Key words and concepts in ORM - getting the thinking and conversations consistent

This article is the third in a series intended to stimulate discussion about advances in mining Operational Risk Management (ORM). The first article outlined the ORM advances and provided a list of 17 articles. The second article provided a perspective on the development of mining ORM in Australia since the late 1980s.

This third article will start to build a foundation for these recent advances; Control-Based Risk management (CBRM) and Critical Control Management (CCM).

Good ORM involves not only a set of methods or tools but also aligned 'mindsets' amongst all those involved. Mindset is defined by the Cambridge English Dictionary as a person's way of thinking and their opinions. We use terminology to help construct our thoughts and express our opinions, providing a basis for decisions. For example, a person driving a car may recognise a threat to safety because another car is speeding. The person knows what the terms speed and speeding mean. Speed is a measure of travel (distance over time) and speeding means exceeding a defined speed limit. The person can easily describe the issue to another person because his or her terminology for the situation is well known and commonly used.

In ORM there may be confused or inconsistent terminology, making thinking and communication of opinion or information less effective. For example, the terms 'hazard' and 'risk' are historically colloquial terms with broad meanings. If we want to have effective

ORM communication both terms, as well as others, require clear definitions. Four definitions are offered below. The terms 'unwanted event' and 'control' have been added to provide the basic terminology for a good ORM foundation. Consistent use of these terms as defined will affect both mindsets and methods.

- **Hazard** – something with the potential for harm. When considering physical harm to humans, assets or the environment, a hazard is any energy source that, if released in an unplanned way, can cause damage. Electricity is a hazard. It has the potential for harm but not necessarily an unacceptable risk.
- **Unwanted Event** – a description of a situation where the hazard has or could possibly be released in an unplanned way, including a description of the consequences. For example, failure to correctly isolate the electricity supply leads to the maintenance person being electrocuted.
- **Risk** – a proactive measure of the chance of something happening that will have an impact upon objectives such as safety. It is commonly measured in terms of unwanted event likelihood and consequences. As such, risk is a measure of the degree to which an unwanted event is a concern. Using the example above, the risk can be estimated by considering the likelihood an isolation failure will occur, combined with the fatal consequences. The determination of event likelihood should be based on an effective review of the existing controls.
- **Control -** an act, object (engineered) or technological system (combination of act and object) intended to arrest or mitigate an unwanted event. A control must be specifiable, measurable and auditable. For the example, an important control is probably the act of isolating as required. In some cases, other controls may contribute to the risk such as ground fault protection, PPE, etc.

This definition of a control may be different from current site practices. Often procedures, training and supervision are considered controls. However, this definition suggests more careful selection. This change may require greater explanation.

To expand, one type of control is a defined human 'act', which of itself, arrests or mitigates an unwanted event. The defined human act may be derived from a procedure (ex. The step in the procedure when effective isolation is done), training content (ex. The maintainer's

training has effectively included training and assessment on correctly isolating) or experience in applying specific practices in the given situation (ex. The maintainer has adequate experience in the specific isolation requirements). As such, a procedure is not a control but rather a specific act defined in a procedure.

The second type of control is a tangible / physical, 'engineered' or designed 'object', which of itself, would arrest or mitigate an unwanted event related to that hazard. It can be described as follows.

- Automatically actuated or operated, not relying upon a human act to actuate or operate,
- Passive (e.g. a windrow) or active (e.g. on-machine gas monitoring), and possibly
- Operated based on software.
- Ex. ground fault protection on the circuit, automatic fire suppression system, transformer bunding, pressure relief valves, etc.

The final type of control is a combination of an act and an object; an object control that requires human acts to actuate, operate or respond. This might be called a 'technological system' control. It can be described as follows.

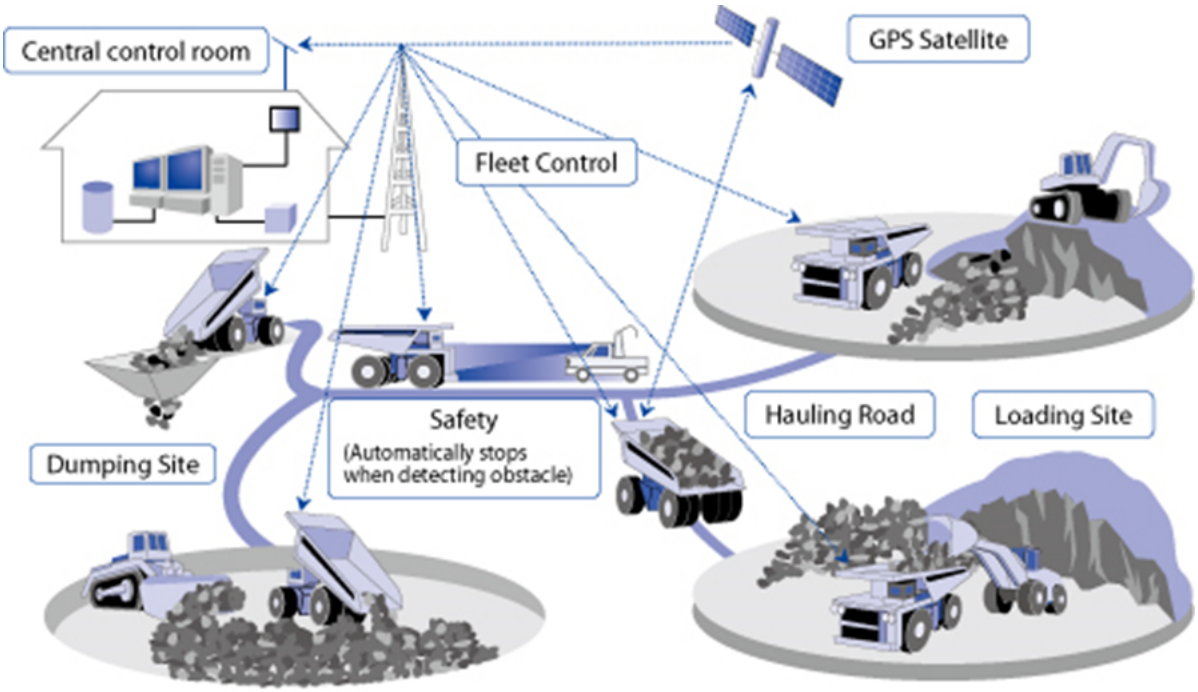
- Technology reliant upon a human act to actuate or operate when required such as a response to an alarm, and
- Passive (e.g. barriers installed near an ore pass) or active (e.g. ventilation system gas monitoring from a control room).
- Ex. smoke detection system that requires operator action such as actuating an alarm or message to evacuate, tell-tale system which requires physical inspection, proximity alarms that warn the operator to act, etc.

Also, a control must be specifiable, measurable and auditable. As the adage goes, 'if you can't measure it, you can't manage it'.

A 'human act' control for collisions at mine intersections is the driver operating the vehicle as defined at the intersection, the requirements being set by the related road rules

or procedures. For example, the vehicle coming to a T intersection will give way to all vehicles approaching from the right. As such **the control is specifiable.**

The illustration below shows an equipment suppliers summary of GPS-based equipment monitoring as part of fleet control. If vehicle position is tracked frequently, say once per 5 seconds, then vehicle operations can be measured against expectations. Specific to intersections, the GPS information can capture the vehicle's operation through the intersection and compare it to the defined rules or procedures. Thereby **the control is measurable** and, if the data is analysed, the technology offers an approach to **auditing the control** across individual vehicles, site intersections, over a time period, considering the entire fleet, etc.



The consistent use of the terms hazard, unwanted event, risk and, especially, control is critical to successful CBRM and CCM. For more information on controls and their effectiveness see ACARP Report C23007 (available to purchase at https://www.acarp.com.au/reports.aspx).

The next article will discuss ways to influence site personnel about being 'control-focused', based on a change management approach.