

# Chapter Overview

## Context

This approach was used by Glencore Coal Australia, a division of a tier one resources company at 11 open cut coal mines from 2015-2016.

## Results

The approach delivered immediate site benefits, developed a comprehensive group level understanding of mobile equipment interaction controls, and delivered a repeatable ICMM CCM align process while setting industry benchmarks.

## Approach

The approach detailed is part of a broader project to comprehensively and systematically review and baseline vehicle interaction control effectiveness using major project justification methodology.

## Discussion

See following detail: the material the course is based on was developed over many months by the project team.

## Alignment with new control management thinking

See following detail, particularly in the facilitator's notes.

## Alignment with EMESRT Model

The work involved developing and applying a process that baselined a multiple-site business approach from levels 1–5.

## Contributors

The project team behind this work was made up of senior engineers, consultants and experienced mine managers.

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# Introduction to new risk and control thinking

Workshop 1

**Mobile Equipment Working Group**

Version 24 October 2016 for MEI Working Group Review

Coal related presentations

Facilitator Notes – where this information fits as part of the QRC Mobile Equipment Interaction Field Guide Resource

QRC Resource Context	How this resource was applied
<b>Situation</b> – describe context e.g. company expectations, mine size, type equipment issues etc.	This approach was used by Glencore Coal Australia, a division of a tier one resources company at 11 open cut coal mines from 2015-2016
<b>Results</b> – summarise what outcomes were delivered, describe how things improved	The approach delivered; immediate site benefits, developed a comprehensive group level understanding of mobile equipment interaction controls, a repeatable ICMM CCM align process while setting industry benchmarks
<b>Description of approach</b> – provide where you started, what you did etc.	The approach detailed is part of a broader project to comprehensively and systematically review and baseline vehicle interaction control effectiveness using major project justification methodology
<b>Discussion</b> – explain why it worked, what you might do differently next time, early hurdles etc.	See following detail, the material that the course is based on was developed over many months by the project team.
<b>Aligning</b> this work to new control management thinking – describe the work in terms of controls, erosion factors, error tolerance etc.	See following detail
<b>Notes on contributors</b> – background and experience of the people involved	The project team behind this work was made up from senior engineers, consultants and experienced mine managers

## Foreword

This resource is part of a broader collaborative sharing of member company good practice that has been facilitated by the Queensland Resources Council, a not-for-profit peak industry association representing the commercial developers of Queensland's minerals and energy resources.

Each day, tens of thousands of mobile equipment interactions take place at Australian open cut mining operations in predictable and reliable ways. However, our industry experience is that when controls erode or fail then our work colleagues die.

While a case can be made that current industry approaches for controlling mobile equipment interaction risks are already highly reliable, we do accept that they can improve further. For example, immediate improvements are possible from sharing knowledge and current good practice approaches across our industry. We also see that delivering our intent of a step change improvement requires a systematic re-examination of our current risk and control assumptions. This training course and support material are based around concepts that are fundamental to undertaking this work.

As an industry it is no longer enough to understand and catalogue the risks in our workplaces, our challenge is to understand the risks and ensure that corresponding controls are well designed, implemented, maintained, monitored and routinely verified. And we particularly need to review and improve those controls that are entirely dependent on the judgement of people with little tolerance for error. This approach must be built into our operational processes and always inform the way that we plan and execute work.

We believe success will be closer when all people working in our industry are able to answer these straight-forward questions and, where necessary, take action

1. *As I carry out my work, what are the hazards that can kill me or others?*
2. *What are the controls that stop this from happening?*
3. *What is my role in ensuring and demonstrating that these controls are in place and remain reliable?*
4. *What will I do if I think the controls might not work?*

For supervisors and other operational line managers

5. *What are my monitoring and support activities to ensure controls are in place and remain reliable?*

For senior managers

6. *How do I verify that controls are in place and that their design is practical, business sensible and effective?*

In closing, I thank the general contributors to this important work and specifically Glencore Coal Australia for sharing the knowhow and experience captured in this document.

Signed

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## Acknowledgments and conditions of use

### Acknowledgements

This training course outline, with support slides, is offered by the Queensland Resources Council (QRC) as a practical and applied information resource to improve mobile equipment interaction (MEI) controls on open cut mine sites. It applies new and evolving thinking about risk and control developed through the University of Queensland, ACARP Project work and comprehensively captured in the ICMM 2015 documents, *Critical Control Methodology Good Practice Guide* and *Critical Control Management Implementation Guide*.

The core of the course material is adapted from site based workshops that were held as part of the Glencore Coal as part of their Vehicle Interaction Control Effectiveness (VICE) project (2015-2016). The first part of each Glencore workshop:

- introduced 'new' risk and control thinking to workshop participants
- developed and tested for their understanding through concept discussion, real world exercises and a quiz
- prepared participants for Part 2 of the VICE workshop where newly trained participants reviewed and validated current state site approaches using new risk and control thinking

Glencore Coal's willingness to share this information and actively collaborate with the QRC Mobile Equipment Interaction working group is a credit to business leaders with particular thanks to people who developed, delivered and improved the material; Kylie Ah Wong, Marcia Friend, Tony Egan, Tim Gray, Dr Peter Standish and John Bowen.

### Conditions of Use

This publication is written by practitioners for practitioners and while it acknowledges the extensive input of researchers, academics and other industry thought leaders, including referencing and applying their research and theory, it remains firmly based on an approach that has been successfully applied in mining operations.

With the agreement of Glencore Coal, this resource was prepared by Mr Mike Boyle Principal Consultant, Precipitate Pty Ltd with some financial support from QRC. It is freely offered as part of an evolving good practice industry reference resource through the QRC and reflects an industry intent to collaborate and share information. As such it cannot be, nor is it intended to be a prescriptive document. Instead it is expected that users will appropriately adapt the information based on their specific circumstances and role.

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<https://www.qrc.org.au/about/>

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### Facilitator Advice - how to successfully use this resource

This presentation is intended to be a comprehensive resource for skilled facilitators, who are not necessarily subject matter experts, for use when introducing control methodology and thinking to organisations.

People using the material need to adapt it to make it relevant for the course participants and this includes removing or hiding advice slides such as this one (*all advice slides have an orange background*). It also means using real world examples that are relevant to the experience of participants and the organisation that they represent.

Some Glencore Coal VICE information has been retained in this master version to maintain structure while illustrating proven style and content.

The contributors see that there are at least four ways to apply this resource:

1. Use the material to introduce new risk and control thinking as a general concept i.e. for raising awareness
2. Adapt and apply to new subject matter e.g. reviewing other workplace risks starting with the control framework methodology used in the VICE project
3. Replicate the Glencore Coal VICE project, noting that success requires considerable preparation if the workshop following this introduction is to be successful (this is not fully covered in this course)
4. Use the training course to prepare participants to undertake mobile equipment interactions or other risk and control review work, based on alternate pre work and post work approaches e.g. using bow tie analysis pre workshop and verification sheets post workshop

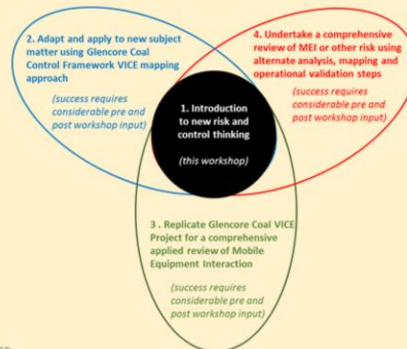
Multiple use options for this foundation material are illustrated in the 'propeller' diagram opposite.

***"Note that there is no one right way to implement the CCM Good Practice Guide, and it will need to be tailored to suit individual companies and sites"***

ICMM CCM Implementation Guide  
page 5, 2015



The Propeller Diagram



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### Facilitator Advice – Course Design

The design of this course is based on Kolb's Learning Cycle, according to Kolb (1984), the process of learning follows a pattern or cycle consisting of four stages, one of which involves 'reflective observation.'

Kolb states that we can learn from any experience, if we work through these four stages

1. Have the experience
2. Reflect on what we have done and experienced
3. Interpret the experience and generate a hypothesis on its meaning
4. Test our interpretations in the real world

This theory as applied to this training workshop is represented in the diagram opposite. Facilitators need to consider that the workshop

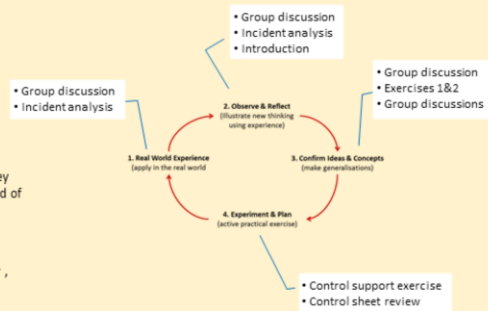
- presents new ideas and concepts
- Some of these will be challenging especially for people who have invested much into current risk and control thinking

Our experience has been that the workshop must

- Recognise and reference common real world (concrete) experiences specific to the group
- Reflect on the experiences using the new 'control' lens
- Confirm that there is real value in applying the approach
- Practically demonstrate how the new thinking can apply and improve what people are doing now in the workplace.

Allowing adequate time for the course exercises are essential as they allow both individual and small group discussion and reflections. And of course people work through their own multiple learning cycles throughout the course.

Equally important is to avoid over using PowerPoint slides and suggestions are made in this resource where to use butcher's paper, white boards etc.



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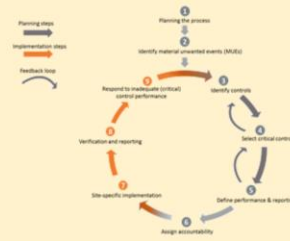
### Facilitator Advice – Underpinning thinking and process

You should be familiar with the documents below as they provide underpinning thinking and theory .

- Both ICMM documents are available to download on the links below
  - The ACARP document can be downloaded (may have to be purchased ) at the link below
- Where relevant, the course material will reference (see slide notes or advice to facilitator) the relevant part of the ICMM nine step Critical Control Management Process illustrated in the diagram opposite.

However, remember the course is about preparing operational people to review, reinterpret and recalibrate their real world practice for the most significant open cut mining risk; mobile equipment interactions.

More simply, the course introduces new risk and control concepts to participants and confirms their understanding before they apply their new skills in a second workshop to reassess the adequacy of existing controls i.e. it prepares participants to carry out step 3- *Identify Controls of the ICMM CCM Process*



ACARP - 23007 Selection and optimisation of risk controls



<http://www.acarp.com.au/>

ICMM Health and Safety Critical Control Management –Good Practice Guide



<https://www.icmm.com/en-gb/publications/health-and-safety-critical-control-management-good-practice-guide>  
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ICMM Critical Control Management Implementation Guide



<https://www.icmm.com/en-gb/publications/critical-control-management-implementation-guide>



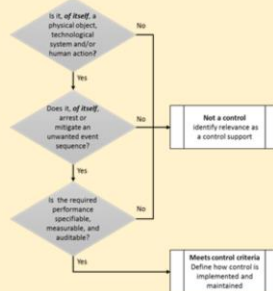
## Facilitator Advice – It is all about controls

The unambiguous intent of this course is to prepare participants so that they are able to carryout Step 3 of ICM CCM Process as illustrated below:  
At the end of the course all participants should be able to:

- Routinely apply the control identification decision tree below to identify what is a control and what may be a control support
- Sort controls into these categories; **Object, Act and Technological System** Controls (OATS is a useful aide memoire)
- Explain what an **erosion factor** (failure mode) for a control is
- Describe how to understand and organise the **control support** activities that prevent erosion factors from impacting controls
- Understand how these activities can be **specified, implemented and monitored**
- Critically review, amend and validate control mapping work specific to their site

If your process design is for introductory course graduates to apply their newly acquired skills to delivery all of the listed points above and especially the last one, then you need to make sure that the examples discussed in the course are concrete and relevant to participants.

Control Identification Decision Tree



Source: Adapted from Hassell, M. Jay, J.  
Dorren, C and Punch, M 2010



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### Facilitator Advice – Preparation, Getting the right people in the room and being clear on Introductory Course Outcomes

A successful introductory workshop requires the right mix people to be successful, leaders (formal and informal) representing all relevant parts of the site or business must be involved if quality work is expected from course graduates.

The Glencore Coal VICE Project operating site workshop participants were typically :

- The site manager and other members of the leadership team
- Experienced operators and maintainers
- Support people e.g. training, health and safety, environment, technical services etc.

The introductory workshop always included a cross-section of site people who had participated in pre-work mapping site approaches to the control framework. Their involvement meant that some respected site personnel have

- Already confirmed that the approach is practical
- It works for the site and
- It really does recalibrate current thinking and approaches

And immediately after completing this introductory course, graduates were tasked with reviewing, amending and validating current site approaches mapped to the Glencore Coal control framework (Workshop 2). Both Workshop 1 and Workshop 2 were supported by up to three knowledgeable (content expert) and experienced facilitators, some of whom had led and supported mapping site content to the control framework before the workshop.

If you intend to replicate the process using alternate pre workshop analysis techniques and approaches e.g. using bow-ties and control verification sheets, then you will need to adapt this presentation to reflect your approach. And perhaps most importantly, if you intend for the graduates of the introductory workshop to move onto a second 'review and validate' workshop then you will need to ensure that you are adequately prepared. For the Glencore Coal VICE project, typical preparation to map current site approaches against a consistent control framework took many person weeks. In addition, incident data was also analysed and used in this presentation.

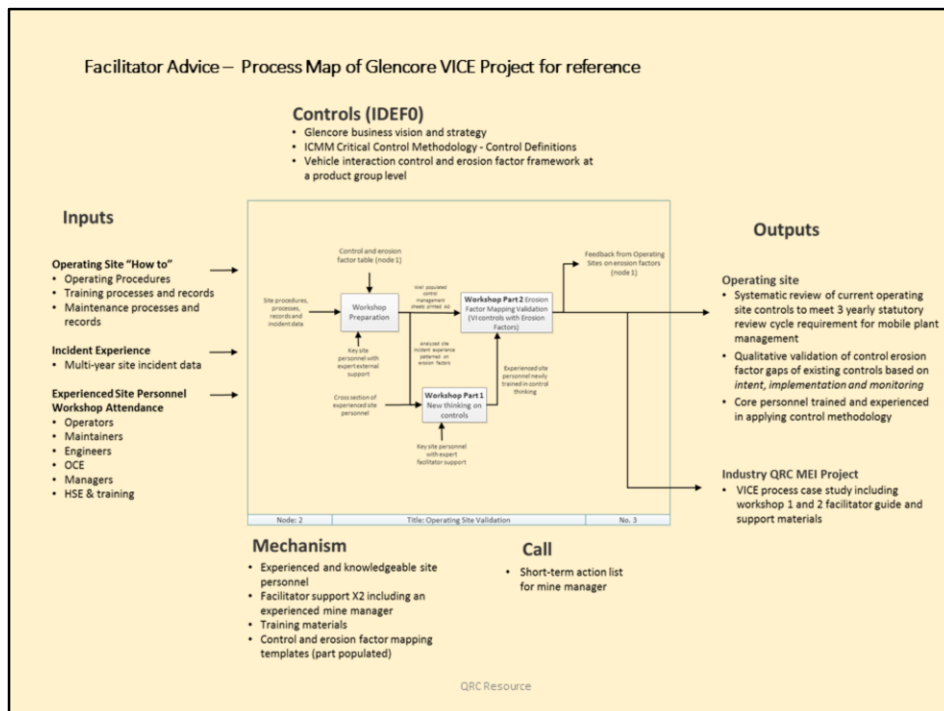
The material in this introductory course is proven, it works well and participants quickly confirm the concepts and apply the thinking for real world scenarios. It can of course be used for awareness training about new risk and control thinking. However, taking this approach raises the question; Why train people if they are not going to be expected to apply their new skills?

Facilitators who adapt this course material as required and get the right people in the room will have success for the delivery of the introductory workshop as a foundation for further useful work.

Facilitators designing for a successful follow-up workshop, where graduates practically apply their skills, need to ensure that extensive preparation work is included in the design. Our experience is that trying to map site approaches in real time while having participants confirm; controls, erosion factors, control supports (and how they are specified, implemented and monitored) is impossible to do accurately or at a rate that keeps participants engaged i.e. you can have one or the other but not both.

The next slide illustrates this point with a Glencore VICE Project workshop 1 and 2 overview covering; preparation, getting the right people in the room be thinking carefully about next steps.

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## Facilitator Notes

1. To get full value from this resource it should be part of a linked business improvement process.

# Recalibrating our Thinking for Mobile Equipment Interaction Controls

Workshop 1 - Introduction to new risk and control thinking

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## Facilitator Notes

1. Change the title to reflect your subject matter and approach

## Slide / Workshop Activity Key Messages

- This course is about getting more from what we are already doing to control risks.
- It is about looking at things differently, precisely and using the experience in the room

### Facilitator Advice - Welcome and Introductions

Venue logistics – alarms facilities etc.

Opening by senior manager

### Workshop Participants – Introduce yourselves

1. Your name and what you do
2. Mining experience
3. Something you may not know about me
4. What I want out of this session

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Slide 13

### Facilitator Notes

1. Do not project this slide!
2. Briefly introduce yourself
3. Quickly cover venue logistics (not course content or breaks)
4. Introduce the senior manager to open the workshop

Suggest that the senior manager makes at least some of these points:

- *Cataloguing risk is no longer enough*
- *Risks are well defined but how do we know as leaders that their risk treatment is adequate, well implemented and maintained?*
- *We must challenge, deepen and reorganise our understanding of what really is a control and what we have to do to improve on our already good performance*
- *We have to get this right because people die when we don't*
- *This is what keeps me up at night ...*
- *The process that we will go through today is a step in the right direction*
- *It depends on your active input and experience to work well*

For introductions, model what you want to hear as you write out the questions on a flip chart or white board. Ask for a volunteer to start and then work around the group. Take note of what people want from the session

### Slide / Workshop Activity Key Messages

There is a lot of valuable experience in this room full of leaders

*“If I am the person who can be harmed, is this **a thing** that will always stop something bad happening?”*

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Slide 14

### **Facilitator Notes**

After introductions, turn on the projector and make these two points:

1. *“This question captures both the challenge and opportunity of changing how we think about risk and control and we will return to it again and again over throughout this workshop.”*
2. *“Our challenge and opportunity is to clearly understand what has to be in place and working to stop people being seriously hurt or killed where we work.”*
3. *“Our current performance may be OK but this work is about being better.”*

### **Slide / Workshop Activity Key Messages**

To recalibrate our thinking and approach we need to be working from the pointy end

## What we will cover in this workshop

- Purpose of this workshop – why we are doing this
- New thinking on controls
- Introduce erosion factors
- Recognise and sort what we do to support controls
- Capture our thinking in a Control Framework (or other e.g. bow-ties and verification sheets)
- Quiz (a test to check that we have done our job well)
- Prepare you for workshop 2 where we will review and validate our existing controls for mobile equipment interaction

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Slide 15

### Facilitator Notes

1. Confirm course logistics, breaks, lunch, use of phones etc.
2. Change the slide based on your starting point and focus areas (dot points in red) or remove for awareness session only
3. Be clear on purpose e.g.
  - this introductory workshop is you learning about some new thinking about what controls and
  - Based on your real world experience, applying your new skills and understanding to review if what we are doing now to manage risk can be further improved.

### Slide / Workshop Activity Key Messages

- You are expected to learn new skills and then apply them.
- You are here because of your experience, knowledge and capability



## Purpose

- Gain an understanding of 'new' risk and control thinking through
  - Covering some theory
  - Practical exercises, discussion and reflection
  - Using our experience and reflection to review what we do now and identify improvement opportunities
- Check on your understanding with a quiz
  - how well we have done our job
- Prepare you to apply this approach in the real world

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### Facilitator Notes

1. Move through this slide quickly, re emphasise the previous points

*This work is about clearly understanding what has to be in place and working to stop people being seriously hurt or killed where we work*

2. And add

*This same approach will make us a better business*

### Slide / Workshop Activity Key Messages

We will work through these four stages (Kolb)

- Have the experience
- Reflect on what we have done and experienced
- Interpret the experience and generate a hypothesis on its meaning
- Test our interpretations in the real world

## Exercise 1 - The Safety Cowboy

### Your First Task

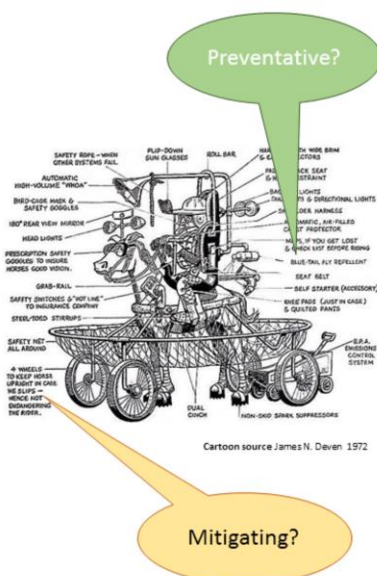
On the handout, please mark each item that you think is a control and decide if it is either

**Preventative** i.e. a control that stops bad things happening

Or

**Mitigating** i.e. a control that lessen the impact when bad things happen

Then please count up the number of each: preventative and mitigating

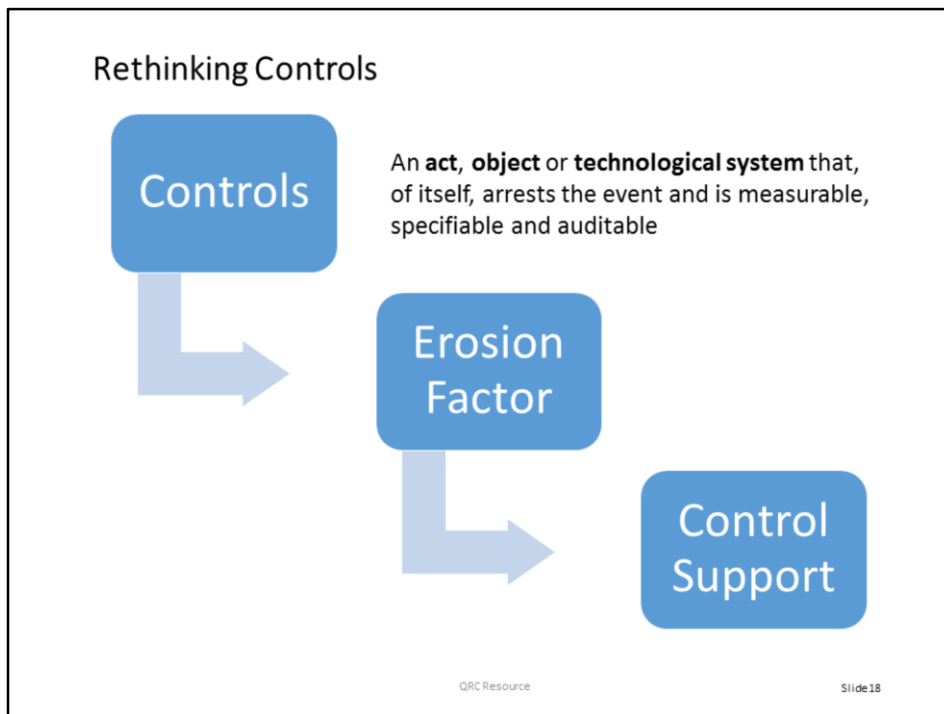


### Facilitator Notes

1. Hand out a hardcopy sheet of the safety cowboy (Exercise 1) and ask workshop participants to count up from the cartoon the total
  - preventative controls
  - mitigating controls
2. Give them three minutes to work by themselves and then capture totals from each individual on a whiteboard or flip chart.
3. Ask how many controls people think are essential to prevent a fatality?
4. Ask how many cows are going to get rounded up if all the controls are in place?

### Slide / Workshop Activity Key Messages

Make the point that capable and experience people can look at the same thing and see it differently and confirm that if we are to improve and challenge our thinking around controls then we need to be more precise with our definition and approach.



### Facilitator Notes

1. Reinforce that this model is the core of the change we're making
2. When presenting, highlight that we will come back to this slide after each section of the training as it gives the main phases that are required in the identification of Controls, Erosion Factors and Control Supports.

### Slide / Workshop Activity Key Messages

This is where we begin to challenge our thinking about what a control really is

## Elements of a Control (part 1)

We need to be clear and precise about controls

- Control Description:

- A short name for the control that describes what it does, write it as an active (doing) sentence such as:

*e.g. Access gates / barriers prevent unauthorised vehicle entry*

- Control Intent:

- A short statement that states why you have the control, express it as minimising, reducing or eliminating a hazard:

*e.g. Minimise potentially hazardous interactions between vehicles in the pit area*

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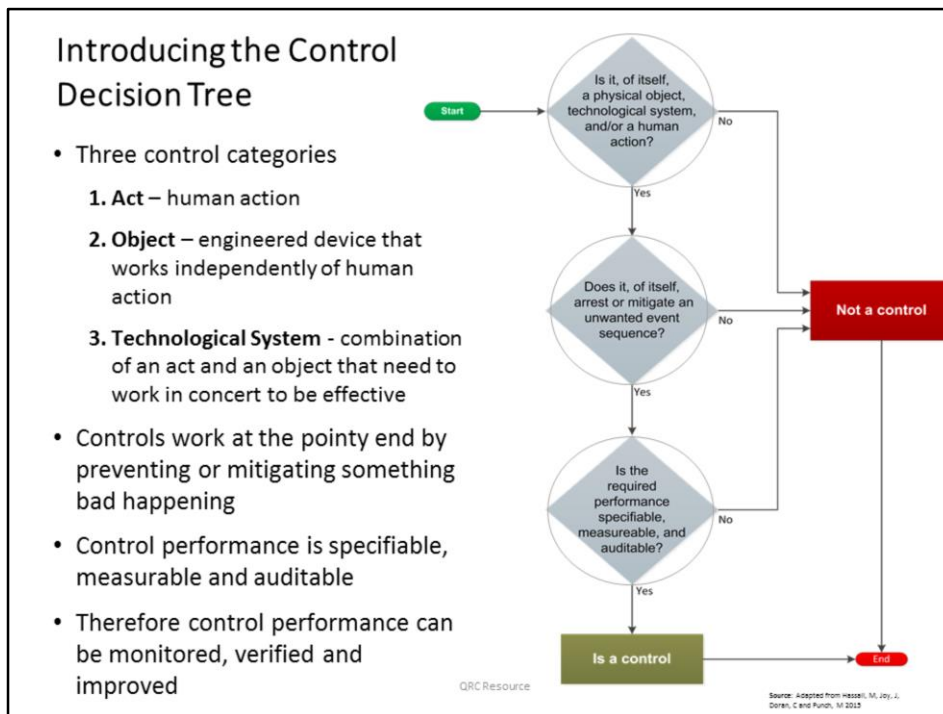
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### Facilitator Notes

1. Make the point that a precise description of what a control does and what its intent is the first step
2. If you can't precisely describe what it does and its intent then how can it be a control
3. As necessary edit the example in red.

### Slide / Workshop Activity Key Messages

To apply the new thinking on risk and controls we need to be precise and clear about what makes up the elements of a control



### Facilitator Notes

1. Work through the animated slide
2. Ensure people are getting the concept
3. Make the point that policies, management systems, plans and procedures are not controls but they may contain details and specifications about control design and application and also have information about how controls can fail

### Slide / Workshop Activity Key Messages

We can use a logical process to assist us with identifying what really is a control

## Elements of a Control (part 2)

The control decision tree assists us to decide

- If what we are describing really is a control and
- How to classify it either as
  - an **Act** (human action)
  - an **Object** (engineered device that works independently of human action)
  - a **Technological System** (combination of an act and an object that need to work in concert to be effective)

*For the access gate / barrier example the control is an*

***Object***

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### Facilitator Notes

1. Work through the slide, check for understanding

### Slide / Workshop Activity Key Messages

## Control Decision Tree - Worked Example Step 1

Before we begin, can we precisely describe the possible control:

- Control Name/Description – *Access gates / barriers prevent unauthorised entry*
- Control Intent – *Minimise potentially hazardous interactions between vehicles in operational areas*

**Answer - yes**

### First decision

Is it, of itself, a physical object, technological system and/or human action?



**Yes – *an access gates or barrier is an object***

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### Facilitator Notes

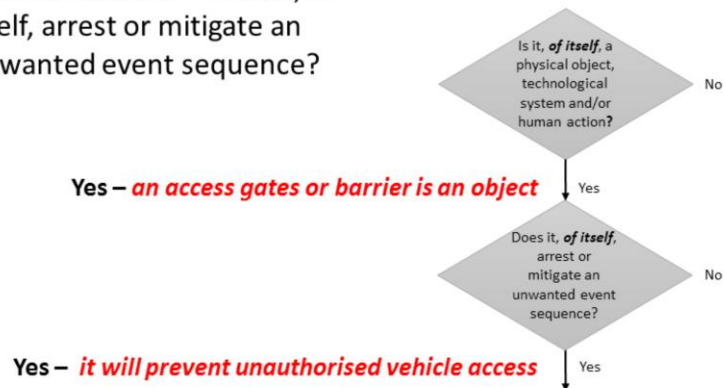
1. Make the point that a precise description of what a possible control does and what its intent is the first step
2. If you can't precisely describe what it does and its intent then ask how can it be a control
3. Apply the first decision question

### Slide / Workshop Activity Key Messages



## Control Decision Tree - Worked Example Step 2

**Second decision** – Does it, of itself, arrest or mitigate an unwanted event sequence?



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### Facilitator Notes

1. Apply the second decision question

### Slide / Workshop Activity Key Messages

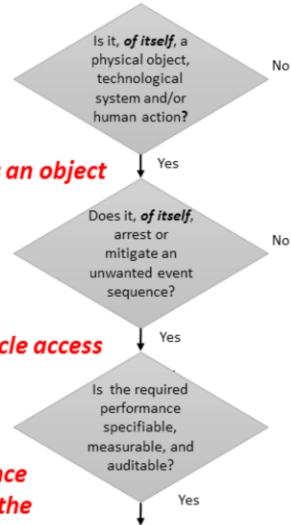
### Control Decision Tree - Worked Example Step 3

**Third decision** – Is the required performance specifiable, measurable, and auditable?

**Yes** – *an access gates or barrier is an object*

**Yes** – *it will prevent unauthorised vehicle access*

**Yes** – *Gate design can be specified, performance monitored with cameras & the database and the database is auditable etc.*



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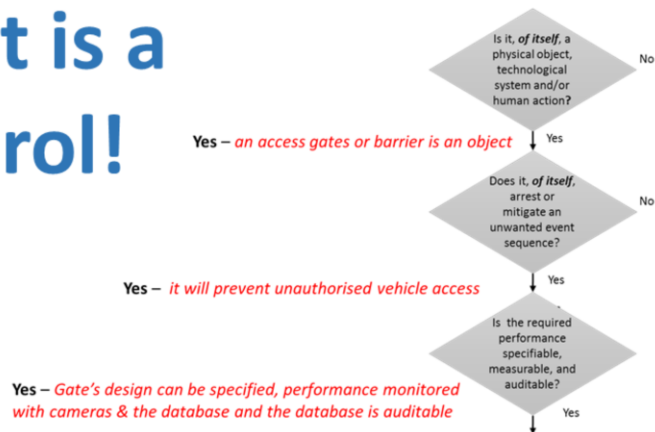
#### Facilitator Notes

1. Apply the third decision question

#### Slide / Workshop Activity Key Messages

## Control Decision Tree - Worked Example Conclusion

**Yes it is a control!**



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### Facilitator Notes

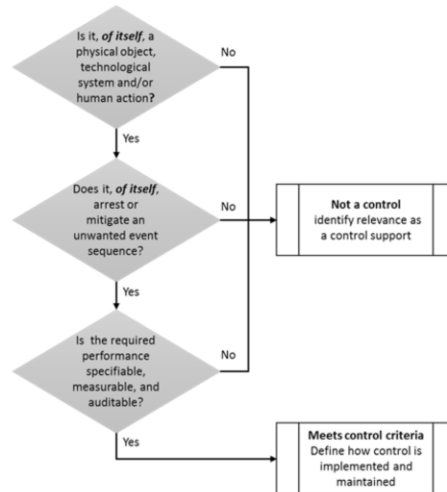
1. Working thoroughly through this worked example sets participants up for Exercise 2

### Slide / Workshop Activity Key Messages

## Exercise 2 – Control Sorting

### Instructions

1. Form small teams – work with people you don't know well
2. Use the control decision tree to sort the items into
  - a. Controls and not controls
  - b. For the controls sort them into type:
    - Act
    - Object
    - Technological System



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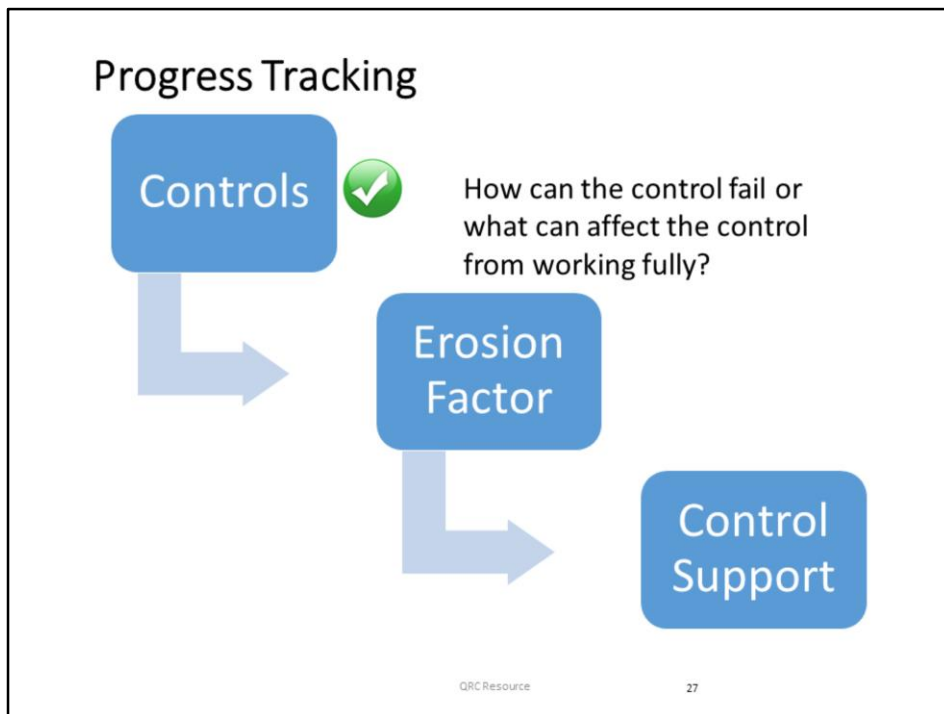
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### Facilitator Notes

1. Teams of 3-4 work well
2. Form teams, hand out resource including a decision tree

### Slide / Workshop Activity Key Messages

Applying this approach is straight forward and it makes sense.



### Facilitator Notes

1. Congratulate the group on their good work on Exercise 2 Control Sorting
2. Say now that we have a way of precisely defining controls then the rest of the work becomes straight forward
3. Say that the next step is to think about how and why controls either fail or do not work properly
4. We call these erosion factors

### Slide / Workshop Activity Key Messages

This is an important step because if we are clear on what are controls and how they can fail then we can work to make existing controls more reliable and/or find better controls

What Erosion Factors are there for our control example ?

Remember the precise description of our control

<b>Control Name/Description</b>	<i>Access gates / barriers prevent unauthorised entry</i>
<b>Control Intent</b>	<i>Minimise potentially hazardous interactions between vehicles in operational areas</i>

- 1. How can it fail?**
- 2. And what can stop it from working fully?**
- 3. Have we covered everything?**
- 4. Have we got enough to keep going?**

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### Facilitator Notes

1. Ask people for their own experience around how the control example has failed, e.g. the grey nomads who drive their caravan onto a mine site then park up and make a cup of tea while they watch the big trucks roll past
2. Use another relevant example for 'not working fully' e.g. power failure, two vehicles through at one, holes in the fence etc.
3. Facilitate a question and answer session with the full group, write down their answers.
4. When you are comfortable with the completeness of the list, ask question 3 – have we covered everything?
5. Make the point that a good range of answers is necessary to move on and as we do more review and thinking then we will come back and add to the list.

### Slide / Workshop Activity Key Messages

Once we are clear and precise about what really is a control, then it is straight forward to work out how they might fail or not work fully.

## Erosion Factors – from practice back to theory

**Simple definition** - something that can cause a control to:

- Fail or
- Not work fully

With improved and precise **control understanding** then capturing our combined:

- Experience
- Knowledge and intuition
- Supported by analysis and research

Provides a very good starting list of **erosion factors**

And we can **sort** the erosion factors into these categories

- People
- Equipment
- Work environment

**The Nertney Wheel**



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### Facilitator Notes

1. Work through definition and the point about the improved control understanding quickly as that is what the group have already done
2. For last point on sorting erosion factors into the three categories, reference the Nertney wheel, a simple model that has been used for four decades that many participants will be familiar with
3. Don't labour the Nertney wheel but it can be aligned to new risk and control thinking.
  - a) People erosion factors may be a lack of competency or not following procedures (two zones on Nertney wheel)
  - b) Equipment can be not fit for purpose or inoperable or damaged
  - c) Work environment – physical conditions, poor planning and management e.g. task assignment
4. Confirm with the group that the list of erosion factors that you listed contains different categories of erosion factors (see next slide)

### Slide / Workshop Activity Key Messages

- The new thinking fits well with proven approaches that we already know well

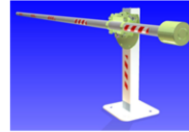


## Erosion Factors – from theory back to practice

Some earlier thinking on erosion factors for our mine access gate example:

### **Equipment** related erosion failure

- Gate fails to operate and is left raised / open

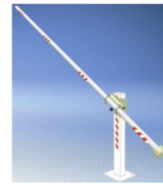


### **People** related erosion failure

- Vehicle tailgates an authorised vehicle
- Unauthorised use of the entry device e.g. someone borrows an access card

### **Controlled Work Environment** erosion failure

- Design of the gate is inadequate to prevent access e.g. there is an open fence line nearby



**And which type of erosion factors do you think are the most challenging to manage?**

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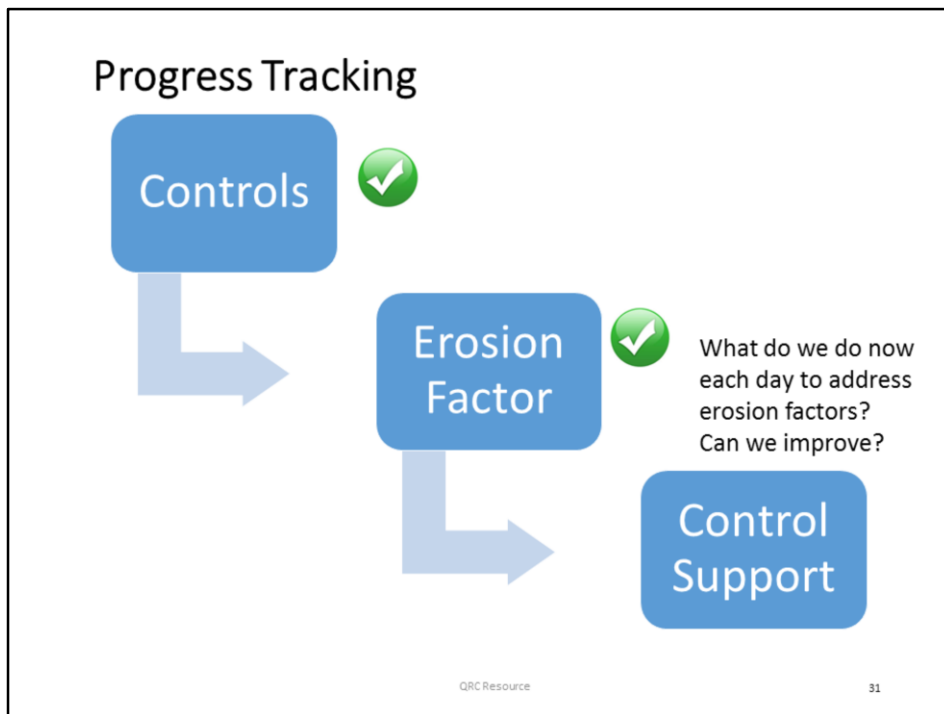
30

## Facilitator Notes

1. When using this slide, cross reference the list prepared earlier
2. Help the group understand that erosion factors that involve people are the most challenging to manage especially when the control failure is brief and there is no evidence afterwards that it has failed
3. People are subject to human error and people sometimes choose to take short cuts.
4. This means that people erosion factors (especially for act and technological system controls) require close monitoring and constant input to be effective
5. So our challenge in making all controls more reliable is to understand their erosion factors and consider if we are doing enough

## Slide / Workshop Activity Key Messages

If we do good work on controls then we can develop a comprehensive understanding of erosion factors. And once we have this understanding we can make sense of the activities that we do every day to make sure that erosion factors do not cause controls to fail or not work fully.



### Facilitator Notes

1. Congratulate the group on their good work on identifying and sorting erosion factors
2. Remind them of the control work that they have done, ask what type of controls are there, remind them of OATS
3. Say that the next step we will take, now that we can define controls and identify their erosion factors, is to systematically review the activities that we do right now, every day to make sure that erosion factors do not cause controls to fail or not work fully.

### Slide / Workshop Activity Key Messages

This is an important step because if we are clear on what are controls and how they can fail then we can work to make existing controls more reliable and/or find better controls

## Control Supports – Definitions and Organisation

Control Supports are *activities that prevent, detect and repair erosion factor impacts on controls.*

To be useful, Control Support activities must:

- **Specify** how they prevent, detect and/or repair erosion factor impacts
- Be clear on practical **implementation** requirements to meet control support specifications
- Detail how ongoing control support work will be assigned, **monitored** and managed

For 'line of sight' clarity, control support activities can be organised by the erosion factor that they address through that to the relevant control that they support



### Operating site questions

- What is **specified** (required) in site systems and documentation to address this erosion factor?
- How does the site **implement** the control support activities to meet site systems specification?
- How is ongoing control support activity **monitored** and enforced?

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## Facilitator Notes

1. When using this slide, cross reference the lists prepared earlier (should be on white board or flipchart)
2. Make the point that being able to define how a control support applies to which erosion factor and on to what control is the breakthrough step for this work
3. Assist the group understand that erosion factors that involve people are the most challenging to manage especially when the control failure is brief and there is no evidence that the control has failed
4. Use an example e.g. speeding in a car and not getting caught. Not speeding is an 'act' control and obviously act controls involve people. So our challenge is to make all controls and especially 'act' controls more reliable

## Slide / Workshop Activity Key Messages

If we do good work on controls then we can develop a comprehensive understanding of erosion factors. And once we have this understanding we can make sense of the activities that we do every day to make sure that erosion factors do not cause controls to fail or not work fully.

## Control Support Questions - Part 1

Remember our control example

Control Name/Description	<i>Access gates / barriers prevent unauthorised entry</i>
Control Intent	<i>Minimise potentially hazardous interactions between vehicles in operational areas</i>

One erosion factor for the control that we identified was in the people category - *unauthorised use of an entry device*

So asking our first control support question

**1. What is specified in site systems and documentation to address this erosion factor?**

And site answers about current practice might include:

- *Mining Infrastructure Area Gate Access Authorisation*
- *Coal Handling Plant Gate Access Authorisation*
- *Hand held two ways readily available (and documented on register)*

And site answers might also recognise that there are no specifications for:

- *Design of the Automated Gate*
- *Setting the Automated Gate System*
- *Training entry requirements for site*
- *Periodic checks on authority to enter*
- *Carrying out routine checks*

**These are improvement opportunities!**

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## Facilitator Notes

1. Work through the animated slide and the process unfolds for the group
2. Change the example as required

## Slide / Workshop Activity Key Messages

If we follow a structured process that begins with being clear and concise a control really is then from this starting point we can do a comprehensive review of what we are doing now and what improvement opportunities might be

## Control Support Questions - Part 2

<b>Control Name/Description</b>	<i>Access gates / barriers prevent unauthorised entry</i>
<b>Control Intent</b>	<i>Minimise potentially hazardous interactions between vehicles in operational areas</i>
<b>Erosion Factor (People)</b>	<i>unauthorised use of an entry device</i>

So asking our second control support question

### 2. How does the site implement the control support activities to meet site systems specification?

And site answers about current practice might include:

- *At induction we state 'only people with valid reasons' should have access*
- *Trained to not share the card with others*
- *Maintenance occurs on the gate when it stops working*

And site answers might also recognise the need for further implementation requirements:

- *Training and formal appointment before we issue a card*
- *Clearly stating 'do not share your card' after induction*
- *Ongoing gate inspection and maintenance so gate operates as specified*
- *A back up security plan if gate fails*

**Again - these are improvement opportunities!**

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## Facilitator Notes

1. Work through the animated slide and the process unfolds for the group
2. Change the example as required
3. At the *site answers about current practice might include* point – use a team discussion to highlight reasons why we don't implement well e.g. "we didn't specify it well" and / or we didn't train them in responsibility for the card
4. The discussion should engage participants and get them to explain
  - What specify means – i.e. avoiding problems like the gate not built for purpose or the gate software not being functional or easily used
  - If people are involved (they must be with an access gate, then how did we tell them how? Policy / Procedure / Training

## Slide / Workshop Activity Key Messages

If we follow a structured process that begins with being clear and concise a control really is then from this starting point we can do a comprehensive review of what we are doing now and what improvement opportunities might be

### Control Support Questions - Part 3

<b>Control Name/Description</b>	<i>Access gates / barriers prevent unauthorised entry</i>
<b>Control Intent</b>	<i>Minimise potentially hazardous interactions between vehicles in operational areas</i>
<b>Erosion Factor (People)</b>	<i>unauthorised use of an entry device</i>

So asking our third control support question

**3. How is ongoing control support activity monitored and enforced?**

And site answers about current practice might include:

- *Gate opens when a valid permit is presented:*
- *Cameras record who is entering the site with which card*

And site answers might also recognise the need for improving monitoring and enforcement:

- *Sampling process of camera for checking cards used against entries granted*
- *Formal response for card holder and person who enters without authority*

**Once again - these are improvement opportunities!**

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### Facilitator Notes

1. Work through the animated slide and the process unfolds for the group
2. Change the example as required
3. Monitoring and enforcement is often an area where there are opportunities for improvement
4. If appropriate, ask senior line managers for comment

### Slide / Workshop Activity Key Messages

Monitoring that improves a business requires specification and implementation to work

## Notes for Facilitators on Specifying Control Supports

*What is specified in site systems and documentation to address this erosion factor?*

### People type Erosion Factors

- Procedures – based on avoiding errors with the steps in their task
- Training modules – to provide the skills and knowledge to apply the procedures
- Checklists and Forms – to make it easier to get it right every time
- Ergonomic work area – to reduce the chance of error

### Equipment type Erosion Factors

- Design – based on consideration of use and available standards
- Specification – to match usage requirement on site
- Documents and checklists for Introducing Equipment to Site

### Controlled Work Environment Erosion Factors

- Road design, pit layout
- TARP – Trigger Action Response Plan to address changing work environment
- Short Term Plans – to Coordinate activities across multiple work groups
- Risk identification and management – to be rigorous in specifying requirements
- Documentation Control – to maintain the integrity of site information



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## Facilitator Notes

1. Background for facilitator
2. Change the example as required
3. These heading reflect Nertney wheel approach and were used in the Glencore Coal VICE Project

## Slide / Workshop Activity Key Messages

This approach is based on a model – and we are using to ensure that we are rigorous in how we identify Erosion Factors (potential problems) and for specifying, implementing and monitoring Control Supports.

## Notes to Facilitators - Implementing Control Supports

*How does the site implement the control support activities to meet site systems specification?*

### **People related Erosion Factors:**

- Communication – on and about their tasks and any changes
- Selection – getting the right person for the job
- Training – providing knowledge and skills to perform the task

### **Equipment related Erosion Factors:**

- Introduction to site – to confirm equipment meets specifications / site requirements
- Maintenance – to keep equipment Fit for Purpose
- Monitoring devices – to continuously check on equipment health

### **Controlled Work Environment Erosion Factors:**

- Signage – to alert Operators and Co-Workers of potential hazards / requirements
- Road Maintenance / Running Surface monitoring & repair
- Communication (formal and informal)
- Resourcing – budget allocations
- Communication devices (e.g. radios) and systems (e.g. regular meetings)

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## **Facilitator Notes**

1. Background for facilitator
2. Change the example as required
3. The examples offered are typical / generic items.
4. Use them as suggestions as required noting that teams can come up with additional / different items and may not use any or all of these items in their deliberations on how to be address a particular Erosion Factor

## **Slide / Workshop Activity Key Messages**



## Notes to Facilitators - Monitoring Control Supports

*How is ongoing control support activity monitored and enforced?*

### **People related Erosion Factors:**

- Supervision – to confirm continuing understanding
- Observations – either continuous (camera) or by inspection

### **Equipment related Erosion Factors:**

- Inspection – to confirm fitness of equipment between maintenance
- 3rd party inspections – to enhance the standard of maintenance

### **Controlled Work Environment Erosion Factors:**

- Monitoring – of the quality and quantity of activities addressing the physical work environment AND the effectiveness of communication and systems / organisation of work
- Reporting – the status of applied controls / control supports to decision makers

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## **Facilitator Notes**

1. Background for facilitator
2. Change the example as required

## **Slide / Workshop Activity Key Messages**

## Control Support Exercise

In a small group, pick another erosion factor from our access gate example

1. Confirm the erosion factor type (people, equipment or controlled work environment)
2. List the control support activities necessary to protect the control (access gate) from your erosion factor
3. For at least two of the control support activities, that you list, answer these questions
  - a) How and where is it **specified** in site systems and documentation to in relation to this erosion factor?
  - b) How does the site **implement** the control support activities to meet specification?
  - c) How is ongoing control support activity **monitored** and enforced?



**Hint:** be clear on *Control Intent* and the *Control Description* so you avoid working on a Control Support for something different that is not directly relevant.

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### Facilitator Notes

1. Follow the flow of the slide
2. The hint needs to be stressed, manage teams so that they avoid diving into interesting discussions that are not aligned with the problem (Erosion Factor) related to just the one Control and Control Intent.

### Slide / Workshop Activity Key Messages

This process is about understanding and improving how we deal with problems

## Control Supports Summary

Its about making sure that controls work by:

- Defining what really is a control
- Understanding erosion factors for each control (define the problem)
- Specifying and implementing the activities necessary to protect the control from erosion
- Monitoring and confirming that the protection is working



Effective control support review at a site:

- Requires going to relevant references
- Detailing the precise section / point
- Asking questions and
- Making improvements

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### Facilitator Notes

1. Follow the flow of the slide
2. This slide reinforces earlier slides and also the experiences that people have had doing the exercises

### Slide / Workshop Activity Key Messages

References must be to precise points and sections, saying that it can be found in a procedure is not good enough.

## Quiz Time

Please answer the questions that will be handed out to test your new understanding of

- Controls
- Erosion Factors and
- Control Support Activities

We will check answers and provide you with more information if required.

Before we take the next step, we need you to understand:

- What we are doing is different to “normal” Risk Assessments
- Your experience and contribution is key to improving how we control risk
- We need to be OK (if not entirely comfortable) with the approach to be able to proceed as a group, and
- Understanding, reviewing and improving the work that has already been done won’t be possible if you’re not solid on this material

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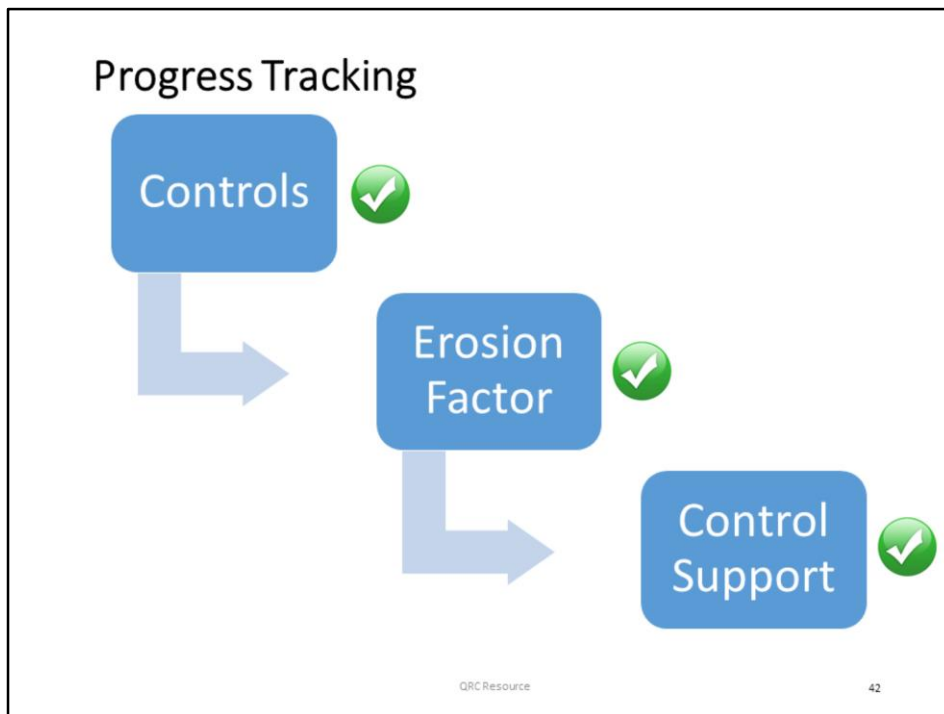
41

### Facilitator Notes

1. Follow the flow of the slide
2. Hand out quiz sheet, allow 15-20 minutes for participants to complete

### Slide / Workshop Activity Key Messages

This step is about checking that the facilitators have done their job well.

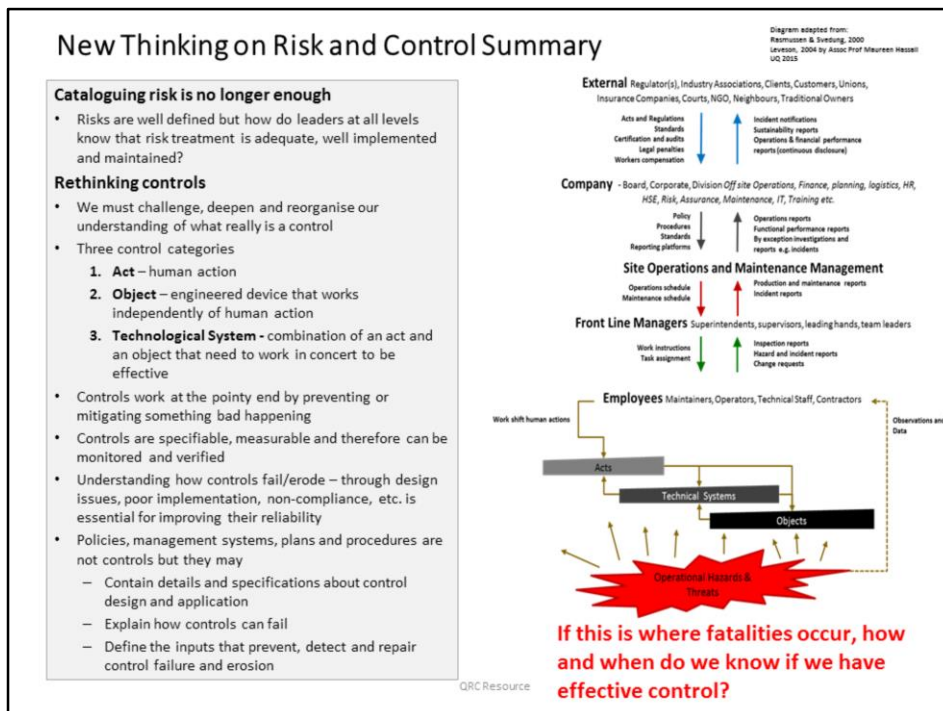


### Facilitator Notes

1. Congratulate the group on their good work on specifying, implementing control supports
2. Remind them of the earlier control and erosion factor work that they have done,
3. Say that the next step we will take now is to apply this thinking in our workplace
4. Confirm that before taking this step, we will have a quiz

### Slide / Workshop Activity Key Messages

Participants are about to become graduates



## Facilitator Notes

1. Use this as a wrap up summary slide if you consider it useful

## Slide / Workshop Activity Key Messages

Policies, management systems, plans and procedures are not controls but they may

- Contain details and specifications about control design and application
- Explain how controls can fail
- Define the inputs that prevent, detect and repair control failure and erosion

If we apply new risk and control thinking and approaches to what we already have then we will improve as a business and fewer people will be hurt.

## Glencore Coal VICE Project Control Sheet Overview Example

### New Control Example - Operator maintains adequate vehicle clearances

**Control Intent** Minimise potentially hazardous interactions between vehicles, co-workers or other items/equipment.

**Controls Description** Operator maintains adequate vehicle clearances

**Erosion factor example**  
Operator fails to notify when entering a specific work area  
caused by:  
- interacting with a live haul circuit  
- entering a RDM  
- Personnel fails to identify when commissioning and/or live testing are being undertaken.

**Specification example**  
A) RAV MIN PLN 0007 Surface Transport Management Plan  
7.4.1 Entrance to Work Area Signage  
- Work area entrance signage shall be displayed on the left hand side of the road no greater than 300 meters from where excavation is taking place.  
13 Entering Restricted Work Areas  
- When a light vehicle or mobile equipment (e.g. water truck, service truck) wishes to enter the restricted areas they will establish positive two way radio communications with personnel working in that work area e.g.:  
Primary operating unit operator

The screenshot shows a complex project control sheet with multiple columns and rows of text. Callout boxes from the surrounding text point to specific areas within the sheet: one points to the 'Control Intent' section, another to the 'Controls Description' section, a third to the 'Erosion factor example' section, a fourth to the 'Specification example' section, a fifth to the 'Implementation example' section, and a sixth to the 'Monitor and enforcement example' section.

**Implementation example**  
A) RAV SD FRM 0062 Surface Transport Management Plan Assessment  
- Question 24 - relates to contacting Mining Supervisor and operators when entering a production area.

**Monitor and enforcement example**  
Supervisor monitor for and address observed non-conformances through disciplinary action or re-training, where required.  
TNA and Monitoring of training requirements as per EF 1 E  
Inspections are completed as per EF 1 F  
Completion of RAV SD FRM 0031 Positive Communications Audit Tool and RAV SD FRM 0177 Load and Haul Process Compliance Observation are reviewed by the safety department.

About this stage, it makes a lots of sense to start systematically capturing how all of this comes together – here is one good example

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## Facilitator Notes

1. This slide is a transition slide to workshop 2
2. Use your own prepared content

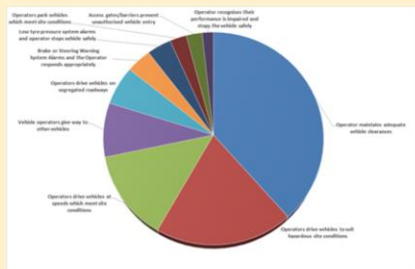
## Slide / Workshop Activity Key Messages

This is good work and can be organised well, especially when compared to what we do now

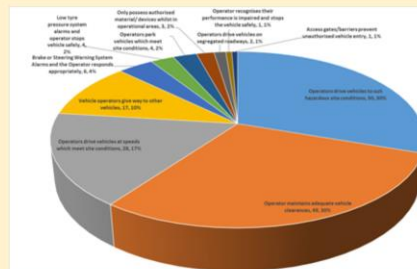
## Facilitator Notes - Transition to Workshop 2 *Validating Controls with Incident Experience*

Correlating incident experience with control definition work is an important transition step for most groups, it confirms

- The relevance of the controls
- Confirms the opportunities to be a better business
- Engages workshop 1 graduates to do good work in workshop 2



Consolidated Site Incident Data Example



Site Incident to Control Correlation Example

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## Facilitator Notes

1. It is unlikely that you can get this information from existing incident databases
2. You will likely have to crunch through a lot of data to get good quality aligned information
3. However, it will be useful at later points on your journey to improve control management

## Slide / Workshop Activity Key Messages

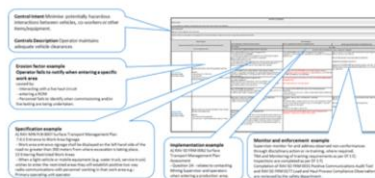
Do your preparation and don't under estimate how long it will take.



## Final Exercise – review a control sheet

In a small group, work through and review a control sheet for (e.g. *give way, parking or speed*)

1. Identify if there are any additional **erosion factors** for the control
2. Check that **control support** items are relevant to erosion factors
3. Identify any **control supports** item that might have been missed
4. Check the mapping of documents and processes that confirm control supports are in place and functioning



**Hint: use your experience and knowledge.**

Ask yourself "is this clear enough so that I can explain it to someone who is not here?"

- Right now
- In a month
- In a year

## Facilitator Notes

1. Use this as a transition to workshop 2 exercise
2. You will need to have prepared a control sheet (or equivalent) and mapped what the site do now to it

## Slide / Workshop Activity Key Messages

This is work that needs to be validated by the people who actually do the work.

## Vehicle Interaction Control Effectiveness (VICE) Project – Outcomes Summary for facilitators

*As well as meeting its primary objective the VICE project is delivering ...*

### Against primary objective – Technology Business Case

1. After 14 months of project work, Glencore Coal now has a deep, operations validated, industry benchmark understanding of the performance required of existing and future surface mining VI technology controls

### While delivering further business benefits

2. Immediate site improvements - the consistent baseline workshops, held at 11 Glencore open cut mines, have improved understanding, increased capability and delivered immediate practical 'fix, improve and maintain' approaches to current controls
3. Group level understanding – validated by extensive mapping and review at all operating sites, Glencore Coal now has a deep and precise understanding of the vehicle interaction controls currently deployed across open cut sites organised into a consistent and logical structure allowing for the identification of leading practice and informing decisions on appropriate consistency
4. Repeatable practical ICMM aligned process - the project approach applied is both scalable and repeatable; it refines risk and control understanding, works directly with operations to deliver short, medium and long-term site business improvements
5. Industry benchmark - through a preparedness to share the success of the VICE project, Glencore Coal is recognised as setting benchmarks in the practical implementation of control thinking to improve the reliability of vehicle interaction controls in the resources industry



VICE Project Overview diagram sourced from: Mr Tony Egan, Glencore Coal

VICE Project Review September 2016

*... multiple other business improvements for Glencore Coal, Glencore and more broadly for the resources industry*  
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