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Interdisciplinary research for occupational safety and health knowledge

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INTERDISCIPLINARY RESEARCH FOR OCCUPATIONAL SAFETY AND HEALTH KNOWLEDGE

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Abstract: In this article we argue for an interdisciplinary and pluralistic account of how occupational safety and health (OSH) is enacted in practice, informed by a critical understanding of OSH management and flow knowledge in organisations. We compare how in human factors and ergonomics, organisation studies, and safety science this question is approached through different theoretical ‘lenses’, and with different analytical consequences. These approaches work with different concepts (systems, practices and behaviours) that situate human agency, and possibilities for practical intervention differently. To demonstrate this we draw on interdisciplinary research in to ‘Management of OSH in Networked Systems’, showing how mobilising the concept of knowledge through different disciplinary frameworks can have implications for understanding safe working in networked organisations

Key words: Occupational Safety and Health knowledge; interdisciplinarity; highly networked organisations.

1. Introduction

In this article we discuss how an interdisciplinary approach to Occupational Safety and Health (OSH) knowledge can be mobilised to produce new insights for improving OSH practice in highly networked workplaces. In doing so we draw on our experiences of the interdisciplinary IOSH funded ‘Management of OSH in Networked Systems’ project.¹ While single discipline approaches are certainly beneficial in some contexts, they can also produce a false sense of certainty around their own understandings of reality. There is a danger that disciplinary-specific analytical ‘lenses’ simply confirm the systematically produced validity of their findings, and delimit them to inhabiting the boundaries set by those ‘lenses’. Thus meaning that perennial problems, like that of OSH improvement, can be difficult to advance precisely because the premises researchers use to understand them are not challenged. Therefore our argument goes beyond the obvious point that different approaches produce different perspectives, which may be at odds theoretically and methodologically. Instead we suggest how interdisciplinary working is important because it can productively invite us to fracture the certainties rooted in discrete disciplinary working, and produce new ways of knowing about how OSH knowledge is part of processes in and across organisations.

Networked workplaces, which were the focus of the research project we reflect on here, are complex contexts where researchers are confronted with a mesh of organisations and groupings within organisations, such that lines of communication and accountability are not straightforward. Our ‘Management of OSH in Networked Systems’ project was developed to address a context where changes in working conditions and practices, government policy and the OSH landscape have created a shifting contemporary context, where OSH issues have become increasingly scrutinized. Within the UK, the advent of the Health and Safety at Work Act (1974) enforced a regulatory regime in which employers, workers and suppliers are afforded distinct roles in ensuring that people in work, or in close proximity to workplaces, are protected from harm. Practice-based approaches to researching workplaces have simultaneously provided new and rigorous ways of understanding workplaces as contexts where a culture of healthy and safe working is possible and practiced (Gherardi & Nicolini 2002), although often in ways that are generated by workers themselves rather than by safety and health regulations (Pink et al., 2010, Tutt et al., 2013, Pink et al., 2015). Within many workplaces, the contemporary context in which

institutional and worker-innovated safety and health play out is shaped by a range of changing factors including: increasing complexity within and between technological and organisational networks; the shift from public regulation to private advisors; the intense pressure to achieve ‘more with less’; and the pivotal responsibility and opportunity for OSH professionals. Yet little is known about the detail of how within this context OSH knowledge is learned, shared, engaged in practical activity, appropriated and implicated in processes of innovation; or if/how it flows within and through organisations. Consequently there are a number of gaps in our understanding as they relate to who does what about OSH issues in networked systems; on the basis of what evidence; the processes of OSH knowledge translation; and, the OSH outcomes generated.

The approach to interdisciplinary research we discuss here was thus designed to respond to these issues, through questions about: who does deal with OSH issues in networked systems, what types of hard and anecdotal evidence do they draw from, what are the processes through which OSH knowledge flows, transforms and is appropriated through organisations and what OSH outcomes are generated. We note that here our objective is to draw on this example to demonstrate some of the issues, challenges and benefits of interdisciplinary work in this field, rather than reporting directly on our research findings.

We first discuss recent debates about interdisciplinarity to establish its relevance for an OSH research context. We then examine the implications of interdisciplinarity in relation to the example of the ‘Management of OSH in Networked Systems’ project. We interrogate the types and layers of knowledge produced by the three disciplines and approaches employed in our project, as they apply to OSH knowledge: human factors and ergonomics; organisation studies; and safety science. Each approach creates specific analytical entry points to what Law (2004) has called the ‘mess’ (Law, 2004: 2) of the social and environmental realities of workplaces, different ‘modes of ordering’ (2004: 111), and different types of knowledge and ways of knowing. Finally through a focus on the concept of ‘knowledge’ and the notion of ‘workarounds’ we demonstrate the implications of bringing together different disciplinary perspectives towards the same question.

2. Interdisciplinarity as a research ‘stance’

OSH research is already an interdisciplinary research field, in that several different

disciplines are harnessed for its work. Yet neither the nature of its interdisciplinarity nor its implications for this field have been fully explored or explicated.

In a wider context disciplinary approaches are often seen to fail to offer palpable solutions to applied research problems, and there can be high hopes for interdisciplinary research, which Barry et al tell us: 'is expected to bring science and technology closer to the needs and concerns of citizens and consumers, reducing the risks of public resistance, uninformed criticism or indifference and stoking the engines of innovation' (2008: 40). In the case of OSH research, disciplinary approaches do claim varying degrees of demonstrable success, yet the question of how to improve OSH is by no means any where near being 'solved' definitively. The effectiveness of some approaches is an advantage when asking how we might build on their respective capacities, and in validating the need to develop a relationship between them. Yet it also creates a challenge since these existing approaches are not necessarily mutually theoretically or methodologically aligned. Moreover, while interdisciplinarity is increasingly promoted, it does not refer to a single set of practices of collaboration across disciplinary boundaries (e.g. Krishnan, 2009) and it appears that there is 'a multiplicity of knowledge forms and practices associated with interdisciplinary research' (Barry et al., 2007: 24).

There have been attempts to map out typologies of interdisciplinary working (e.g. Krishnan, 2009, Barry, 2007). Yet these studies were often pessimistic in their conclusions: working with colleagues who are coming from very different epistemological starting points and bringing together different types of data can be complicated. Barry points out that it is often difficult to evaluate if such projects have been sufficiently 'productive' (Barry, 2007: 24).

However, we suggest that this is because in proposing interdisciplinarity as an end or outcome such assessments are aiming for unattainable goals. Instead, here we shift the focus to propose interdisciplinarity as a research *stance*. We do not usually predict research findings. If we could do this accurately we would not need to do research at all. Therefore we argue that interdisciplinarity is likewise better treated as a *process* and not an outcome. Doing interdisciplinarity means going into unknown territory, and to propose to do so according to a model to be assessed as an output would be unnecessarily restricting.

In the case of understanding OSH knowledge from an interdisciplinary perspective, as we have pointed out above our research has emerged in relation to

perceived gaps in knowledge, that are due to the limits of existing disciplinary approaches. It is our intention that by approaching our research ‘problem’ from different perspectives we might produce new types of knowledge (and new types of problems). This position reflects some of the principles of ‘multimethodology’ research design in management science (cf. Mingers and Gill, 1997; Mingers, 2001). As Mingers (1997) explains, multimethodology can be seen as form of methodological pluralism, or combining together methodologies (either in whole or in part) to tackle problematic situations. In Minger’s terms, combining methodologies from different paradigms (known as ‘strong’ pluralism) enables the full richness of the real world to be examined (Mingers, 1997: 9). Lewis and Keleman (2002) also suggest that, while multi paradigm enquiry certainly poses challenges, it can generate more relevant theory in the way that it can shed light on the complexity of organisational life. Therefore the aim of interdisciplinary research is not simply to fill gaps in knowledge but to potentially produce new spaces for knowledge/ways of knowing. This is not to argue for a new post-disciplinary view of the world, but to suggest that the ontologies of the different disciplines we work with need to be viewed critically, reflectively and relationally. This we propose can be best achieved by engaging interdisciplinarity as a research design tool rather than as a research outcome.

3. Context: Safety and Health in Highly Networked Organisations

The ‘Management of OSH in Networked Systems’ project was undertaken across three industries: construction, healthcare and logistics – all of which were selected because they are operated in complex organisational contexts. In this section, to outline the context and need for an interdisciplinary approach, we discuss the complexity of these environments.

The construction sector is almost exclusively a project-based sector, whereby temporary organisations are formed and disbanded for each project. Typically, these temporary project organisations are formed from a combination of client/owner/funder; designers (usually several independent firms); principal contractor; subcontractors and suppliers along with a plethora of specialists and advisors. The overall project organisation will only usually last for a number of years whilst the project is being designed and built and many of the individual firms may only have an active role for a number of weeks or months. Even when construction

projects are delivered using a form of partnering or alliancing, the partnerships developed still only have a limited life, and conform to single organisational cultures only in as much as necessary to deliver the project. Thus, these loosely coupled organisations are temporarily tightly coupled through the project delivery process, a pattern of involvement that hampers learning and innovation across these inter-firm relationships (Dubois & Gadde, 2002). This is ironic given that the success of complex projects is heavily dependent on the degree of integration of the different parts of the networks (Bolt et al., 2012). These complexities mean that construction has habitually seen itself as 'different' and not able to implement practices from other sectors and thus has failed to learn from other good practice – this has militated against efforts towards a more pluralistic approach.

One of the defining characteristics of the healthcare sector might be said to be the diverse, and at times bewildering, range of organisations, professional groups, technological systems, regulatory and governmental bodies involved in delivering safe, efficient, cost-effective and timely care to patients. As a consequence of this diversity, healthcare is often seen as one of the most complex sociotechnical systems and prone to failure in terms of safety as it applies not only to patients, but also to staff within hospitals and other healthcare settings (Institute of Medicine, 2000; Department of Health, 2000; Carayon, 2012). A patient with diabetes for example, may within the course of a few months 'move' through several parts of the healthcare system (e.g., primary and secondary care, specialist centres) and be treated by a range of people (e.g., general practitioners, social workers, nursing staff, specialists in diabetes). Moreover, information relating to this patient may be stored in a variety of formats and technologies (e.g., paper-based records, electronic systems and images). Not surprisingly, information may be lost or 'fall through the cracks' along the way as it crosses organisational boundaries involving both people and technology (Vincent, 2010). Even within one setting (e.g., a hospital) the handover of information may be problematic (e.g., from one hospital ward to another). In contrast to many other sectors (e.g., construction), the implications of these 'networks' of knowledge, information and data for OSH are only really starting to be appreciated for researchers, policy-makers and healthcare professionals.

As with the construction and healthcare sectors, the logistics area presents its own complex organisational issues. A more traditional view of firms with a focus on internal efficiency is no longer appropriate in today's business environment (Lai &

Cheng, 2003). Accordingly, distribution management within and between organisations, needs to recognise the integrated and intertwined nature of organizational relationships (Mentzer et al., 2001). The effective management of such a supply chain has been increasingly recognised as a key factor in providing a competitive advantage for firms (Christopher, 1998), but demands close integration of a number of internal functions and, in many cases, successful links with external organisations (Lai & Cheng, 2003). Within organisations the flow of information can be problematic, involving functions such as research, engineering, sales, and production, this complexity may be intensified when considering elements external to the organisation. For many organisations road transport forms an integral part of their logistics operations. In Australia, North America and Western Europe road freight is the dominant mode of internal transport logistics (Mayhew & Quinlan, 2006). The interaction with the external transport environment, external organisations and ultimately customers points to the importance of clear information flow. Indeed Singh (1996) suggests that responsiveness to customer demand, and overall customer satisfaction, cannot be achieved without proper management of both the goods movement and information flow throughout the supply chain. The same is true of OHS performance in such a networked environment.

4. OSH and knowledge: comparing three disciplinary perspectives

Having unpacked the complexity of networked organisations above, along with the OSH challenges, which confront the sectors within which such organisations operate, we now examine how they have been understood through three disciplinary perspectives: safety science; human factors and ergonomics (HFE) approaches to OSH; and social science approaches in organisation studies. While these approaches offer fundamentally different ways of ordering the world, assembling these within an overarching meta-level framework, points where they map onto one another are identifiable. An emphasis on understanding the practical activity of people as they work in organisations, and accounting for the worker's knowledge, experience, and perspective, is common to the three approaches.

4.1. Safety science

Safety science focuses on the reduction of accidents and incidents and pays special attention to their precursors. Here, the production and dissemination of knowledge

and learning are considered as systematic attempts to improve behaviours and reduce incidents. While written procedures and guidelines might attempt to control behaviour, an expanded perspective acknowledges the part played by individual differences, and focuses on psychological issues and factors that influence behaviour, akin to approaches that have been referred to as the 'third' and 'fifth' ages of safety (Hale & Hovden, 1998; Borys et al., 2009), and described in the systematic approach to HFE above.

Central to the examination of psychological factors in safety has been the study of climates for safety; forming one of the more influential approaches to understanding the development of safe behaviours. Psychological safety climate has been investigated to determine the relationships between individual and shared employee attitudes and perceptions, and broader outcome measures, including accident rates and safe behaviours, in an attempt to provide explicative models of safe behaviour. For example, Zohar's (1980) study found some relationship between his safety climate measure and safety performance. Mohamed (2002) likewise found significant relationships between safety climate, and its components, and self-reported safe behaviour in construction workers. Several researchers have also examined the relationship between climate variables and accident outcomes, for example, Hofmann and Stetzer (1996) found their measure of safety climate related to accident rates.

Collaborative efforts, from across industry sectors, researchers, regulatory authorities and others, has seen considerable progress being made in an attempt to understand safety culture and safety climate in 'real' working environments (Davies et al., 2001). Use of assessment tools have been shown to be one effective way of encouraging and maintaining employee involvement in their safety, if views are sought and they are then actively involved in implementing improvement actions based on the information obtained.

4.2. Human factors and ergonomics (HFE) approaches to OSH

The primary concern of the HFE discipline is the design of products and systems that are fit for human use (Noyes, 2001). HFE is concerned with the understanding the interactions among humans and other elements of a system and applying theory, principles, data and methods to design in order to optimize human well-being and overall system performance (IEA, 2000). This systems approach is applied to the study of work environments and contexts (Wilson, 2014), aiming to understand the

individual, social and organizational factors that increase the likelihood of human error occurring (e.g. Lawton & Ward, 2005; Underwood & Waterson, 2014).

Although there has been a tendency for the focus on individual factors, in fields such as patient safety research (Waring 2007, Waterson 2009) rather than on the team or organizational.

Other HFE research on UK patient safety has focused on developing tools and instruments to benchmark aspects of safety performance and safety culture within hospitals and primary care (Vincent, 2006), with interventions often based on these measurements. Researchers have begun to question the validity of some instruments to measure OSH (Waterson et al., 2010; Waterson, 2014) and to investigate problems with this type of ‘measure and manage’ approach. Waring (2009) and Waring and Bishop (2010) argue that safety knowledge is not objective, but socially constructed by professionals and embedded in social practice.

The person-centred, systems approach of HFE to OSH has also been illustrated in the construction sector (e.g., Haslam et al., 2005). Work examining the wide range of causal influences in construction accidents identified knowledge as a shaping factor, affecting the dynamic interaction between work teams, operations, equipment and materials in the construction work place. Elsewhere in Haslam et al.’s hierarchy of causal influences, design, project management, construction processes, safety culture and risk management are important knowledge bound influencers of the construction tasks that have to be undertaken and the risks these present. This model has also been adopted by researchers from a construction engineering and management tradition (e.g. Cooke & Lingard, 2011; Behm & Schneller, 2013; Gibb et al., 2014).

4.3. Social Science approaches in Organization Studies

Within the Organization and Management Studies field an understanding of learning as practice-based is well established (e.g. Scarborough et al., 2004; Orlikowski, 2002), and informs the way OSH is understood. For example, within complex project-based environments (such as construction), the literature on learning reveals the difficulties inherent in capturing, diffusing and sharing knowledge across the network of actors that constitute projects (Bresnen et al., 2004). Within the context of construction safety and health practice, Gherardi and Nicolini (2002) show how actors

within hazardous site environments enter a community of practice (cf. Lave & Wenger, 1991) through forms of apprenticeship. Here, safety is not “property ‘added’ to action; rather it is a characteristic of action” (Gherardi and Nicolini 2002), and so safe and healthy working requires integration of multiple modes of appropriate working and understanding from workers with different perspectives. This acknowledges that the ecology and interrelationships of groups within the OSH system is also populated and shaped by materials and knowledge from outside. In other words, both formalised structures and informal ‘webs’ of OSH knowledge co-exist in practice, and both must be accounted for if knowledge flows are to be understood. Furthermore, this approach raises a series of issues and questions that are not problematized in the HFE or Safety Science approaches. For instance: Is it knowledge that flows or is it actually information in some form or another that flows between actors? Can knowledge exist outside of an individual or does what flows only become knowledge when it is understood, contextualised and appropriated by each individual? How does knowledge combine and intertwine with the situated practices of workers?

Anthropological ethnography, which involves undertaking in depth research with people as they engage in work place activities offers a viable route through which to respond to these questions, precisely because it enables researchers to embed themselves in the environments they wish to understand and to observe and discuss activities as they unfold. Indeed, the anthropological literature about informal or ‘local’ (indigenous) knowledge (Sillitoe et al 2002) shows more generally how gaps between institutional knowledge and process and the embodied everyday practical knowledge of the people can differ significantly. For instance, Arce and Fisher “note how for employees of an oil company in Wales the knowledge of their job provided men with the experience to devise practical ways to achieve the task at hand without necessarily following the safety regulations designed to avoid them hurting themselves’ – in this case by not wearing the required gloves when working in the ‘paraffin shed’ (2003: 89)” (cited in Pink et al., 2010). Such scenarios are part of the everyday working life of many people, and part of the unspoken layer of institutional knowledge about how processes *really* work. However much practice-based knowledge remains undocumented, informal, unspoken and thus unaccounted for in our understandings of how OSH knowledge is learned, enacted and communicated to others. In making such knowledge visible, ethnographic studies do not seek to privilege the local and

practical over the institutional, but to explore interrelationships and interdependencies between different ways of knowing.

As we elaborate further below, this approach, which brings together organization studies with anthropological ethnography produces types of research knowledge not commonly used in OSH research because it attends to and seeks to bring to the fore the unspoken and hidden forms of knowledge and experience that inform the ways people stay safe.

5. Bringing disciplines together in practice

These brief outlines of the three approaches, the types of applied knowledge they produce and the types of interventions they inform and develop creates a strong argument for seeing each of these ways of understanding the OSH world as viable and productive. The approaches come from different starting points, yet in common we see that each of these different approaches, albeit in different ways, focuses on trying to understand and explain the actual practical activity of people as they work in organizations, and in doing so to map out ‘what is happening’. Indeed the growing body of research increasingly calls on researchers to pay close attention to informal and non-standardised routes for safety knowledge learning, communication, translation, appropriation and innovation - alongside ‘codified’ or formalised mechanisms such as organizational rules, guidelines and training.

The Management of OSH in Networked Systems project brought these approaches together through a research design that focused in on two different types of participant knowledge in organizations – reported knowledge and tacit enacted knowledge. The project approaches this through different methods, which were mapped on to the different approaches outlined above. Following a safety science and human factors approach, a mapping (of knowledge flows in organizations) and interviewing strand of the project focused on reported knowledge over a wider sample of 150 participants in seven organizations across the construction, health care and logistics sectors. In parallel with this taking an anthropological approach to organization studies, an in depth ethnographic study was undertaken in organizations in the same three sectors (see Pink and Morgan 2013, Pink et al 2015). In this section we report on how this meant that different teams of researchers in our project focused on particular research questions from different disciplinary perspectives. The outcome

was a set of findings that approached the ‘problem’ from different analytical entry points.

This however was a ‘messy’ endeavour, in that discrete sets of knowledge were not always mapped onto specific disciplinary approaches. The human factors and safety science approaches became part of the same knowledge flow mapping and interviewing strand of the project, while the ethnographic work, informed by organization and management studies was developed in dialogue with the findings of the interview study, but maintained some independence during the research process. Indeed this independence between some of the disciplinary traditions was necessary at this stage in the project. The ethnography team worked with a series of anthropological concepts of knowledge and its transmission that directly challenged some of the concepts that informed work being undertaken in the interview and OSH knowledge flow mapping studies. However, as Pink et al (2017) point out elsewhere, the intention in working in this way within our teams was not to prove other disciplines ‘wrong’. Instead we were interested in seeing how alternative analytical approaches could shed new light on old questions, even if this could be challenging at the moment of bringing the ideas together, thus fracturing or challenging established ways of thinking about OSH.

We next demonstrate this through a discussion of two related examples of how different understandings formed part of our work: the question of ‘knowledge’, and the concept of ‘work-arounds’. We then bring these together to show that depending on how knowledge is conceptualised, the idea of the ‘work-around’ or ‘bad’ safety behaviour becomes redundant.

5.1. Knowledge

The concept of knowledge has long since been debated in the social sciences and humanities. These debates range from considering what knowledge is to how it is transmitted between people, to if we can even consider it as being transmitted, instead suggesting it can only be learned (see Pink et al 2017 for a discussion of this issues in relation to OSH research). These differences in understanding of the concept were significant for our project, leading us outline some of the issues in our final report:

A dictionary definition of knowledge is: “understanding of or information about a subject that you get by experience or study... the state of knowing

about or being familiar with something... ” whereas information is defined as “facts about a situation, person, event etc”². There is a sense that it is information that ‘flows’ and it only becomes ‘knowledge’ when it is understood and appropriated by an individual or group. However, this differentiation is not absolute and is certainly not understood by the most people. Therefore, in the interviews and interactions for this project, the team have talking about in what ways people ‘know how’ or ‘know why’ they work in a certain way. This has avoided the need to talk about knowledge flow or information flow. The research team also acknowledge the complexity of how people know how and know why and the multiplicity of ways that knowledge is created and diffused between people and across networks. The ethnographic work also talks about ‘ways of knowing’ to support the argument that OSH knowledge does not only (or always) ‘flow’, but sometimes emerges *through* practice. This perspective argues that it is not only static, predefined ‘knowledge’ that is added to action and then moves around an organisation, but that ‘ways of knowing’ emerge incrementally from and through the practical, situated actions of workers (Gibb et al., forthcoming).

These differences in approach meant that it could be difficult to merge the findings from the different strands of the project. That is, their findings did not build on each other directly but ran in parallel and often provided different types of insights. This led to some discussion around how we should present the findings in the final report. We eventually decided to bring the findings together in the key findings and recommendations of the report. However, we maintained them separate in our more in-depth reporting. This was because the ethnographic findings offered a different vision of the world to that presented through the interview-based findings and rather than needing to use the report as a context through which to illuminate these different perspectives and how and why they might sometimes work in different ways, we decided to maintain the narrative of the ethnographic part of the report in-tact as a persuasive argument, and set of insights and recommendations in its own right. We also concluded that the ethnographic and interview-based parts of our work might have implications and insights that can be used independently of each other in different domains of OSH practice and theory. These insights could be obscured (for either set of findings) if they were merged with each other.

5.2 Workarounds

Workarounds were a key aspect of OSH behavior as discussed in the findings of the interview based research in our project. This part of the project, guided by the Safety Science and HFE approaches suggested, as we put it in our report that:

“The term ‘workaround’ seems to be somewhat emotive in all three sectors, and, particularly amongst OSH professionals. There is an assumption by some that workarounds are always wrong and always less safe than the prescribed method. The term ‘shortcut’ was also used frequently, although often in a slightly more negative way than workaround, suggesting that the shortcut was perhaps less safe than the official method. Occasionally an interviewee talked about ‘breaking the rules’ but they would often indicate that this was still done safely. The reasons why people used workarounds or shortcuts were discussed, for example, lack of necessary equipment, situation being different to the one assumed in the instruction/method statement or perceived time pressure. Sometimes it was seen as the only way in order to do the job and was deemed the safest way to ‘bend the rules’” (Gibb et al., forthcoming).

This approach understands OSH knowledge as something conscious and as something that might be transgressed when it was considered to be a viable solution to a perceived impediment in circumstances that would have made following OSH rules impossible. Workarounds are not necessarily seen as always being unsafe, although they sometimes are. However they are associated with the idea that OSH knowledge can flow through organizations and is used in conscious ways. In contrast the ethnographic strand of the research did not refer to the concept of ‘workaround’ at all. That is, participants in the ethnographic research were not seen as ‘working around rules’, but instead, as we outline in our report:

“The ethnographic research set out to understand how OSH knowledge ‘flows’ – or is learned, communicated, and *actually* used by workers – in complex networked organizations from across the healthcare, logistics, and construction sectors. The ethnographic findings demonstrated that OSH happens in and as part of an ongoingly changing world, in which personal and tacit ways of knowing are vital. By revealing the role that tacit (or usually

unspoken) ways of knowing – including the embodied, sensory, affective, and experiential – play in worker safety, the ethnography posed different understandings to the idea that OSH-knowledge *always* ‘flows’ and does so *only* through formalised mechanisms from one person to another. Learning was found to also happen through informal mechanisms, and knowing how to work in safe and healthy ways was generated through practical activity undertaken in specific workplace environments”. (Gibb et al., forthcoming)

5.3. Re-thinking knowledge and workarounds

This approach to knowledge and the ways it is learned and experienced leads to a way of understanding OSH practice whereby the workaround is fractured to a certain extent. This is because it does not see workers as operating at a level of conscious knowledge whereby decisions are made to break the rules. Instead it understands practical activity in the world in two ways that are different from this: first by understanding knowing as both conscious/verbalised and as unconscious/tacit; and second by understanding human activity as improvisory, and thus understanding OSH practices as emerging through the contingencies of different situations. This does not mean that the notion of workarounds is redundant, because as shown above, they form a useful way to understand some instances of the ways the people consciously seeks solutions that do not necessarily attend to OSH rules. However it does show that what might be happening in any situation where OSH rules are not followed may be significantly more complex than being a workaround, and that by attending to different theories of knowledge and of human creativity and action these become clearer.

One of the important points to remember in such work is that the theories nurtured in academic disciplines help us to understand the world. They are our work tools. However they do not directly mirror or determine what actually happens in the world. Therefore when we come to pool together the findings of different disciplines to approach applied research questions, the task is different to that of academic scholarship. Design research offers a useful model for thinking about the task here. While, the production of OSH interventions and insights is not commonly thought of as design practice, the task is similar. Designers sometimes bring together a range of theoretical and practice-based insights needed to make successful interventions in the world, which makes theoretical scholars wince. We are seeking to do something

similar, while bearing the effect that working in such an interdisciplinary way means that representatives of different disciplines will sometimes feel uncomfortable and see their approaches as compromised. Here we are mixing the practical with the workable, the theoretical with the *known* and seeking to bring these together to understand how interventions might be viable and workable. Therefore, if we return to the examples of different disciplinary perspectives on knowledge and workarounds, the question for us is not *if* workarounds exist in workplaces or not. That would be a question that might be debated within or between academic disciplines. Instead however within our wider applied project the question for us is *when is it useful to understand the ways people do safety as a workaround* and *when is it useful to understand it as an improvisory way of staying safe?*

7. Conclusions

In this paper we have outlined how a pluralistic perspective on OSH knowledge can reveal new knowledge about how safety and health are performed and achieved within highly networked organizations and sectors. The ways in which these different analytical frames can be mobilized provide a more robust understanding of the contingencies through which everyday workplace knowledge and safety and health is learned, shared, constituted and reconstituted. This provides a fresh set of provocations for both theory and practice in terms of how safe working practices should be conceptualized and ultimately managed. By focusing in detail on the often taken-for-granted aspects of everyday OSH practice, the perspective we have put forward in this paper might help to build bridges between current existing OSH approaches such as human factors and ergonomic, safety science and an anthropological approach to organization studies. While the combination of multiple approaches renders the study of OSH knowledge multi-faceted and complex, we argue that an approach informed by recent perspectives on interdisciplinarity along with an emphasis on the contingencies of knowledge/ways of knowing, can provide new insights on OHS and its management with theoretical and practical benefits.

It is not, as we have emphasised earlier in this paper, as case of assessing if interdisciplinarity has ‘worked’ in our project. Since on one level we might suggest it has not – in that the disciplines did not necessarily always agree. However, this, we argue is not the point. Seeking to make disciplines blend in the research process can produce important new knowledge, but it might not always be the most advantageous

way of to bring disciplines together. As we have shown, by bringing the critical approach of anthropological ethnography to OSH research, we have been able to gain deeper insights into where and how different approaches to knowledge and the OSH activities and performances related to it are effective. We urge both researchers and research funding bodies to encourage and develop further interdisciplinary work in this field.

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Notes

¹ This is moreover a paper co-authored across disciplines. We note that in seeking to undertake an interdisciplinary task, we are effectively seeking to reconcile the irreconcilable, and we do not always represent the views of all authors as the text progresses. Yet this is a worthwhile endeavour because to do so is to create an advantage for OSH practice.

² <http://dictionary.cambridge.org/>