

Citation

Love, P. and Teo, P. and Ackermann, F. and Smith, J. and Alexander, J. and Palaneeswaran, E. and Morrison, J. 2018. Reduce rework, improve safety: an empirical inquiry into the precursors to error in construction. Production Planning & Control. 29 (5): pp. 353-366. <http://doi.org/10.1080/09537287.2018.1424961>

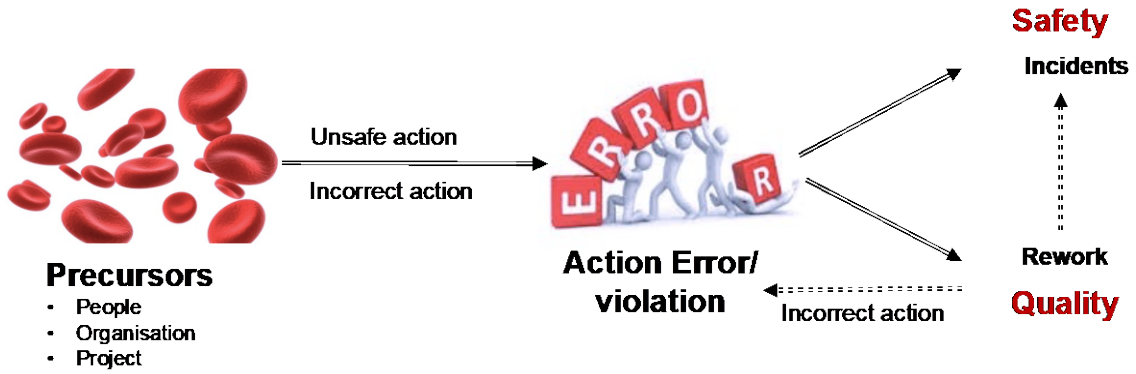


Figure 1 Conceptualisation of the causal chain for rework.

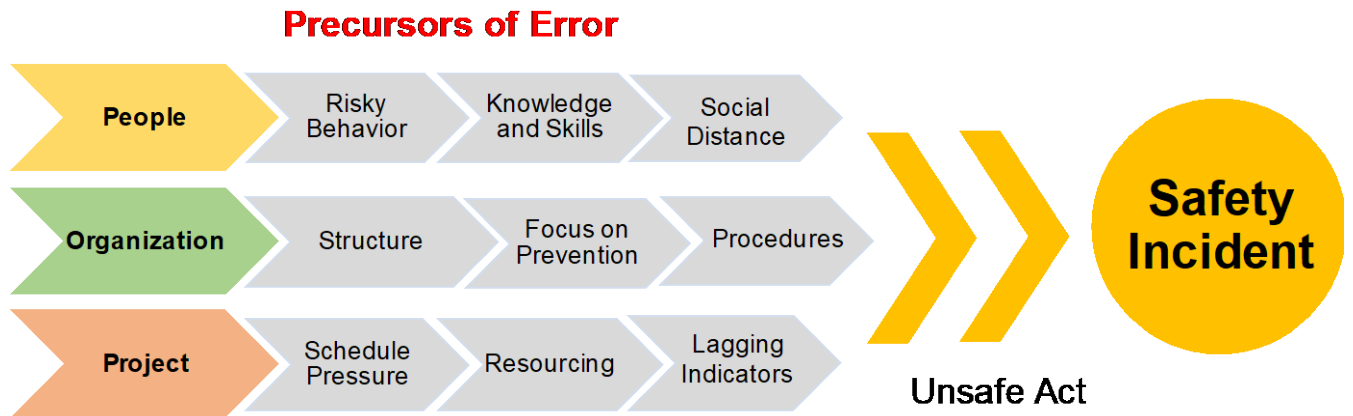


Figure 2. Precursors of error for safety incidents

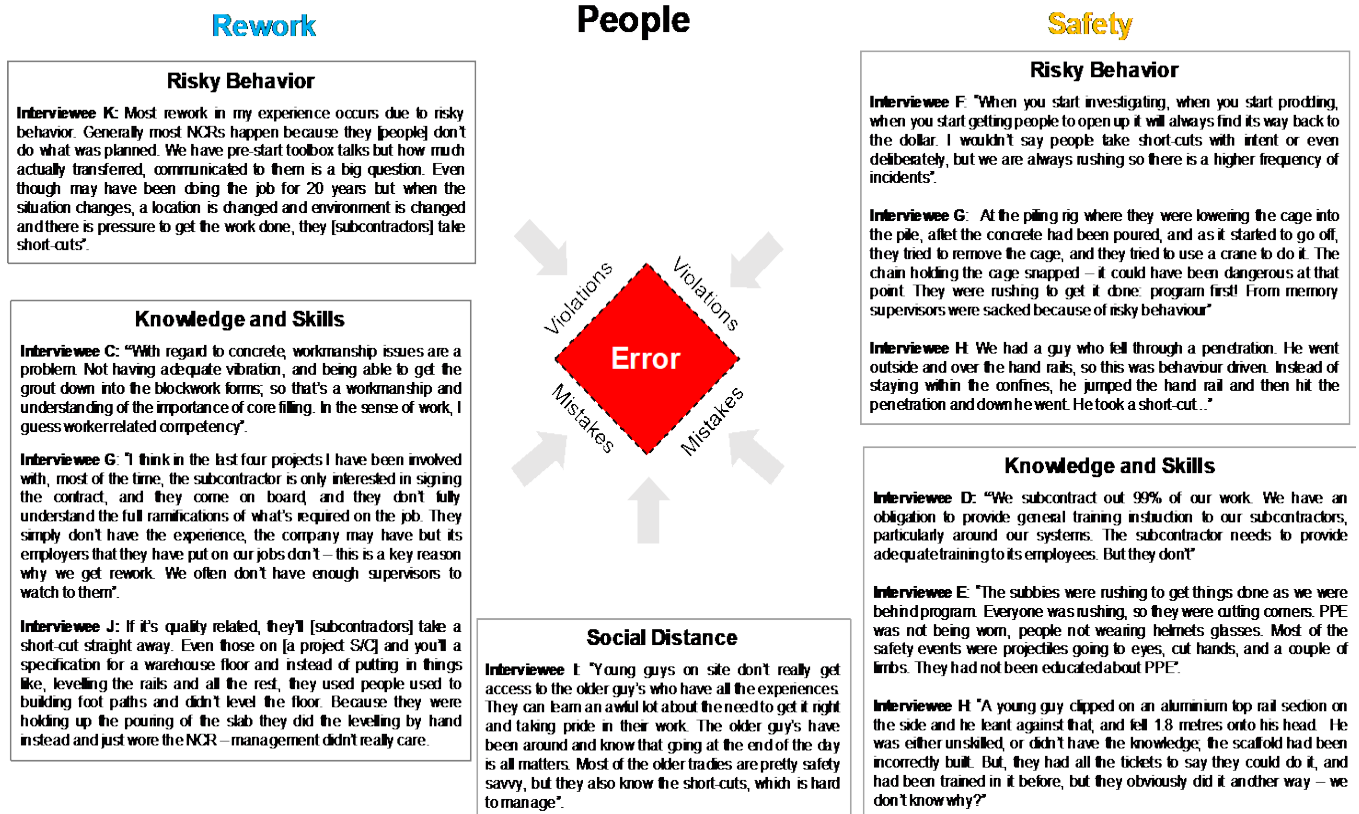


Figure 3. Examples of people 'precursors' to error

Rework

Schedule Pressure

Interviewee F: In terms of rail safety incidents, they traditionally occur with rework and rushing. In one project we had three or four derailments in a space of two weeks and that was just because everyone was fanatically rushing around to get scope out. Just minor stuff where machines would strike platforms because they weren't set properly weren't being supervised. We had breaches of rules because people weren't being supervised. Jobs simply don't have enough fat in them and supervisors are stretched".

Resourcing

Interviewee B: "Under resourcing from a Q perspective. We have a combined role, which certainly isn't enough. So, if you have an SQE or HSEQ, you're never going to get there. If you are an S manager then you are not responsible for it

Interviewee B: "Checks and balances that would typically take place on a daily and weekly basis by these Q practitioners morning around, the value was unseen. The value of quality was not acknowledged by senior leaders. There is a belief that anyone can do it!"

Interviewee K: Most of the time the budget is severely cut to the bone. We are Tier 1 contractor, but we do work that can be done by a Tier 3 who use less resources. We tend to put fewer staff on these jobs.

Managerial Commitment

Interviewee D: It comes back to culture and management commitment. If culture and the messaging around rework was like it was with safety, like, if rework goes up, then someone dies, we might turn the tide. I am not saying that we'll ever be able to provide a message like that, but if we treated it as seriously as we do other cultural angles, like environment and safety, I think you'll see a massive shift in business improvement".

Interviewee A: "We don't understand the root causes, and we don't have the right people in the organization really promoting this. Really stepping out and promoting the importance, prompting what've learnt. We need commitment from management to say "Hey, you guy's its important we find out exactly why things happen, and then we put a fix in place so it doesn't happen again"

Organization



Safety

Schedule Pressure

Interviewee A: From my perspective, we're not making margin, which has meant the organization has been cutting back on resources, which is causing more rework. Which affects the margin again. We are in a cycle and we need to come out of it by investing, reducing and increasing our profits. When we get rework we're confronted with schedule pressure which impacts our safety; it's a vicious that we need to break"

Resourcing

Interviewee G: If you say the word, safety it is a show stopper, management will listen. But what they have done is piled other areas into the safety, so it's getting less resource but they expect it to be given the same importance.

Interviewee H: "I'm always very critical about how we manage rectification works. It's not a matter of, go hell for leather and whatever it takes to get it done, it's a matter of... we can still do it as quick it's just got to be planned. But, no matter how well we plan, resourcing becomes an issue and so does cost, the potential for safety to be compromised increases when this unplanned work occurs. New risks emerge. We always under the pump so we'd forget sometimes to do things – just the pressure of the job"

Interviewee I: "If we've [the company] lots of work on, and this one [project] is finishing, and this one's started, they'll put minimal staff on projects that are starting. They move people when the project is finished to the new one rather than employing new staff. So at the start of projects we have poor resourcing and both quality and safety are affected, supervision is an issue".

Lagging Indicators

Interviewee J: "All quality and safety teams are pushing their own agenda". No one wants a safety incident, and the problem with quality is that it affects your pocket. There is nothing that legislates anything to recover those costs. With safety you have something that is very tangible. You have jail terms, lagging indicators used to indicate progress toward compliance with safety rules. But these indicators don't tell you how many people got hurt and how badly, but not how well our company is doing at preventing incidents and accidents. If we reduced rework maybe we could prevent incidents?"

Figure 4. Examples of organization 'precursors' to error

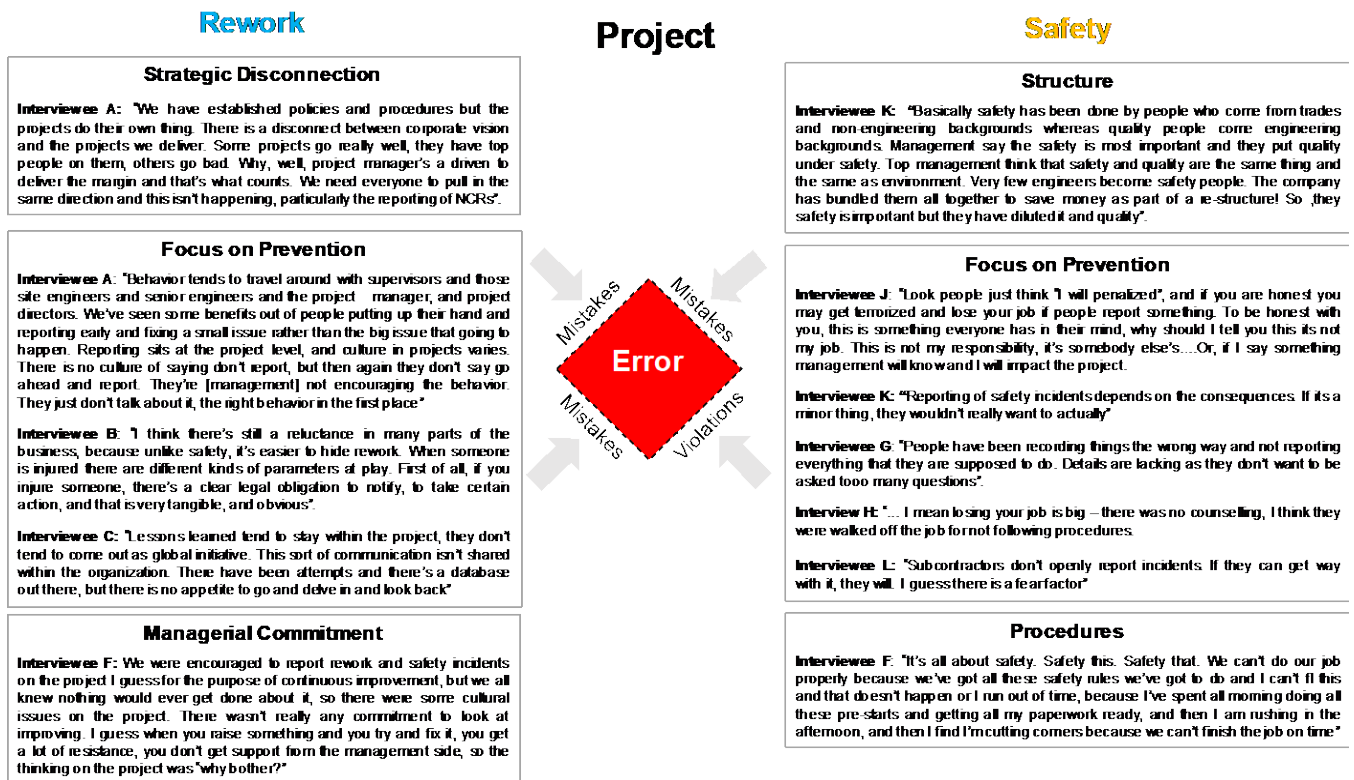


Figure 5. Examples of project 'precursors' to error

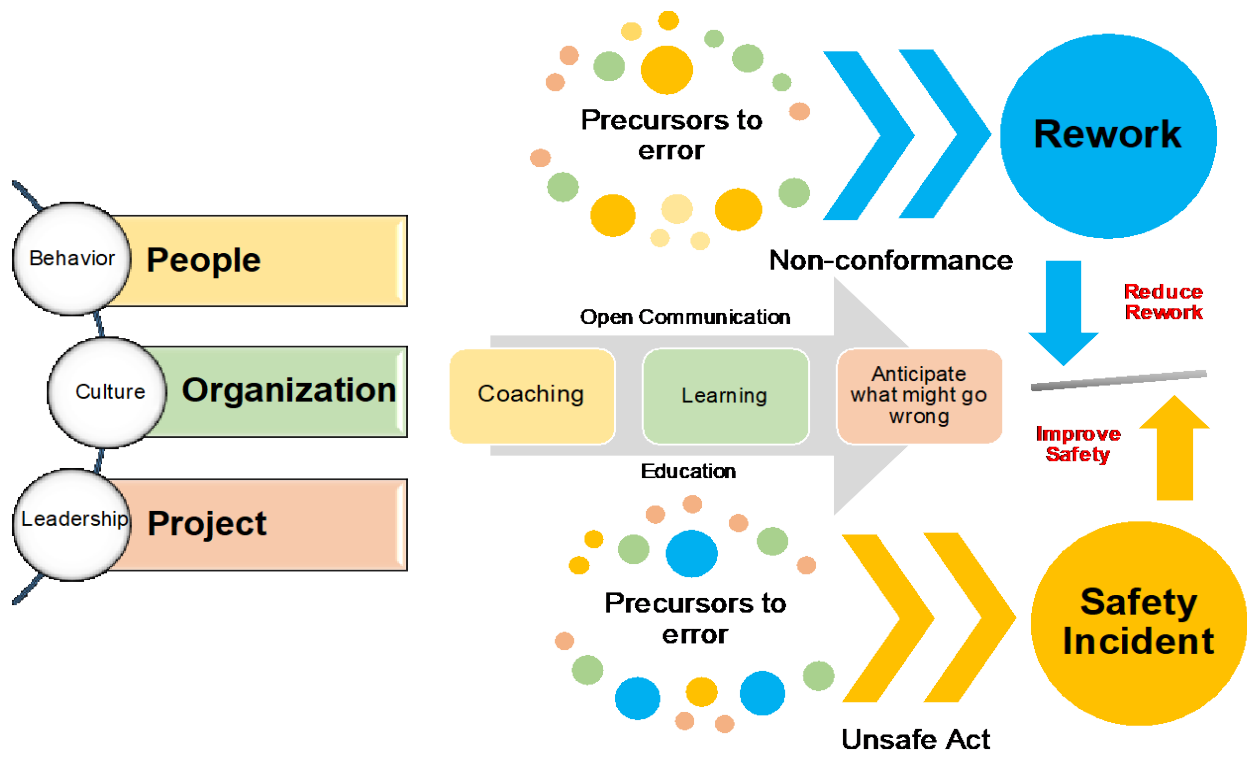


Figure 6. Mitigating precursors of error