



Investigating Resilience Engineering Through Safe Work Method Statements in Residential Construction

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Abstract. This paper reports on an investigation of resilience engineering as a construction safety strategy through safe work method statements. Safe work method statements are a regulated strategy for controlling health and safety risks in Australia. However, there is little research published on safe work method statements, so the specific role they play in construction are unknown. Previous studies have suggested similar approaches, such as safety rules and/procedures were not followed to the latter but adapted to suit the local context of work and environment, creating gaps between the two. Such gaps are also important in Resilience engineering, a new paradigm for safety management. While RE is attention in construction safety, the specific links between safe work method statements and resilience engineering have not been investigated, so it is not clear whether safe work method statements enhance or hinder resilience engineering. This study seeks to address this through a case study in a residential construction project.

Keywords: Resilience engineering · Safe work method statements · Construction safety · Case study

1 Introduction

This paper is a part of a broader research project on advancing organisational safety through Resilience engineering (RE) in the Australian construction sector. Like most countries, construction continues to be singled out for its poor safety performance in Australia. The industry currently employs 9% of the workforce but is responsible for more than 11% of the workers compensation costs and 16% worker fatalities [1]. The industry also ranked third highest for both the number of fatalities and workers compensation claims for serious injuries in the last five years. What is concerning is that workers continue to be affected by the same type of health and safety hazards they were exposed to a decade ago. These include, for example, falls from heights, being hit by falling objects, and impacted by vehicles [1]. This is more pronounced in residential construction where work environment changes constantly, work crews are relatively

smaller and comprised of young workers or migrants, on-site safety advisors are rare and safety innovations lag behind commercial construction projects [2]. Over two and half decades ago it was observed that the manner in which construction safety was managed had not changed [3]. Recent studies suggest this continues to be the case, with the industry continuing to rely on contemporary strategies to manage construction safety risks. As authors such as Wachter and Yorio [4] note, such strategies become institutionalised through policies, plans and procedures; and generally not able to be adjusted to inevitable changes in work, the environment in which such work is conducted, or any emergent risks that may be encountered.

One contemporary approach includes safe work method statements (SWMS) that was introduced in Australia under the harmonized construction safety regulations [5]. However, there is a paucity of research on SWMS, so the role they play in construction safety are largely unknown [6]. What is known is that similar approaches, such as safety rules and/procedures were not followed to the latter but adapted to suit the local context of work and environment, creating gaps between the two [7]. Contemporary safety management generally treats these gaps as violations. Advanced approaches such as Resilience engineering (RE), however, treat such adaptations as human variability and part of normal human performance, and a necessary requirement for achieving safe performance by recognising, adapting and absorbing variations and changes [8]. Accordingly the gap between work-as-imagined (WAI) and work as done (WAD) is an important facet of RE [9, 10], which is gaining some attention in construction safety [11]. The specific links between SWMS and RE, however, have not been investigated [6, 12]. This study reports on the findings of a study which sought to address this gap on a residential housing project. It specifically focuses on the WAI aspect of SWMS from the perspective of managers.

2 Theoretical Framework

Fostering RE involves developing an understanding of how work practices evolve in normal work settings, as opposed to how it was imagined (or prescribed) [9]. Nathanael and Marmaras [13] argued that the transformation of prescriptions to work practices involved a series of four interconnected loops which could be decomposed at two broad levels. This is illustrated in the modified prescriptions-repetitions-distinctions-descriptions (MPRDD) model in Fig. 1.

The top level included the prescriptions loop which represented an organization's goals and intentions as expressed in its policies, standards, procedures and/or work instructions, and communicated downwards as assigned responsibilities, specific objectives norms, standard operating procedures, task and work descriptions [13]. In Fig. 1 this is conceptualized as work-as-imagined (WAI).

The bottom level is about the actual practice, which evolved through a series of double loops, each encapsulated inside the other and unfolding at different times [13]. The repetitions (R) loop involves the development of 'safe work habits' via re-enactment and reinforcement during normal operations; while the distinctions (D) loop their situated challenging following a breakdown where members distinguished new ways of acting [13]. The authors suggested some of these also triggered reflection-in-action

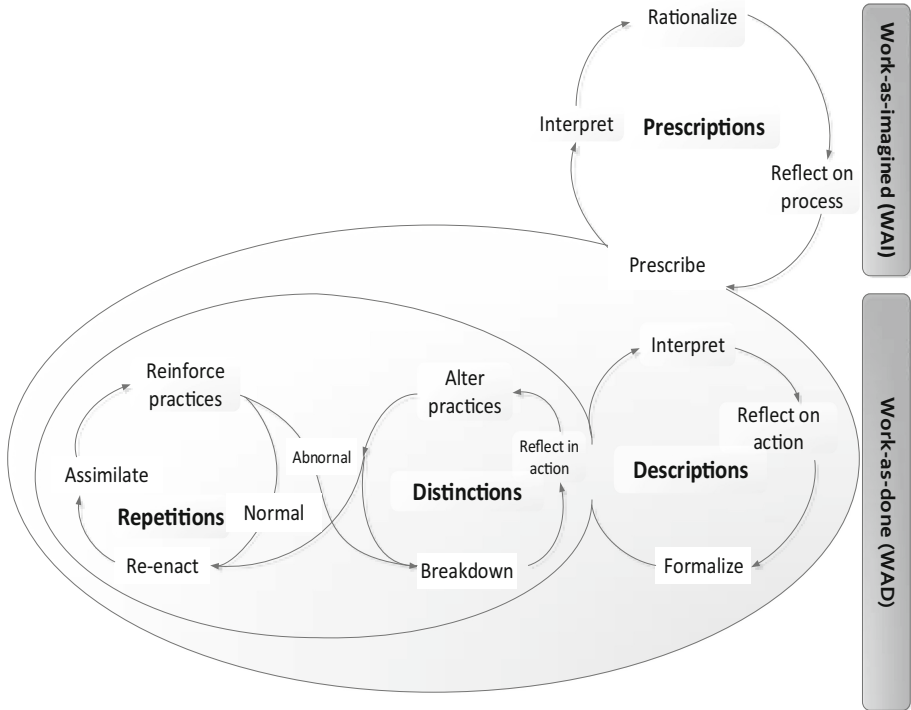


Fig. 1. Modified prescriptions-repetitions-distinctions-descriptions model (M-PRDD)

in the groups, leading to modified practices which were subsequently immersed into the prescriptions cycle. The descriptions (D) loop provided an opportunity for detached reflection in instances where workgroups acted not only in the present but also placed their identity outside of their evolving work experience and reflected upon it. This reflection-on-action was generally disconnected from experience and allowed groups to generate their own interpretations which were formalised through dialogue and discussions [13]. Successful adaptation depended on an organization's ability to provide a stable foundation for their interpretation and formalisation. In Fig. 1 this is conceptualised as WAD.

The MPRDD model acted as the theoretical framework for collecting and analysing data on the prescription and practice of SWMS.

3 Methodology

A case study was used for this project, a comprehensive research strategy where data is collected over a period through a combination of methods in order to illuminate the phenomena being investigated [14]. The research setting, which is identified in this paper as Organisation A, included a medium-density residential construction project

located in Victoria, Australia. A triangulation [15] of semi-structured interviews, field observations, and documents were used to collect and analyze the data.

4 Results

For the purposes of this paper, the results of interviews with managers is reported, with the pseudonyms PAR### used to indicate participant number. These represent the prescription of SWMS according. The five themes that arose at this level suggested that SWMS provided legal protection, involved a process, had a role in safety. However, there were mixed views regarding the type of construction work SWMS were required for.

4.1 SWMS Provide Legal Protection

A common theme from Organisation A Managers is that SWMS provide legal protection. An example of this is expressed in the following excerpt: “...*I find them as a way of being able to transfer liability from the principal contractor to other parties... shifting of liability*”... (PAR001). For this informant having a SWMS in place meant the organisation was able to transfer liability to others where possible. The informant spoke of a recent experience of an incident at one of his construction sites which had resulted in an intervention by the regulator. According to him organisation A was able to shift the liability for the incident back to the lead contractor, in this case a concreter: “*It had basically gone from a builder’s point of view, from I’d done the paperwork, and then the liability went to the concreter for taking unnecessary works outside his scope. So now any of the liability that would have come to use from the Regulator has now gone straight across to the concreter...*” (PAR001).

4.2 SWMS Involve a Process for Driving Efficiency

A second theme from Organisation A managers is that SWMS establish a process; an example of this is expressed by the following excerpt: “*Well, I think they are quite good because they set the process....*” (PAR003). The informant elaborated that “...*instead of wily-nily turning up to a job and just going for it, but if there’s a set process that guys can work through.... That it’s actually a quicker way to do it by these devised processes.* The second part suggested this process was about achieving the work faster i.e. driving efficiencies by following a set process.

4.3 Work Contexts for SWMS

A third theme related to the types of construction work that warranted a SWMS. There were two different views in this regard. The first was that these were required for some types of construction, as expressed in the following: “*Well, obviously we’ve got regulatory requirements to make sure we’ve got it for all high risk works*”... (PAR001). However, another suggested these were required for nearly all types of construction:

“So you’d almost say that our generic Safe Work Method Statements that we have would apply to 95% of the works that we do.”... (PAR0003).

4.4 SWMS Have a Role in Safety

A fourth themes related to SWMS and safety, generally expressed in the following way: *“Obviously it’s to ensure the safety of the guys on site as well. That’s a primary function of it from that point of view...” (PAR004).* Another provided some context around this *“...it’s to keep people safe and to prevent them from completing activities in the incorrect manner that could possibly increase their risk of personal injury”... (PAR004).* In this the suggestion is safety can be achieved through working correctly i.e. procedure following.

5 Discussion

This study is part of a larger study aimed at investigating the links between SWMS and RE. A M-PRDD model was developed and used as the theoretical framework to investigate the prescription of SWMS in a residential construction project. These preliminary findings from semi-structured interviews with managers suggested SWMS provided legal protection, involved a process and aimed at achieving efficiency by following a set process. These finding are, to some extent, at odds with a previous findings from regulators [6], which suggested they were a safe system of work, a live strategy for controlling risks, a cognitive artefact, and a tool for social interactions. There were two different views regarding the type of construction work for which SWMS were required. The first is that these are required for some work, while the second suggesting required for nearly all work. The view that they were required for some types of construction is consistent with previous views of the regulators; while the view they are required for most types of construction resonates with those of industry association [6]. The view that SWSM contributed to safety by rule following also was different to previous findings from regulators, who suggested that their use as a safe system of work and social interactions were more important.

Future work will report on the findings from semi-structured interviews with supervisors and workers, observations on the use of SWMS used in a range of construction activities, and analysis of documents.

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