Challenges for DfS in Singapore

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Principles of quality management dictate that quality is to be embedded through design. This is also applicable to safety, that is, safety must be embedded to a project through design (Toole, Gambatese, & Abowitz, 2017). Design for safety (DfS) is defined as "the practice of anticipating and "designing out" potential occupational safety and health hazards and risks associated with new processes, structures, equipment, or tools, and organizing work, such that it takes into consideration construction, maintenance, decommissioning, and disposal/recycling of waste material (Schulte, Rinehart, Okun, Geraci, & Heidel, 2008)." The Workplace Safety and Health Design for Safety (DfS) regulations, which came into effect in August 2016, placed duties on developers and designers to identify and address foreseeable risks throughout the lifecycle of a construction project. Through a series of interviews with industry practitioners, some challenges faced during the DfS review process were identified.

Challenges

Active participation from all stakeholders

There is a lack of active participation from project team members during the DfS review process. Interviewed DfSPs have observed that in their projects, there is a need to prompt the project team members to respond. One of the reasons for this as seen in the literature, is that design professionals do not understand how they can contribute to making a design safer. For example, many designers feel construction site safety is part of the contractor's methods of working and that they have no responsibility for it (Gambatese, Behm & Rajendran, 2008). However, design of a structure can influence the safety of those who are tasked to build the structure. For example, while designers may design for the final load, a structure may undergo additional stress while being erected. If this additional load is not accounted for by the designers, failures in the structure may occur (Toole, 2005). Designers addressing the hazards that a design poses during the different stages of a building's lifecycle is an important way that they can contribute. As the

designers are the ones who are most familiar with the design, they are best placed to evaluate hazards in the project. Without their participation, it will be difficult to identify and address hazards.

Developer support

It is observed in the field that while there are the additional imposed duties arising from the regulations, no additional project resources are allocated for the project by the developers. Resources allocated to a project are determined by the owner and they will have to bear any possible increases needed (Gambatese, Gibb, Bust, et al., 2017). Respondents noted that design changes that involved contractual variations were less likely to be carried out. Developers had little issue with recommendations which involved no cost increases. It has been suggested that owners should dedicate sufficient resources to supporting platforms that can help the project team members to communicate design concerns and any possible changes (Toole & Gambatese, 2008). If suggestions are made sufficiently early, the changes are more likely to be implemented.

The way forward

A range of approaches to improve DfS implementation had been identified as part of the research. One of these approaches is to measure a project team's shared perception towards the policies, procedures, and practice of DfS. The measurement can provide a way to quantify a team's perception of the "way things are done around here". This is known as DfS climate. This measurement can help stakeholders mark if they are improving, and thereby improve their ownership of DfS.

During the interviews, interventions to improve DfS climate in project organizations were elicited. Research is being done to evaluate and prioritise these interventions. The industry may be able to use the guidance to directly improve their project's performance of DfS review.

These strategies will be discussed in an online seminar organised by the Safety and Resilience Research Unit, on 3rd July, 14:00-15:30. Industry professionals will be presented with takeaways to help them improve their organisation's ownership of DfS.

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