or organisation. Constraints to selection refer to the rules and governance arrangements that determine which organisations can work together. A similar organisational challenge results from different procedures and ways of working and the inconsistent implementation of rules between organisations. How safety data is captured and shared can also differ between organisations, and this may influence how tasks are configured and executed. In contrast, differences in knowledge between the two organisations can explain how there are different conceptions of the scope of the work, the required ways of working and whether individuals and organisations are judged to be competent to perform the task. Similarly, the turnover of staff on site may influence the levels of understanding of both the task and the site. These are challenges to safety arising from differences in knowledge. Communication too depends on a shared understanding of the work, which is also a knowledge challenge. However, effective safety communication may also be influenced by cultural differences. Inability to speak the same language is evidently a barrier. This provides an important illustration. The three analytical elements are not completely independent and discrete in their creation of safety challenges. More than one may generate and contribute to the same challenge. Moreover, the overlap between any two of these dimensions may have also a specific influence on safety in an outsourcing relationship. Communication about safety illustrates this overlap. Another example might be the writing of methods statements, which assumes an understanding of the detail of the required work practices, and of their importance in the context of safely executing the task.

Other categorisations of the safety challenges arising from outsourcing, for example Quinlan's PDR framework, can also be analysed and reinterpreted using this organisation, culture and knowledge framework. Economic and reward pressures reflecting the prioritisation of production over considerations of safety and the structuring or organisation of work align, respectively, to cultural and organisational differences operating across the organisational boundary. Disorganisation incorporates issues related to competence, communication and ineffective occupational health and safety management systems. These are covered by a combination of all three dimensions, respectively, knowledge, culture and organisation. As noted above, communication may be accounted for in the overlap between knowledge and culture. Inadequate safety management systems and the related concern of

over-bureaucratisation of safety fall in the overlap between knowledge and organisation. Regulatory failure incorporates poor knowledge of legal rights and obligations, limited access to occupational safety and health, fractured or disputed legal obligations and non-compliance and regulatory oversight. Some of these reflect differences in understanding of the task, but they also reflect differences in governance (i.e. knowledge and organisation).

8.6 Other Boundaries, Outsourcing and Safety

So far, we have explored one particular analytical framework for investigating boundaries, observing how it may help in practice to explain the safety challenges frequently arising from outsourcing. It provides a heuristic device for practitioners to ensure that different facets of the safety challenge are not overlooked in an outsourcing relationship. Nevertheless, there are other ways of investigating boundaries, and there are also other boundaries that influence the management of safety that may not align with organisational boundaries. We now turn to consider both of these briefly.

Returning to Santos and Eisenhardt's (2005) consideration of organisations, there are four different conceptions of an organisational boundary: efficiency, power, competence and identity. Respectively, they delimit the transactions occurring within the organisation, the extent of its influence, the resources it can draw upon and the dominant 'mind-set' or culture. Exploring outsourcing relationships using these different conceptions as lenses might reveal why particular safety management challenges occur. Organisations attempting to collaborate but having different conceptions of what an organisation is and what a boundary represents may encounter particular difficulties. Understanding how these different conceptions interact and how their salience varies with context may help to mitigate some of the tensions encountered in outsourcing and make safety management more effective.

Four different types of interface between suppliers and buyers have been identified by Araujo et al. (1999), namely standardised, specified, translation and interactive. These may also be used to describe the nature of the interface between client firms and contractors in an outsourcing relationship. Standardised interactions indicate no specific adaptations to accommodate the uniqueness of the relationship; every relationship is managed in an identical way. Where directions are provided by the client or customer, they may (translation) or may not (specified) take account of the contractor and the wider circumstances. An interactive interface is one where both organisations jointly develop the desired solution. These four types of interface may also impact the way safety is managed between firms in an outsourced relationship, ranging from unbending application of safety rules demanding strict compliance, which may lead to adversarial relationships, to more collaboratively developed safety management systems based on contextually aware risk assessment.

Professional affiliations are known to be strong, and the boundaries between professions are defended fiercely, especially when established hierarchical relationships between professions are disputed. These professional boundaries traverse

organisational boundaries, resulting in the professionals in one organisation identifying more closely with their peers in another organisation than with their fellow workers in their own organisation. Inevitably, this will disrupt the consistency of interpretation between firms of the social dimension of the boundary between them. In a similar manner, companies operating across national borders may experience internal inconsistencies in their interpretation of the three dimensions of the boundary. Legal and regulatory frameworks differ between nations, creating physical boundaries. In construction, the UK's CDM regulations (HSE 2015) identify more strictly the roles and responsibilities of the different parties. Differences in language contribute to social boundaries. Mental boundaries result from differences in the values and beliefs that underpin national cultures, which senior managers in the oil and gas industry anecdotally suggest contributes to differences in risk taking or incident reporting (Mearns and Yule 2009; Casey et al. 2015). It is perhaps unsurprising therefore that outsourcing internationally adds further complexity to the existing challenges of managing safety between organisations within a country.

8.7 Managing the Boundary: The Role of the Boundary Spanner

The principle thesis of this chapter is that understanding and managing boundaries is vital for successfully managing safety in outsourcing relationships. Boundaries within an organisation require maintenance in order to differentiate one organisation from another. Nevertheless, they are also permeable, allowing the flow of information. Boundary spanners who perform four main roles undertake tasks across the organisational boundary. These are relational, coordination, mediation and entrepreneurship (Williams 2013, 2019). Each of these roles requires a different set of competencies that may, or may not, be found in a single individual. The relational role requires competencies in managing the politics of inter-organisational relationships and the complexity of the information flow supporting different professional and organisational interests. Coordination and planning are vital to effective collaboration in an outsourcing relationship, but this is time consuming. The mediation role requires an ability to understand and value differences between the participating actors, and the ability to interpret one to the other, ensuring effective communication. Finally, the entrepreneurial component focuses on the abilities to develop innovative solutions to the particular challenges of working together while adhering to established policies and procedures and managing the inter-organisational politics. These boundary-spanning skills are rarely taught in safety training, and yet, they are vital for successful working relationship between organisations, including effective safety management.

Safe working in an outsourcing relationship is made more challenging by the presence of an organisational boundary. By deconstructing the organisational boundary into three separate elements, it is possible to explain the occurrence of different safety challenges and to identify appropriate managerial interventions to mitigate

the problems. This analytical framework has proven to be a useful tool for managers in one multinational company. They have used it to diagnose their relationships with contractors, and through open discussion of the differences and similarities in these three dimensions, to develop better, safer and more effective working relationships. A better understanding of organisational boundaries and how they are managed would improve the safety of outsourced work.

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Chapter 9

Sfumato as a Metaphor for Creating a Common Understanding in Complex Projects



Nadezhda Gotcheva

Abstract *Sfumato* painting technique is proposed as an artistic metaphor for creating a shared understanding about safety and risk in complex safety-critical multi-stakeholder projects. The aim is to illuminate a mindset and suggest approaches for softening potentially detrimental effect of sharp dysfunctional boundaries between and within different project parties, which might impair quality of communication, coordination, and collaboration and impact safety.

Keywords Inter-organisational · Sfumato · Metaphor · Safety

9.1 Introduction

Derived from the Italian word *fumo* (“smoke”), *sfumato* is a painting technique of allowing tones and colours to shade gradually into one another, producing softened outlines (Oxford Dictionary). Leonardo da Vinci is considered the inventor of *sfumato* technique and one of its most prominent practitioners, culminated in the famous *Mona Lisa* portrait (ca. 1503–1519). In contemporary art, the Japanese photographer and architect Hiroshi Sugimoto has used *sfumato* in his photographs of iconic buildings to show the essence of superb architecture by obscuring the boundaries between a building and its context (Photobook Reviewer 2021).

In this chapter, I borrow ideas from arts and specifically *sfumato* painting technique as a metaphor for developing a shared understanding about the conceptions and ways in which the organisations work to create safety in multi-stakeholder safety-critical projects. Metaphors rely on symbolism and comparisons to challenge perceptions and evoke meaning. In safety science, safety metaphors and models on accident causation have been studied (Swuste et al. 2010, 2014). For example, building on the concept of incubation period of major accidents (Turner 1978) and his medical

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J.-C. Le Coze and B. Journé (eds.), *Safe Performance in a World of Global Networks*, SpringerBriefs in Safety Management, https://doi.org/10.1007/978-3-031-35163-1_9

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school training, Reason (1988) came up with the “resident pathogens” metaphor to express the distinction between active and latent errors.

An artistic metaphor such as *sfumato* could provide a valuable perspective towards creating a common understanding in the whole project, softening potentially detrimental effects of sharp boundaries between all different project actors that are part of “the picture”. There are many types of boundaries (country-specific, institutional, organisational, occupational, temporal, spatial) that could give rise to unhealthy tensions, major communication and knowledge sharing problems (Bosch-Sijtsema and Henriksson 2014; Whyte and Nussbaum 2020). Sometimes project partners have ended up in court to reconcile claims (Marrewijk and Smits 2016), which could be detrimental for trust, climate, work moral and collaboration. Although clear lines must be drawn between acceptable and unacceptable behaviour in terms of safety, sharp dysfunctional boundaries shall to be softened to ensure favourable conditions for creating trust and long-term relationships between project parties.

Collaboration in large-scale projects is challenging both with regard to the actors’ ability to collaborate (coordination) and willingness to do so (cooperation) (Tee et al. 2019). In safety-critical projects, the need for developing a shared understanding between different stakeholders about risks, project safety goals, common values and ways of working have been recognised as increasingly important for effective performance. Denicol et al. (2020) conducted a systematic literature review on the causes and cures of poor performance of megaprojects. These projects typically cost more than US\$1 billion; they are notoriously difficult to manage due to huge scale, high levels of complexity, diverse and often geographically dispersed actors, and significant impact on communities, the environment and governments. Building and leading collaborations was identified as one of the future avenues to advance the successful delivery of megaprojects. Hence, there is a room for new perspectives and metaphors to support creating a shared understanding of safety and risks in complex projects.

9.2 Cultural Complexity

The concept of cultural complexity has been conceptualised from different perspectives, such as anthropology (Hannerz 1992) or organisational behaviour (Sackmann 1997). According to Sackmann (1997, p. 2), the concept of cultural complexity includes two ideas: “simultaneously existing multiple cultures that may contribute to a homogenous, differentiated, and/or fragmented cultural context”. Boundaries between occupational groups within a single organisation might be more stubborn than inter-organisational boundaries and further affect safety (Tillement et al. 2009; Russel and Tillement 2022). The notion of coexisting multiple cultures is closely linked to the concept of subculture.

9.2.1 Organisational Subcultures

In the 1960s, the sociologist Howard Becker studied the subculture of jazz musicians (Hannerz 1992). He noted that a subculture formed when musicians interact and share emotions and interests rather than because they share historical roots or same skin colour. Becker's study provides insight about the conditions for developing a cultural shared understanding: it might be that it is not necessary to take a long time for a culture to develop; the intensive time spent together with others is creating conditions for culture to emerge. Schein (1990) also gives an example of a combat unit which, despite a short history in time, developed a strong culture by means of intensity of members' shared experiences.

Subcultures are embedded in a dominant, larger culture but still differ from it; they develop as a reflection of common problems or experiences that are faced by members of a work group (Gregory 1983). They tend to develop their own vocabulary, norms, values, artefacts and practices. Subcultures may emerge around "networks of personal contacts or demographic similarity" (Martin 2002). Schein (1996) differentiates between three generic subcultures in organisations, based on hierarchical level and core work task: (a) executives, concerned mostly about the financial conditions; (b) designers (engineers) who are concerned about process safety and how to minimise the human factor in operations and (c) operators, who are concerned with coping with surprises and anomalies of operations.

Since individuals usually belong to more than one subculture, in project contexts it is likely that, for example, executives or engineers may belong to the project management subculture as well. Most cultural approaches acknowledge the existence of at least three types of subculture, based on shared history with regard to education, work unit or shared work experience: (a) occupational or professional subcultures based on educational background, (b) departmental subcultures based on the work unit and (c) age or tenure-related subcultures (Parker 2000; Rollenhagen et al. 2013).

Arguing that a given subculture exists only in relation to a dominant culture or other subcultures, Martin and Siehl (1983) suggested a typology of three main subcultures. *Enhancing subcultures* are compatible to the dominant culture and even enhancing it. Its members tend to more intensely adhere to the core beliefs and values than other groups. For instance, a safety culture ambassadors group may form a subculture as they embrace the role of strong advocates of safety culture and interact accordingly (Viitanen et al. 2018). *Orthogonal subcultures* are independent from dominant culture—members adhere to the core beliefs and values of the dominant culture while simultaneously adhere also to other, not conflicting set of beliefs, for example, R&D department adheres to safety management system yet at the same time focuses on innovation, which may potentially challenge established practices. *Countercultures* are opposing or resisting the dominant culture—the "deviance" in members' beliefs and values may challenge the values, beliefs and practices of the dominant culture as a way to test the limits. For example, nurses in health care can form a counterculture if they believe their professional standards are compromised by a dominant administrative culture of bureaucracy, efficiency and cost cutting.

9.2.2 *Subcultures and Safety*

In safety research, the existence of subcultures has been linked to structural characteristics and power relations, which in turn have the potential to affect the sensemaking processes (Pidgeon 1998; Pidgeon and O’Leary 2000). This implies that various subcultures may have constructed different versions of reality, and this needs to be taken into account by the safety management. The coexistence of subcultures in organisations is potential source of misunderstandings or conflicts but also a source of diversity (Cooper 2000). This diversity of perspectives has important safety implications because it enriches the interpretation on emerging safety problems and helps to deal with potential “collective ignorance” (Pidgeon 1998). Furthermore, Boisnier and Chatman (2002) noted that subcultures can provide flexibility and responsiveness that a unitary culture could limit.

Oedewald and Gotcheva (2015) indicated that creating a common understanding and facilitating shared cultural norms through personnel training may be challenging. Training results are short-lived as there is a constant flux; companies and workers join the network and others leave. The temporary nature of a project may also reduce motivation of different parties to invest in joint development of activities and culture. In such a fast-paced networked context, the shared time with various partners is short and fragmented which sets constraints also for accumulation of lessons learned.

Cultural differences in complex projects and their effects on safety should be monitored and understood. Oedewald et al. (2011) refer to importance of *sharedness of the conceptions, practices or social norms with regard to safety*. For example, engineers involved in project work in the nuclear island may feel strong sense of personal responsibility for the future plant’s safety, while the conception of responsibility for safety may differ in the project management department or in the supply chain. Moderate variance in that sense between different groups is rather natural given different positions in the project structure, tasks or professional background. Variances are not necessarily seen as a challenge to safety, and they can be seen as an asset that have the capacity to challenge taken-for-granted assumptions. Still, if different viewpoints seem to hinder the quality of the work or prevent joint development, they need to be tackled.

9.3 **Complex Projects as Cultural Phenomena**

Complex projects, also framed as megaprojects or major projects, bring together differing and competing partners, interests, values and ways of doing and thinking (van Marrewijk 2013). With regards cultural influences, the Guide to the Project Management Body of Knowledge by Project Management Institute (PMI 2000: 27) referred to a dictionary definition of *culture*: “culture is the totality of socially transmitted behaviour patterns, arts, beliefs, institutions, and all other products of human work and thought”. Such a monolithic view on culture pays less attention to issues

of ambiguity, subcultures, power dynamics and the decision-making practices in complex settings (e.g. Alvesson 2013). Power dynamics and tensions play important role in organisational life and their effects on decision-making and organisational arrangements need to be considered.

Megaproject cultures have been framed by Kendra and Taplin (2004) as consisting of multiple fragmented subcultures. Anbari et al. (2010) studied cultural differences in multicultural project networks and highlighted that to achieve project goals and avoid cultural misunderstandings, project managers need to be culturally sensitive and respectful through adaptive leadership. Hietajärvi et al. (2017) explored the management of inter-organisational integration in alliance projects (Lahdenperä 2012), highlighting integration mechanisms at the level of organisational and relational arrangements. Nysten-Haarala et al. (2009) and Kujala et al. (2016) use the notion of “soft contracting” to emphasise the importance of setting contractual conditions for flexibility, good will, mutuality and commitment to cooperate with the parties, given that in a complex inter-organisational project it is not possible to foresee all uncertainties and ambiguity.

There might be many sources of division or “splitting” in multicultural project contexts, which need to be taken into account when collaboration activities are planned. For example, “faultlines” are defined by Lau and Murnighan (1998: 328) as “hypothetical dividing lines that may split a group into subgroups, based on one or more attributes”. Power struggles in teams can activate latent tensions related to language asymmetry, triggering us-versus-them relationship dynamics. Boundary spanning could be used to “build relationships, interconnections and interdependencies” to soften such dividing lines (Williams 2002). As pointed out recently by Russel and Tillement (2022), boundary spanners are able to improve information and knowledge sharing between the different organisations or professional groups within projects and thus contribute to project performance.

Cramton and Hinds (2005) built on the notion of *faultlines* to show how location differences can also strengthen the tendency towards ethnocentrism in internationally distributed teams. Ethnocentrism is the belief that the own group is superior to other groups. Consequently, this leads to reduced effectiveness of collaboration, which can have potential safety consequences. In multicultural work settings, one strategy to overcome the tendency towards ethnocentrism is *mutual positive distinctiveness* (Cramton and Hinds 2005). It is defined as a respectful attitude towards differences among members (in views, values, competencies, practices) and perceiving differences as a source of advantage. In a safety-critical context, this is not so straightforward if there are significant differences, for example in beliefs and norms with regard to questioning attitude. If there are assumptions that it is challenging to question management decisions, this needs to be worked out to raise awareness on how such an attitude could be harmful for safety. It should be noted that shared basic assumptions and beliefs are considered the deepest level of culture. Schein (1985: 9) defined culture as “a pattern of basic assumptions—invented, discovered, or developed by a given group as it learns to cope with its problems of external adaptation and internal integration—that has worked well enough to be considered valid and,

therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.”

Aaltonen et al. (2009) studied twenty-one case projects delivered to 17 countries worldwide to identify novel ways to unravel the risks and difficulties of the project management due to the cultural differences. The results highlighted the significant impact of various project stakeholders and emerging cultural diversity on the project risk management processes. Aaltonen et al. (2009) noticed that different cultural groups in a project network initially start by operating according to one’s own cultural way, and achieving cross-cultural synergy across boundaries is a long-term process, which requires gradual learning and adaptation.

9.4 Examples of Approaches and Practices for Creating a Shared Understanding

The need to improve the sharedness in understanding of safety and risks between different stakeholders, for example in nuclear industry projects, has been previously recognised (Oedewald and Gotcheva 2015). The diverse and multiple actors may hold strikingly different conceptions and practices about ways of working and collaboration. Ensuring harmonisation of meaning, mutuality and common ground between project parties can be achieved and maintained by different means. This section presents some approaches and examples of practices for creating a common understanding in inter-organisational projects.

Project alliancing or *integrated project delivery* is a method based on relational contracting and trust building between the project actors (Ross 2003; Lahdenperä 2012). Although there are several models of project alliancing, generally the method creates incentives for developing best-for-project mindset and no-blame culture for all the parties involved. It emphasises equitable sharing of risk and reward, agreement on mutually beneficial principles of openness and information accessibility, open books accounting policy in pursuing of close collaboration.

Governance for safety in inter-organisational project networks includes coordination, adaptation, and safeguarding mechanisms internal to a project network that enable multiple independent organisational actors to work towards shared goals (Kujala et al. 2016; Gotcheva et al. 2020). Governance in project networks has been categorised in six dimensions: goal setting, rewarding, monitoring, roles and decision-making, coordination and capability building (Kujala et al. 2020). Governance mechanisms are approaches and concrete practices that are applied to align the different interests of project parties to enable them to work towards shared goals.

Cross-cultural synergy between project partners (Aaltonen et al. 2009) involves project management support characterised by long-term patience, mutual respect and information sharing, mutual interdependence and motivation to work together, creating a common goal, equal status between partners, joint experiences, ensuring

participation of mediator/facilitator/buffer persons and preparing for common external threats.

Boundary spanning is defined as the ability to link, communicate and engage with others and deploy effective relational and interpersonal competencies (Tushman 1977; Langan-Fox and Cooper 2014). Boundary spanners are systems thinkers who act as “cultural brokers”, who are willing and able to understand other people and organisations, to make a genuine effort to acknowledge and respect different values and perspectives, and to positively dissolve boundaries for building mutual trust. Boundaries can be spanned effectively by understanding the coding schemes and contextual information on both sides (Tushman and Scanlan 1981).

Shared space (IAEA 2016) is about building healthy social interactions to support mindfulness, engagement and well-being. It is characterised by creating “we” instead of vs. “us versus them” atmosphere; working relationships that support trust, decrease of power dynamics, mutual respect, openness for sharing of thoughts and ideas without fear of recrimination or exclusion.

Humble leadership (Schein and Schein 2018) refers to humble inquiry, genuine curiosity towards the others not as roles but as whole persons and the “art of asking instead of telling”. This approach to leadership advocates open trusting communication, building and maintaining collaborative relationships. Notably, it is the responsibility of the leader to create conditions for openness and trust.

Mutual positive distinctiveness (Cramton and Hinds 2005) refers to an attitude of respect and tolerance for differences in views, values, competencies and practices. It involves strategy for overcoming the tendency towards ethnocentrism and fostering learning from differences and perceiving differences as a source of advantage rather than seeing them as dividing lines.

9.5 Closing Remarks

In this chapter, I proposed *sfumato* as an artistic metaphor that could be useful in a highly technical, regulated and challenging domain of multi-stakeholder safety-critical projects. The process of allowing tones and colours to shade gradually into one another, producing softened lines, is believed to evoke meaning and ideas that could support partnership for safety. Many of the selected approaches and practices for creating a shared understanding in this chapter come down to familiar issues, such as the importance of mutual respect, trust building, openness or relationship building. Still, bridge building “over the whitewater” of complex inter-organisational projects is not a trivial task, especially with regard to ensuring safety. Managers and leaders, just like artists, need tools and a palette to work in this challenging field: to understand where the boundaries are, how sharp they are, how they are changing, why they exist, what is their nature, how, when, if and to what extent they could be softened.

The soothing *sfumato* tonality suggests that metaphorically, organisational boundaries, cultural divides and contractual relations between project actors may not necessarily draw thick “lines and borders” but instead “evaporate like smoke” to nurture

dialogue, openness and mutual understanding when this benefits safety. At the same time, attention should continuously be paid to make certain it is crystal clear, for instance, what are the roles and responsibilities between project parties, or which set of rules is applicable in a given situation. Safety management and leadership need to account for clarifying and harmonising these “contours” within and between organisations to ensure long-term safety in the whole project, in all lifecycle phases and for all the parties.

Oil paintings have been proven to last for many decades, denoting an unexpected resemblance to safe and effective nuclear power facilities. Leonardo da Vinci had created a masterpiece without sharp lines and razor-like boundaries. *Sfumato* metaphor’s visual power could be harnessed to create a more nuanced and shared understanding between organisations with a positive effect on safety in high-risk project contexts.

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Chapter 10

The Unsung Virtues of Ambiguity in Subcontracted Work



Nicolas Lot and Benoît Journé

Abstract Academic literature deems ambiguity must be eliminated or pushed outside these organizations, since it is considered to weaken risk management. Based on a qualitative study, this chapter demonstrates that ambiguity can offer a powerful means to facilitate coordination between stakeholders involved in preparing and carrying out complex and hazardous activities. This assumes that ambiguity is accepted and managed rather than eliminated. To turn ambiguity into an advantage, it is important to be able to discuss multiple interpretations, choose ‘the best one’ and negotiate or create new ones in order to produce a shared frame of reference that is appropriate to the situation. Management systems can be designed to support these discussions of multiple interpretations ahead of work being carried out. We show that ambiguity is managed ‘cold’, *outside* the process of action, and *during* action, depending on the quality of interactions between the relevant stakeholders and the soft skills employed by those involved.

Keywords Subcontracting · Ambiguity · Uncertainty · Coordination · Action strategies

10.1 Introduction

It is commonly held that subcontracting risks jeopardizing industrial safety (Hopkins 1999; Thébaud-Mony 2000). The reasons proposed for this include the assertion that subcontracted work can be a source of uncertainty and ambiguity regarding individual responsibilities, coordination and communication between stakeholders.

In a bid to improve safety and reliability, including from a human and organizational perspective, industries that involve hazardous activities traditionally tend

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to minimize subcontracting. The academic literature refers to a ‘strategy, of anticipation’ (Wildavsky 1988), ‘regulated safety’ (Daniellou et al. 2008) or the ‘Safety I model’ and deems uncertainty and ambiguity to be significant problems which must be eliminated or pushed outside these organizations, since they have an adverse effect on the quality of decisions, introduce conflict and, ultimately, are considered to weaken risk management.

Although they are often linked, uncertainty and ambiguity are, by nature, very different and in fact conflicting. It is therefore worth making a distinction between the two concepts. Uncertainty is the product of a lack of information, while ambiguity stems from too much, leading to an excess of possible interpretations. Where ambiguity is present, a discussion of the conflicting interpretations relating to a challenging issue is called for. Uncertainty, on the other hand, requires a search for additional information, particularly regarding rules and formal procedures. While more rules and procedures reduce uncertainty, they result in more ambiguity. Every rule needs to be interpreted (Weber 1922) if it is to lead to effective action.

Ambiguity is characterized by excess information from a variety of sources, demanding multiple, often contradictory or diverging interpretations. This creates confusion (Weick 1995). The features of an ambiguous situation are as follows: the nature of the problem is not sufficiently clear; the quality of the information is problematic; there are conflicting interpretations of the same data; conflicting goals are set by multiple managers; time and attention are lacking; contradictions and paradoxes emerge; it is difficult to establish a clear understanding of the relationship between cause and effect; and the allocation of roles and responsibilities is unclear (McCaskey 1982).

This chapter aims to demonstrate that ambiguity can, in certain circumstances, offer a powerful means to facilitate coordination between stakeholders involved in preparing and carrying out complex and hazardous activities that have been subcontracted. This assumes that ambiguity is accepted and managed rather than eliminated. We will focus our analysis on radiographic inspection and the challenges of radiation protection during maintenance activities and combine micro-analyses (at the team level) with a macro-organizational and inter-organizational approach to managing ambiguity.

10.2 Subcontracting and Ambiguity

The subcontracting relationship is inherently ambiguous because it creates tension between the need for cooperation and the conflicting interests involved in all activities covered by the contract. There is greater ambiguity within the genuine intent and commitment of the subcontractor than there is within the more traditional setting of work carried out solely by employees of the instructing party.

10.2.1 Ambiguity is Inevitable

Ambiguity is a factor in any organization engaged in hazardous activities (March et al. 1976). The theory of social regulation highlights the ambiguity of ‘control rules’, which introduce both constraints and appeals for cooperation (De Terssac 2003; Reynaud 1989). Such rules are often intrinsically ambiguous: they express a set of requirements, procedures and rules, but they often—whether consciously and deliberately or not—contain gaps, omissions, contradictions and errors. This opens up a certain amount of space for interpretation—room for manoeuvre which will be filled by ‘independent rules’, reflecting the ingenuity and critical distance of operational stakeholders. The effectiveness of the rules then depends on the investment of individuals in coming up with rules that enable work to be done and organizational solutions.

Ambiguity appears to be the natural downside of rules and a structural feature of organizations, stemming from the process of developing and disseminating rules which are valid but in competition with each other.

10.2.2 Ambiguity as a Resource for Hazardous Activities

The theoretical trends around ‘high reliability organizations’, organizational ‘resilience’, ‘managed safety’ or ‘Safety 2’ emphasize the need for capacity building on responding to unforeseen events. This involves more ‘reflexivity’ and ‘sense-making’ at all levels of an organization, from the individual to teams, from the instructing party’s organization to relationships with subcontractors.

In the workplace, stakeholders use ambiguity to highlight the challenges they face in their work as a result of the constraints imposed by rules and operating procedures which can appear to them to be contradictory or incoherent in the way they coexist or overlap. Ambiguity allows them to justify the trade-offs they are driven to make and to draw on their professional expertise to make up for the shortcomings of the rules (Lot 2008), and in doing so, to help ensure the safe management of workplace situations.

To turn ambiguity into an advantage, it is important to be able to discuss multiple interpretations, choose ‘the best one’, and negotiate or create new ones in order to produce a shared frame of reference that is appropriate to the situation. Management systems can be designed to support these discussions of multiple interpretations ahead of work being carried out.

10.3 Empirical Approaches to Managing Ambiguity

Broadly speaking, there are two phases in which ambiguity is managed, and these call for different approaches. Ambiguity is managed ‘cold’, *outside* the process of action, during the preparation phase. It is also managed *during* action, when it depends on the quality of interactions between the relevant stakeholders and the soft skills employed by those involved.

10.3.1 *Creating Meaning and Developing Action Strategies Prior to Intervention: The Radiographic Inspection Unit*

Non-destructive testing involves checking the condition of existing welds on a facility’s circuits. It is regulated by both external factors and internal factors, focused on the radiographic inspection process, with a dedicated frame of reference. Close collaboration with a specialist risk prevention service is required due to the radiation hazards. This activity, which involves a number of interfaces and is subject to the vagaries of scheduling, presents challenges in coordinating across the different levels of the organization and leads to the regular updating of risk prevention documents (marking plans and inspection permits). Given these factors, the instructing party has put in place a specific and prescribed structure. This structure, the radiographic inspection unit, leads coordination and inspection validation meetings.

The unit has been given authority over this activity to ensure comprehensive risk management. Reporting to the instructing party (outage project, trade or Risk Prevention Team), it is responsible for establishing links between the various stakeholders, acting as a single gateway for any queries regarding radiographic inspections, managing the production of risk analyses and inspection files during the preparation phase, ensuring that the risks of activities being conducted simultaneously and impact on schedules have been taken into account, including radiographic inspections in the relevant project schedule and supervising their implementation. Daily meetings are held to bring together representatives from the instructing party and the subcontractors and ensure coordination between them. These offer an opportunity to work together to identify and establish countermeasures and to update them as required.

The meetings are held at 2 pm and are attended by the site manager from a maintenance company, two managers from the companies carrying out the radiographic inspection, the project manager responsible for radiographic inspections on behalf of the instructing party, the Risk Prevention Team assistant responsible for radiographic inspections and the coordinator. An A4 list of contact details for members of the radiographic inspection unit and the radiographic inspection schedule is distributed to participants. The permits scheduled for the evening are then presented.

The first relates to inspections of the steam generator. It is presented by the radiographic inspection site manager from the subcontracting company, who warns that:

“The permit needs to be reviewed, because the exposure time noted in the grid is not correct”. The project manager comments on the marking to *“make sure that the access points have been properly closed off, because it’s not easy to see them”*. Once the various opinions have been expressed, the coordinator ensures that collective agreement is reached, then updates and validates the documents.

The second relates to the inspection in the machine room and is presented by the manager of another subcontracting company, who talks about the first page of the inspection permit, and states the job number, the location, the source used, and the gammagraph, then explains that the inspection will be carried out with a collimator. He then reminds everyone that an announcement will be made by megaphone to tell people to clear the operating area. The inspection zone will be surrounded by two thicknesses of lead. Finally, the control room will be informed so that it can issue an audible warning at the beginning of the inspection. The ‘comments’ box on the permit sets out the following three points, which are standard for all inspection permits: a meeting point in the control room and a pre-job briefing prior to the inspection, confirmation of the return of the source using a radiation survey meter and the employment of error-reduction practices. It also adds the following: *“Lift to be locked using the special key, small ‘radiographic inspection’ notices to be put up for the levels that are closed off”*. The manager of the subcontracting company then discusses the scope of the inspection. *“It will be carried out on three levels. There are more than ten access points, outside the controlled area. The marking plan is not reliable. There is no lift. The exposure time is higher than 30 min. We are working night shifts and there is local interference. We have a total of 40, which is below the site threshold of 45, but since we’re working in the machine room, this inspection presents specific risks”*. He then talked about the marking plan, which was revised following a field visit during the morning. *“There is some scaffolding that has been erected since the last visit two days ago, so this needs to be marked”*. Once the various opinions have been expressed, the coordinator ensures that collective agreement is reached, then updates and validates the documents.

To facilitate a joint effort to identify and establish countermeasures, and to update them as required, the unit brought both sides together, with technical representatives and site managers from the supplier side, risk specialists (safety officers) and members of the outage project for maintenance. By analysing these meetings, we can learn a number of lessons.

These meetings **‘produce’ a regulatory document**: the inspection file, comprising a signed inspection permit, validated marking plan and shared scope, which is required for implementation of the activity. Beyond the inspection permit document itself, however, it is the process of developing it on the basis of debates, discussion and complementary perspectives that really matters and gives the decision its strength. By making use of formal mechanisms like the marking plan, risk analysis, etc., the **unit serves as a ‘discussion space’** (Detchassahar 2013). This helps to regulate the activity and allows stakeholders to work together to identify the appropriate responses to changes affecting the environment, schedule and resources. The inspecting party’s recognition and consideration of the expertise contributed by the subcontractors, who have a more detailed understanding of the activity, facilitate

collective agreement. Such agreements between professionals with different interests are based on sharing perspectives. They contribute to ‘negotiated order’ (Strauss 1963) and are essential in cases where predictions prove to be at odds with the reality of events.

The coordinator allows the various participants to share their views and knowledge and ensures that no one is excluded from the discussions. The aggregated knowledge produces collective decisions in the form of the solutions clearly set out in the inspection permit. It is an organizational mechanism that promotes **links between representatives of the professionals** involved in the work and their joint capacity to identify risks and develop the appropriate responses as a team. The different functions, each of which understands some part of the situations being addressed and how to resolve them, are all involved in developing a new action strategy. The coordinator’s more limited technical expertise means that he or she is obliged to quickly bring out and aggregate participants’ knowledge to develop robust, consensual strategies that are appropriate to the situation. The coordinator acts as the interface between several complementary professional practices, drawing on his or her skills in communicating, coordinating and bringing together different perspectives (Chanal 2000).

Soft skills are used to facilitate the emergence and adoption of collective consensus. This involves ensuring that people are heard and promoting discussion and the aggregation of individual knowledge, while avoiding arriving at a limited understanding of the problem and its impact. The coordinator assumes the role of a leader and facilitator to clarify problems and enable everyone to offer their opinion on the origins and impact of the activity. The coordinator then aggregates the knowledge and summarizes the discussions, allowing other participants to jump back in. This ultimately results in the development of a consensus-based action and risk management strategy, which is clearly set out in an official regulatory document (the inspection permit).

10.3.2 From Unit to Reality

Regardless of the quality of the compromise reached during the ‘cold’ phase, there is no guarantee that it will stand up to reality on the ground. Between this phase and implementation of the activity, the environment can change, resulting in new ambiguities to resolve. The unit’s links to other parts of the organization and the strength of the relationships between stakeholders are what makes it possible to update the compromise.

The **unit is not isolated from the rest of the organization.** Formal meetings (outage meeting, daily meetings between the inspecting party and the subcontractors) help to lay the groundwork for discussion, establish and update a compromise and then disseminate the inspection permit. First of all, the unit is linked in advance to the outage management meeting, which validates activity implementation in accordance with the project schedule and prioritizes activities. Project managers and coordinators from the trades take part in this meeting. The information and decisions must

then be communicated to workers on the ground. This relies mainly on personal networks that can be used to identify changes in activities, clarify operational needs and tackle problems. While these networks are based on membership of a trade and a given level of the hierarchy, their stability over time is also key, supporting the sharing of information and experience, arrangements, assistance and more substantial mutual aid. As a result, between inspection meetings, **the work to jointly create this collective representation is continued by numerous networks.** Finally, the instructing party officially takes control of implementation once again and checks that the inspection permit matches reality on the ground. The marking plan described in the permit is checked by a supervisor, and then the stakeholders involved in plant operation validate and sign the permit, meaning that the activity can begin.

10.3.3 Management While the Activity is Ongoing: The Intervention of a Third Party

Regardless of their quality, the compromises reached during the preparation phase must be maintained until the start of implementation, when new ambiguities may arise. These processes require the assistance of a third party to update the strategies that have been prepared and extend the sensemaking processes. This will be illustrated using the example of conflict between risk analyses and the prevention plan.

Each site is unique in terms of technical factors, the risks posed and the countermeasures that need to be put in place, so a risk analysis specific to each activity is carried out during the preparation phase to establish appropriate management measures. Multiple activities can also take place in a single location, potentially transferring risks between the different interventions. To ‘manage’ this possibility, the organization has put in place a prevention plan that anticipates interference between sites and formalizes the protective measures required to mitigate the overlap. This is posted at the entrance to the premises.

However, the vagaries of production and slips in the schedule can undermine such risk management mechanisms. Activities which, during the preparation phase, were planned for different times can end up being scheduled for the same time and the same space, leading to contradictions between the protective measures set out in the risk analyses and those in the prevention plan. A risk analysis that is specific to an activity might, for example, stipulate certain risk management measures (clothing, measurements) that are not, however, recommended in the prevention plan for work in the area. The information and strategies contained in the documents are therefore contradictory, placing operational stakeholders in an ambiguous situation which they will need to resolve. When they meet, they consider the gap between the documents and reality, which means that, at the point of their intervention, they do not have a clear idea of what risks they actually face, how they can protect themselves from them or how to prioritize activities. To manage these contradictions, they ask an external third party to develop an appropriate action strategy. A risk prevention specialist will

then update the protective measures, or a member of the project team will prioritize the interventions. To enable this compromise to be reached, the relevant third parties have a presence on the ground, technical expertise which lends them their legitimacy and the required soft skills.

By enabling a response to be developed in situ by professionals, this organizational work helps to manage risk. The quality of interactions and success of the dialogue is dependent on the soft skills of those involved (Lot 2008). These skills include the ability to listen, an awareness of working conditions and tact (Goffman 1974). Empathy helps with understanding workers' expectations, achieving social recognition and leaving room for manoeuvre in difficult interactions where there is potential for conflict.

10.4 Conclusions

The structure of complex organizations generates ambiguity, with the control rules and the process by which they are developed, the ambivalence of managerial practices and the organization of work (with tension between centralization and decentralization) all contributing to embedding it in the organization. Rather than seeking to eliminate this inevitable ambiguity by introducing new rules (which will in fact only create more ambiguity), a more effective approach is to learn to manage it with the use of organizational structures.

A structure that establishes times for discussion and brings stakeholders together at different stages of the process facilitates management of ambiguity, while structured organizational mechanisms that serve as discussion spaces foster the ability to work as a team, support debate between operational staff and provide opportunities for dialogue on protective measures and the prevention strategy.

The effectiveness of this structure depends on the technical skills of the stakeholders and above all on their ability to listen to each other and reach compromises on risk management mechanisms. Primarily, it provides a means for temporarily bypassing the strategic and political tensions between stakeholders, while the activity is underway. Despite the inherent asymmetry between them due to the instructing party's authority and its monitoring remit, the relationship between the inspecting party and subcontractor also requires cooperation, compromise and the pooling of knowledge and skills to effectively manage risks and complete the work. Instructing parties and subcontractors involved in the same work must therefore overcome the inevitable ambiguities and collaborate to develop a risk management strategy.

In the cases discussed, the nature of the relationship between the two parties has little bearing on the resolution of the problem and, we would suggest, there are two conditions here that contribute as much to risk management as the formal mechanisms. First, a focus on real-world activity allows participants to share their perspectives and work together to find solutions that help to manage risks. Disagreements and strategic tensions are temporarily put aside when professional activity is at the core of the discussion. Second, the quality and dynamic of the compromises

reached are supported by the leadership and communication skills of the various participants and the nature of their long-term relationship based on reciprocal trust. When these two conditions come together, the problem ‘shifts’: the power asymmetries described in some of the literature (Walter 2017) as an obstacle fade away in the face of business priorities that are common to both parties, provided that the discussion is organized (by mechanisms) and that those involved possess and make use of soft skills to transcend the positions of power between stakeholders for the duration of the interaction.

Ethics Statement The identity of individuals whose oral statements are reproduced in this chapter has been anonymized, and their informed consent was obtained. Ethics approval is not required for this type of study in France.

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