

Construction OHS Research

SCHOOL OF PROPERTY, CONSTRUCTION
AND PROJECT MANAGEMENT

DESIGN OHS INFORMATION SHEET

An analysis of design decision-making in the construction industry

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Who are we?

A team of researchers from the School of Property, Construction and Project Management at RMIT University are conducting research into the influence that decisions made during the planning and design stages of a construction project have on the occupational health and safety (OHS) of buildings and other structures.

Why are we doing the research?

In Australia the concept of eliminating hazards or reducing risks at the design stage of construction projects has gained momentum since the National OHS Strategy 2003–12 identified “eliminating hazards at the design stage” as one of five national OHS priority areas.

However, the complexity of design decision making in the construction industry is not well understood.

In construction, design is an iterative process in which many contributors make decisions that can influence or impact upon OHS.

Policy initiatives often assume a simplicity that does not reflect the reality of design work in the construction industry. For example, regulations and guidelines are written in a way that assumes a single stakeholder (e.g. the architect or engineer) is responsible for all design decisions, when in fact design is a complex socio-technical process in which many stakeholders play a significant part.

Further, design OHS policy needs to adequately reflect the fact that building design is a developmental, dynamic and iterative process in which interactions and information exchanges between participants play an important role in shaping decisions.

The aim of this research is to examine the multiplicity of participants whose inputs are important and influential in shaping OHS outcomes in the design of buildings and other structures.

The research seeks to demonstrate the true complexity inherent in decision making during the planning and design stages of construction projects.

The purpose of this research is to provide greater understanding to enable the development of guidelines for design OHS for the construction industry that reflect the nature of design, the roles of multiple professional and technical contributors and the relationships between them.



Erection of pre-cast crosshead.
Photograph courtesy of: West Gate Freeway Alliance

What are we doing?

Data will be collected at case study construction projects, which will include projects in different industry sectors and procured using a range of project delivery mechanisms (see Figure 1). This will allow patterns to be identified in the characteristics of design decision-making within and between industry sectors and procurement/delivery mechanisms.

	Residential	Engineering	Industrial	Commercial
Traditional (Design-Bid-Build)	•	•	•	•
Design and Build	•	•	•	•
Accelerated	•	•	•	•
Collaborative	•	•	•	•

Figure 1: Sampling frame for case study construction projects

Case study projects will be selected on the basis that project participants have been involved in making decisions during the planning and design stages that positively impact upon workers' OHS during construction and subsequent stages.

At each case study construction project, data will be collected using a combination of methods including:

- » attending project design meetings, including OHS reviews;
- » interviewing project personnel, including the client, project management team, design consultants, contractors, construction workers and their representatives; and
- » viewing project documentation, such as plans and other documents.

The mix of data capture methods will vary from project to project depending upon the location of the project and the willingness of project personnel to provide access to people and documents.

Data will be used to develop three forms of output:

1. design decision process maps (Figure 2);
2. social network diagrams; and
3. narrative descriptions of design rationale.

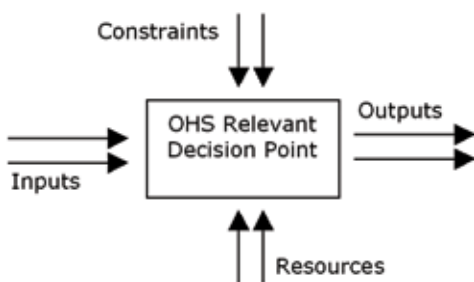


Figure 2: Process mapping technique based on IDEFO

Together, these three outputs will provide a rich understanding of the context in which design decisions, which impact upon OHS during the construction and subsequent stages of construction projects, are taken.

This will include detailed information about the nature and timing of decisions, as well as the participants involved and the information that flowed between them to enable design decisions to be taken.

The research outputs will provide an in-depth analysis of the rationale for design decisions, including the factors that enabled OHS hazards to be eliminated, or risks reduced at the design stage.

How will we do this?

The research will be conducted in three stages.

Stage 1: First, suitable case study construction projects will be identified and an agreement to participate by project management teams sought. If the project management team agrees to participate in the research, data collection will commence using an appropriate and agreed mix of the methods described above. Features of the design of a building/structure in which OHS hazards were eliminated or risks reduced by design decision-making will be identified. Project personnel will be asked to 'walk back' through project decisions, capturing the chronology of events, and the content of design decisions that had implications for OHS during the construction or subsequent stages of the project. Where possible, researchers will observe design team meetings and view project plans and other design documentation to provide a comprehensive understanding of the participants, information flows between them and influences on the design decisions made.

Stage 2: Next, data gathered will be used to develop graphic representations and narrative descriptions of the design process and decisions made within it. Process maps will be constructed and supplemented with social network diagrams to reflect the complex interactions between project participants involved in design decision-making (Figure 3).

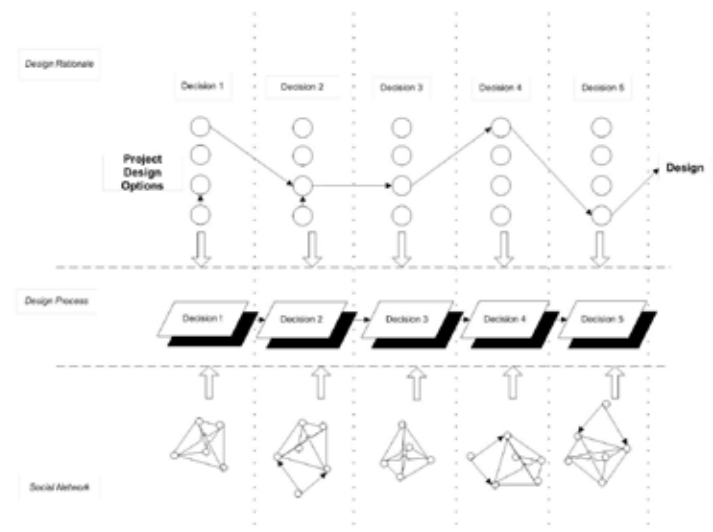


Figure 3: Design decision mapping

Narrative descriptions of the design rationale will also be developed to provide a 'rich picture' of the reasoning of contributors to decisions made at key decision points.

In combination these outputs for each case study construction project will illustrate the complexity and multiplicity of factors shaping design decisions that have OHS implications. The outputs will also show the diversity and interplay of different contributors to design decisions (extending well beyond the project architect and engineering design consultants).

At this stage project participants will be able to review and revise the outputs to ensure that they are an accurate reflection of design decision-making in each case study project.

Stage 3: Once confirmed by participants, the resulting process maps, social network diagrams and design rationales will be examined to identify patterns in the decision-making across case study projects.

At this stage it will be possible to examine whether characteristics of design decisions that impact upon OHS are consistent within industry sectors and/or project procurement mechanisms/delivery modes. For example, are similar decision patterns evident in all civil engineering projects? Or are collaboratively procured projects characterised by particular patterns of design decision-making?

Patterns will be used to suggest opportunities to transfer good practices between industry sectors. The patterns will also be used to make suggestions about an appropriate allocation of responsibility for OHS that reflects the true roles and contributions made by occupants of different professional and technical roles in various project procurement scenarios.

Deliverable: A final report on the outcomes of the research will be provided to participating organisations. The report will:

- » provide an analysis of the decision processes contributing to OHS in the case study projects;
- » identify key decision points, activities and processes that contributed to OHS hazard elimination/risk reduction in the case study projects; and
- » develop recommendations and an implementation strategy for further embedding OHS into design decision-making within each organisation.

If it is of interest to participating organisations, the research could also provide the opportunity for inter-organisational benchmarking of design OHS practices and processes, enabling the transfer of 'best practice' between organisations.

The likely benefits this research is expected to provide to participating organisations are:

- » a greater understanding of how OHS is currently integrated into design decisions in their projects, including the identification of critical decision points, interfaces and information exchanges;
- » the development of strategies for embedding OHS into design decision processes in a way that realistically reflects the role and ability of each contributor/stakeholder to influence OHS outcomes; and
- » ultimately, the achievement of design OHS policy and practice that reflects the inherent complexity of design work in the construction industry.

What do we need?

The research team needs to secure the participation of engineering and architectural design organisations, as well as construction clients, to provide access to personnel and projects for data collection.

Who is funding the research?

This research is supported under a subcontract with Virginia Tech.

Research team

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