

QUEENSLAND MINING INDUSTRY

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2015



The Next Phase in Operational Risk Management: Critical Control Management (CCM)

Professor Jim Joy



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Critical Control Management (CCM)

1. Why do we need to improve Operational Risk Management?
2. The development approach of the ICMM CCM guide
3. Overview of the CCM process steps
4. Suggested CCM implementation planning required to facilitate effective adoption, maximising value realisation.



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BUT ...Fatalities in the industry

Source: Safe Work Australia

From 2007–08 to 2011–12, 36 Mining workers died (about 7 per year)

Repeats of the past

In 2013-14 – 16 mining workers died

In 2014-15 – 9 mining workers died (plus possible 2 more)



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ICMM Member Companies

ARM
African Rainbow Minerals

AngloAmerican

**ANGLOGOLD
ASHANTI**

AREVA

BARRICK

bhpbilliton
resourcing the future

CODELCO
Orgullo de Todos

**FREEMONT-MCMORAN
COPPER & GOLD INC.**

GOLDCORP

GLS
Global Steel

HYDRO

JX

LONMIN

MMG

**MITSUBISHI
MITSUBISHI MATERIALS**

NEWMONT

RioTinto

SUMITOMO METAL MINING CO., LTD.

Teck

VALE

xstrata

ICMM's vision, values, goal and objectives create a platform for members to work together and with others to strengthen the contribution of mining, minerals and metals to sustainable development.

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ICMM CCM Project Objective

Produce a user-friendly guide outlining a model end-to-end 'material' H&S risk management process

The guide will include:

- a definition for 'critical controls',
- the process for identifying critical controls,
- the process for defining performance and assurance criteria for critical controls, and
- an understanding of how to assess and manage to achieve control effectiveness.



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<http://www.icmm.com/publications>



www.qldminingsafety.org.au

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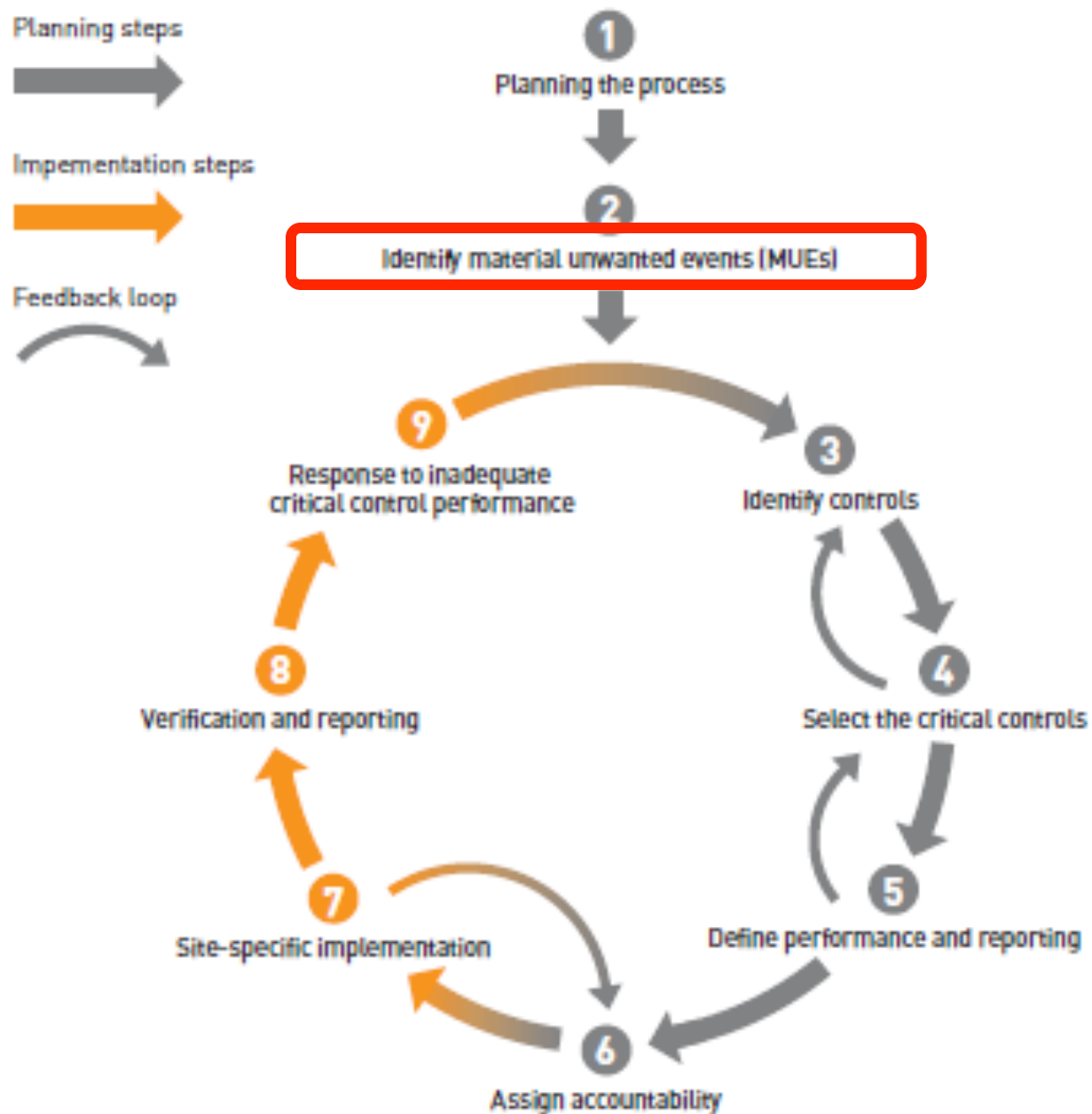


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Figure 1: The critical control management process



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Risk Matrix plus materiality criteria

Likelihood	A (Very Likely)	Has occurred several times in the past	Low	Moderate	High	Extreme	Extreme
	B (Likely)	Has occurred at some time in the past	Low	Moderate	High	High	Extreme
	C (Possible)	Could occur multiple times on this site	Low	Moderate	Moderate	High	Extreme
	D (Unlikely)	Could occur once during the life of the facility	Low	Low	Moderate	Moderate	High
	E (Rare)	Unlikely during the life of the facility	Low	Low	Low	Low	Moderate
			LOW	MINOR	MODERATE	MAJOR	CRITICAL
	Consequences						



Fatal Risk	The Material Unwanted Event (MUE) used in the BowTie Analysis
Aviation	Journey Does Not Go According to Plan
Biological Agents	Exposure to an Agent Causing Disease
Cranes & Lifting Devices	Lift Does Not Go According to Plan
Confined Space	Exposure to Uncontrolled Physical and/or Atmospheric Hazards
Electrical	Unplanned/ Unexpected Contact with Electrical Energy
Fall from Heights	Worker Exposed to Unguarded Edge Above Grade
Fires (Fixed & Mobile)	Thermal Event
Ground Falls (Surface)	Exposure of Personnel to Ground Fall
Ground Falls (UG)	Exposure of Personnel to UG Ground Fall
Handling Explosives & Blasting	Unplanned Detonation
Hazardous Materials	Uncontrolled Release of Hazardous Material
Machine Guarding & Barricading	Personnel in Contact with Unprotected Operating Equipment
Mobile Equipment (Heavy)	Unwanted Contact
Mobile Equipment (Light)	Motor Vehicle Crash
Operations (Failure or Collapse of Infrastructure)	Failure of Infrastructure
Stored Energy	Unexpected Release of Energy
Trenches & Excavation	Trench Becomes a Hazardous Environment



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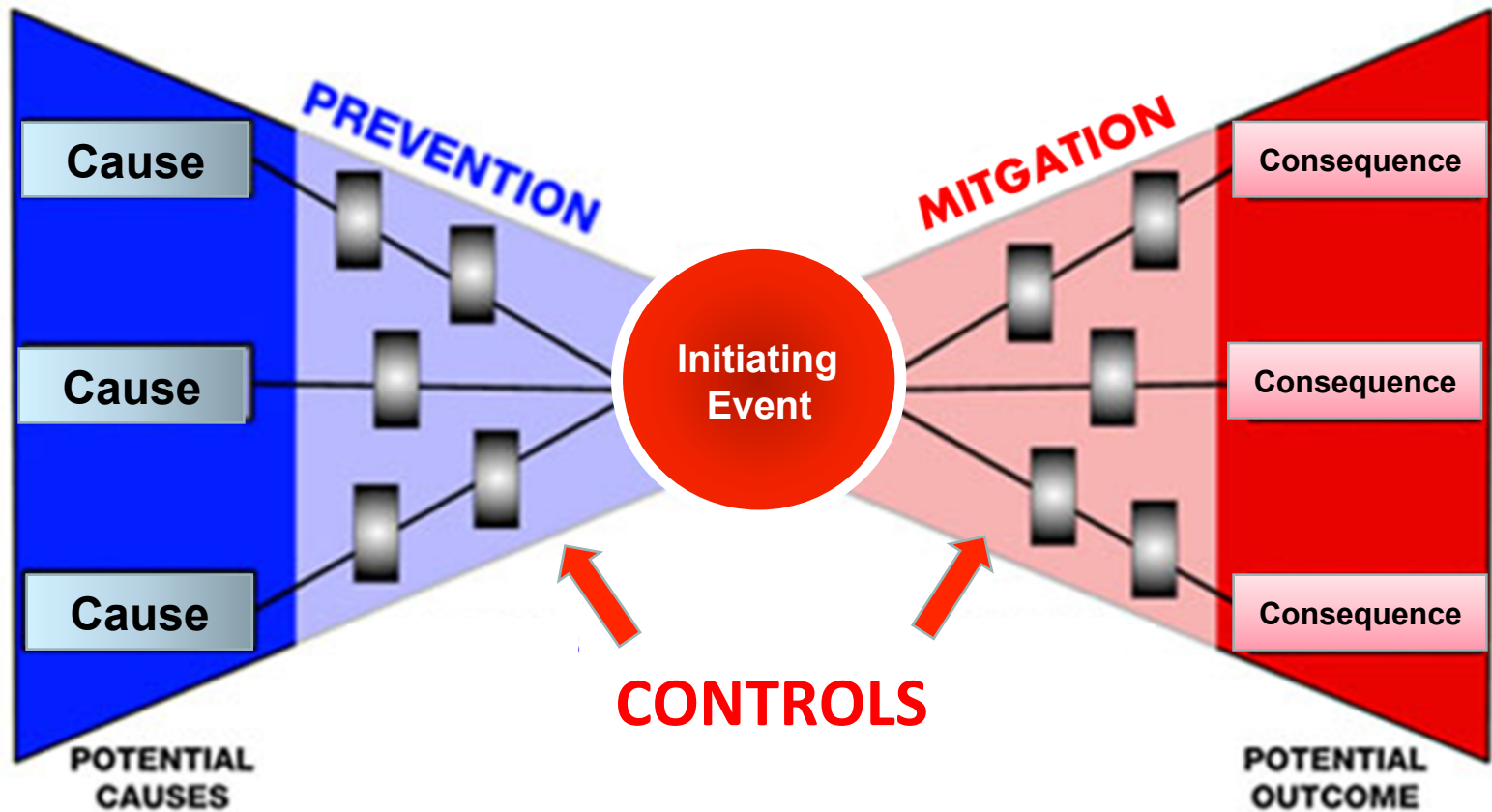
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Figure 1: The critical control management process





**The Bowtie Analysis (BTA)
method**

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Controls are:

Acts – a description of what a person should do

Objects – a device that works without an act(s), or

Systems – combination of act(s) and object(s)



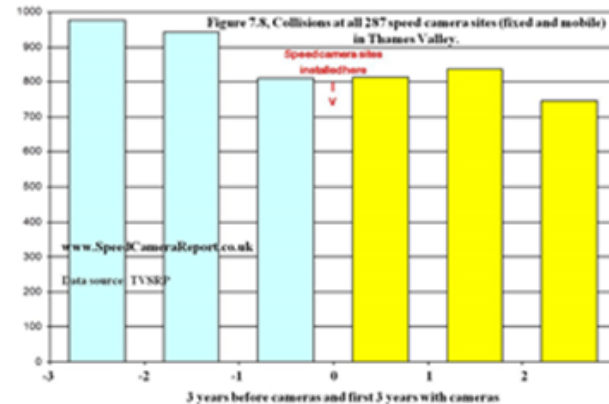
ACARP C23007 - Report June 2015

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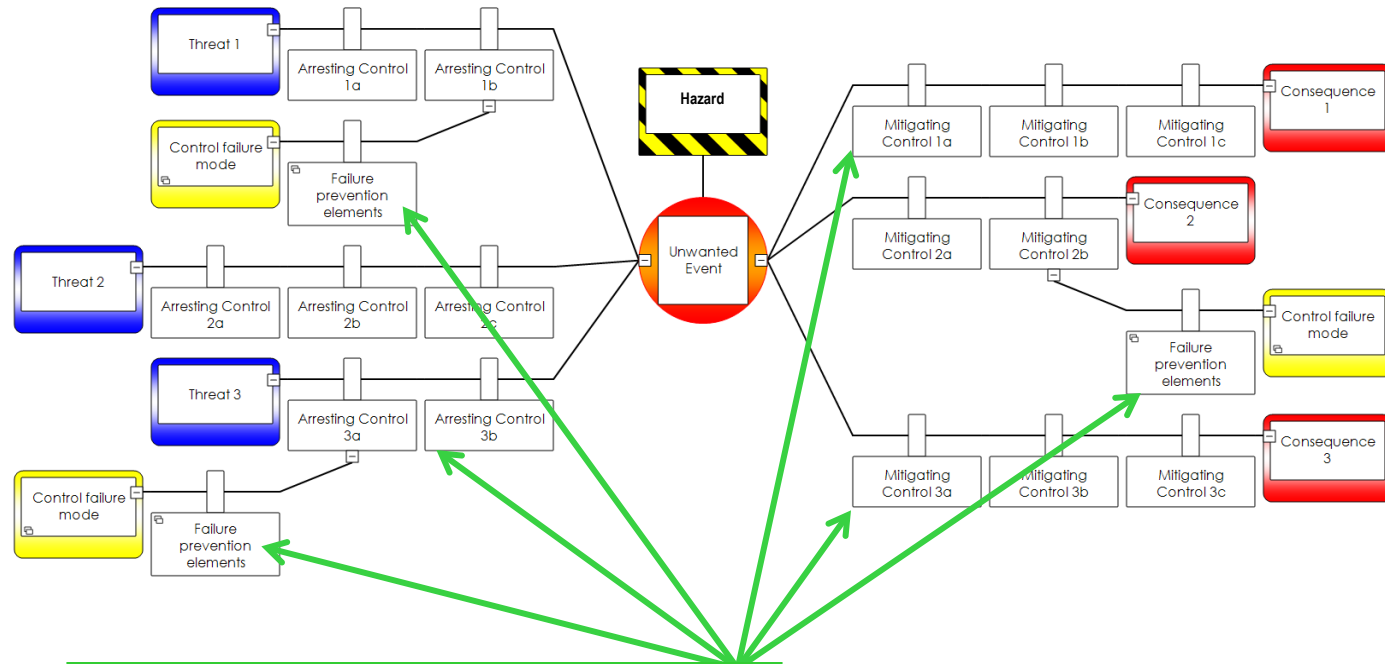


Specifiable

Measurable

Auditable





CONTROL ASSURANCE MANAGEMENT SYSTEM (CAMS)

Operations activities

Maintenance activities

Engineering activities

Management activities

CAMS: Activities that ensure people and equipment are ready and able to perform the control activities as required when required (i.e. activities that ensure controls sustain effectiveness over time)

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ACARP C23007:

SELECTION AND OPTIMISATION OF RISK CONTROLS

- To define 'Control Optimisation' methods for determining tolerable risk at sites.
- The Team:
 - Maureen Hassall
 - Marcus Punch
 - Chris Doran
 - Jim Joy



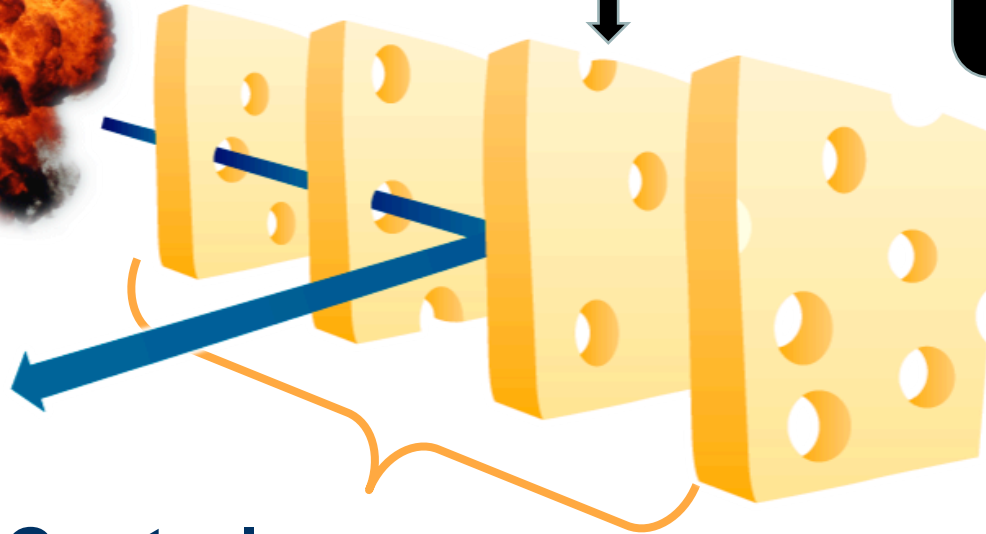
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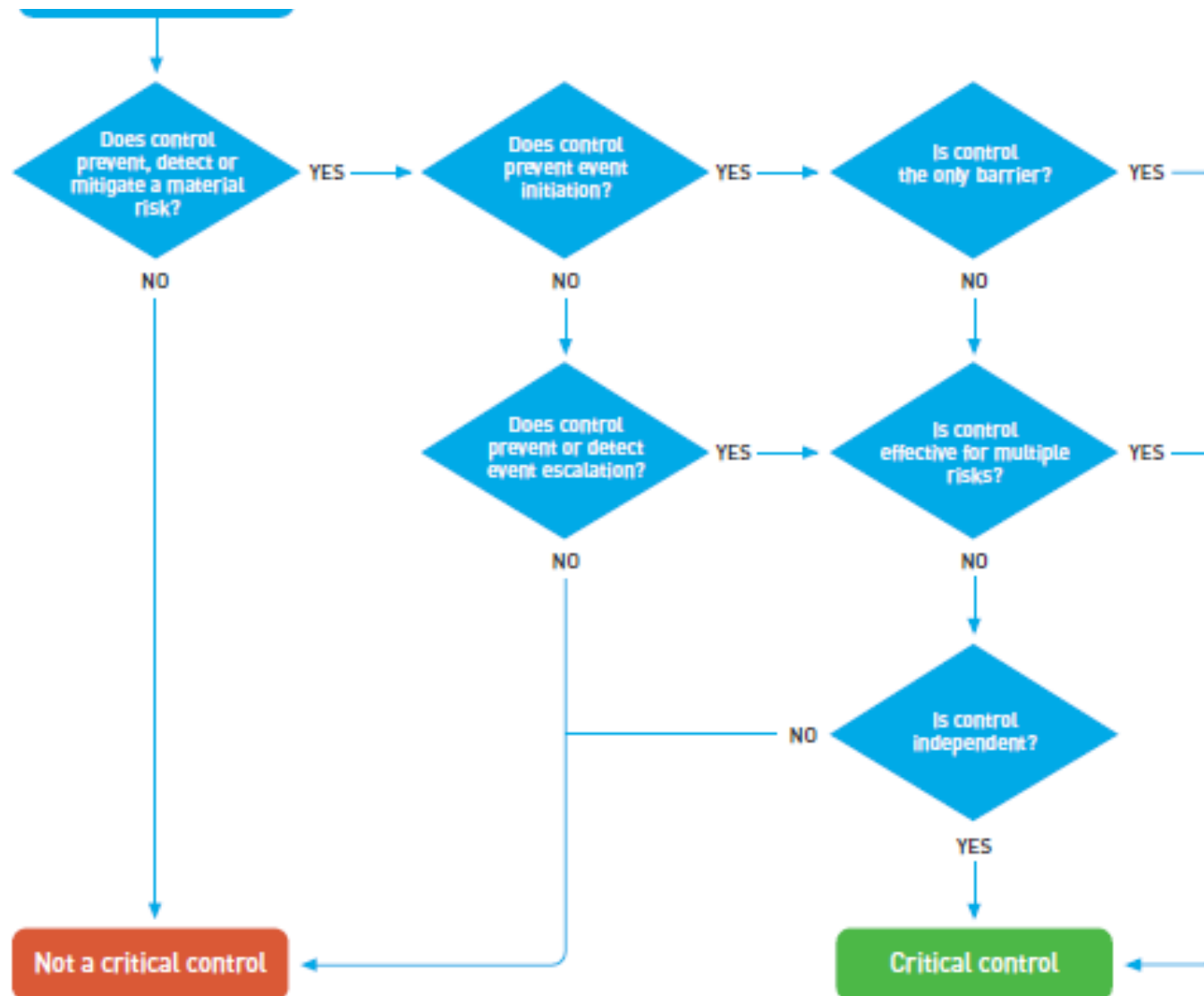
Critical Control



Risk Controls

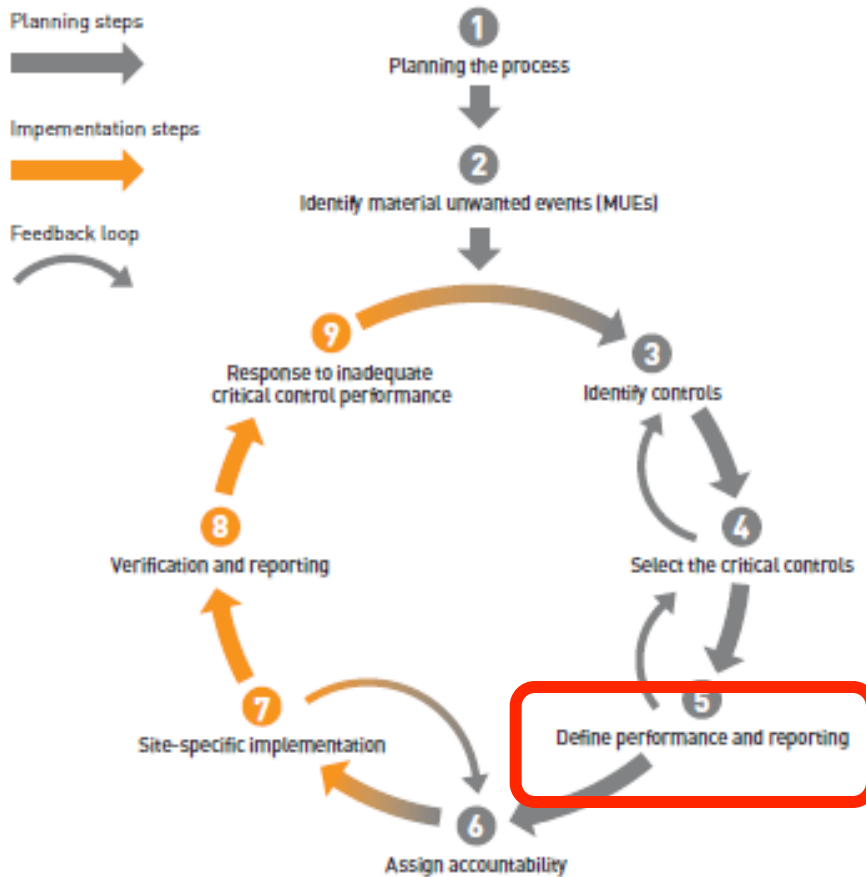


Figure 4: BHP Billiton critical control decision tree



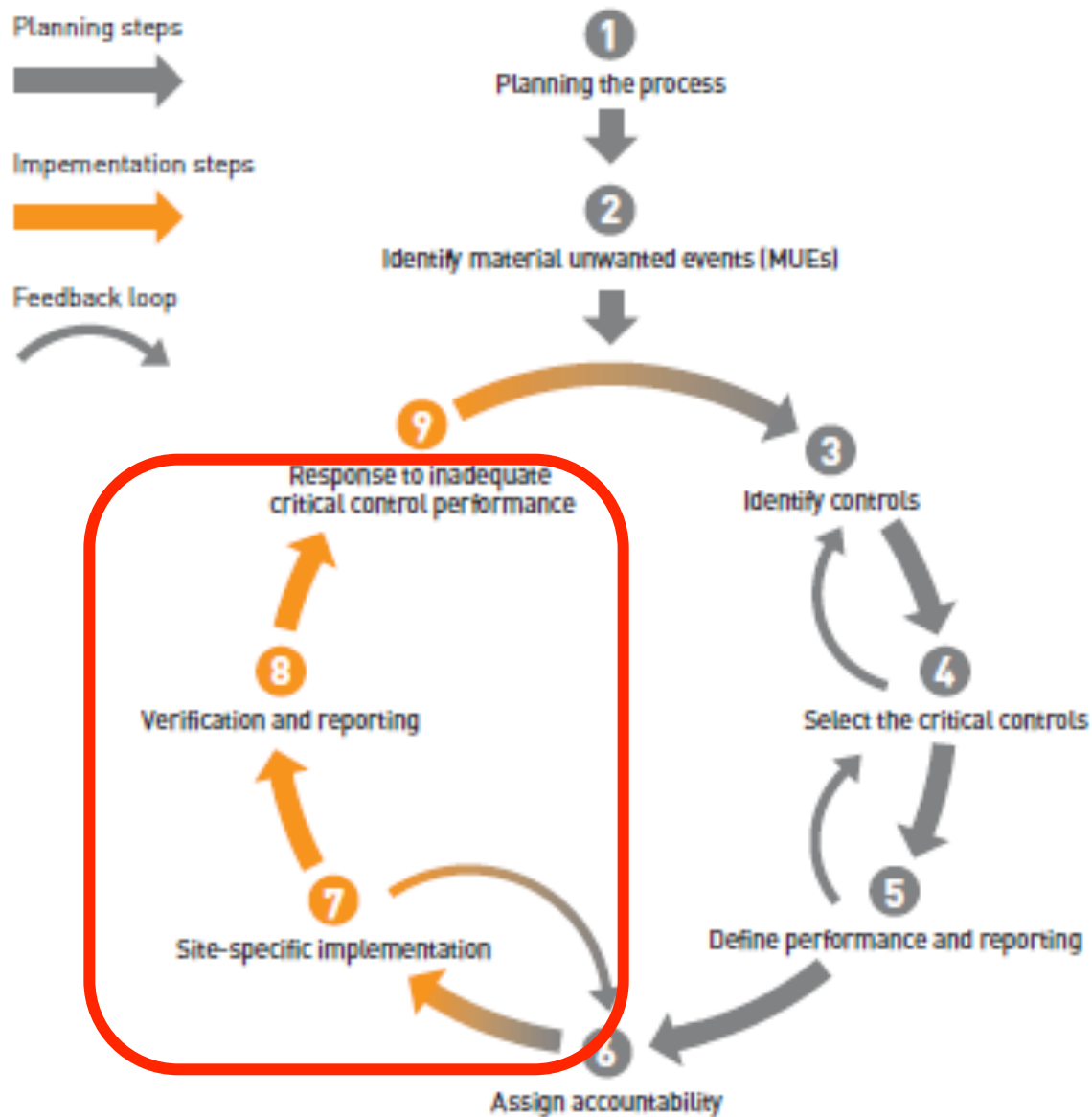
a process
for
selecting
'critical
controls'

Figure 1: The critical control management process



1. What are the CC specific objectives?
2. What are the CC performance requirements?
3. What are the current checking activities within the management systems?
4. What can be sampled for verification?
5. What is the target CC performance?

Figure 1: The critical control management process



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Material Unwanted Event (MUE) Owner

CC 1 Owner

CC 2 Owner

CC 1
verification
activity 1

CC 1
verification
activity 2

CC 2
verification
activity 1

CC 2
verification
activity 2

CC 2
verification
activity 3

Critical
Control



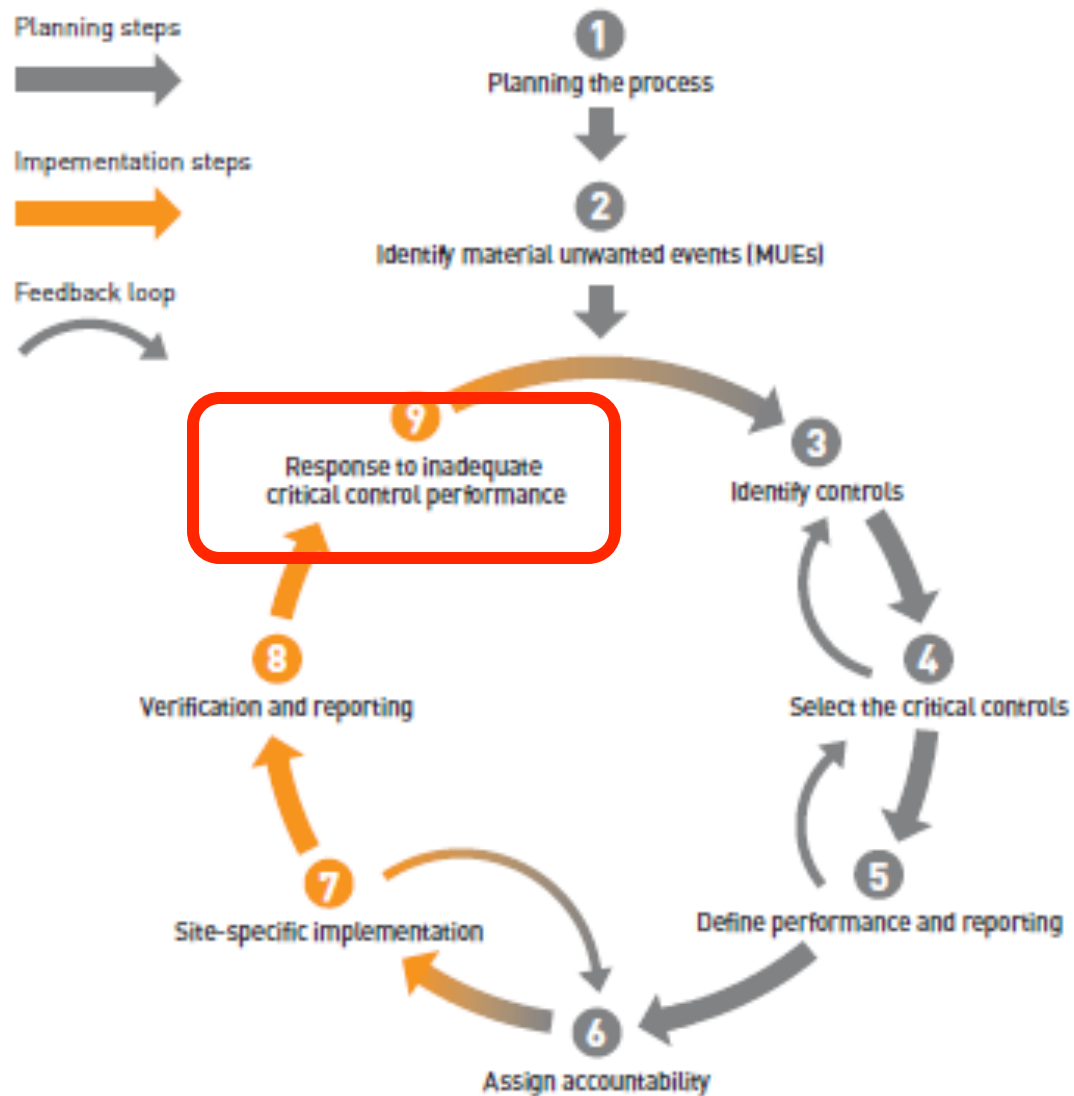
Critical
Control

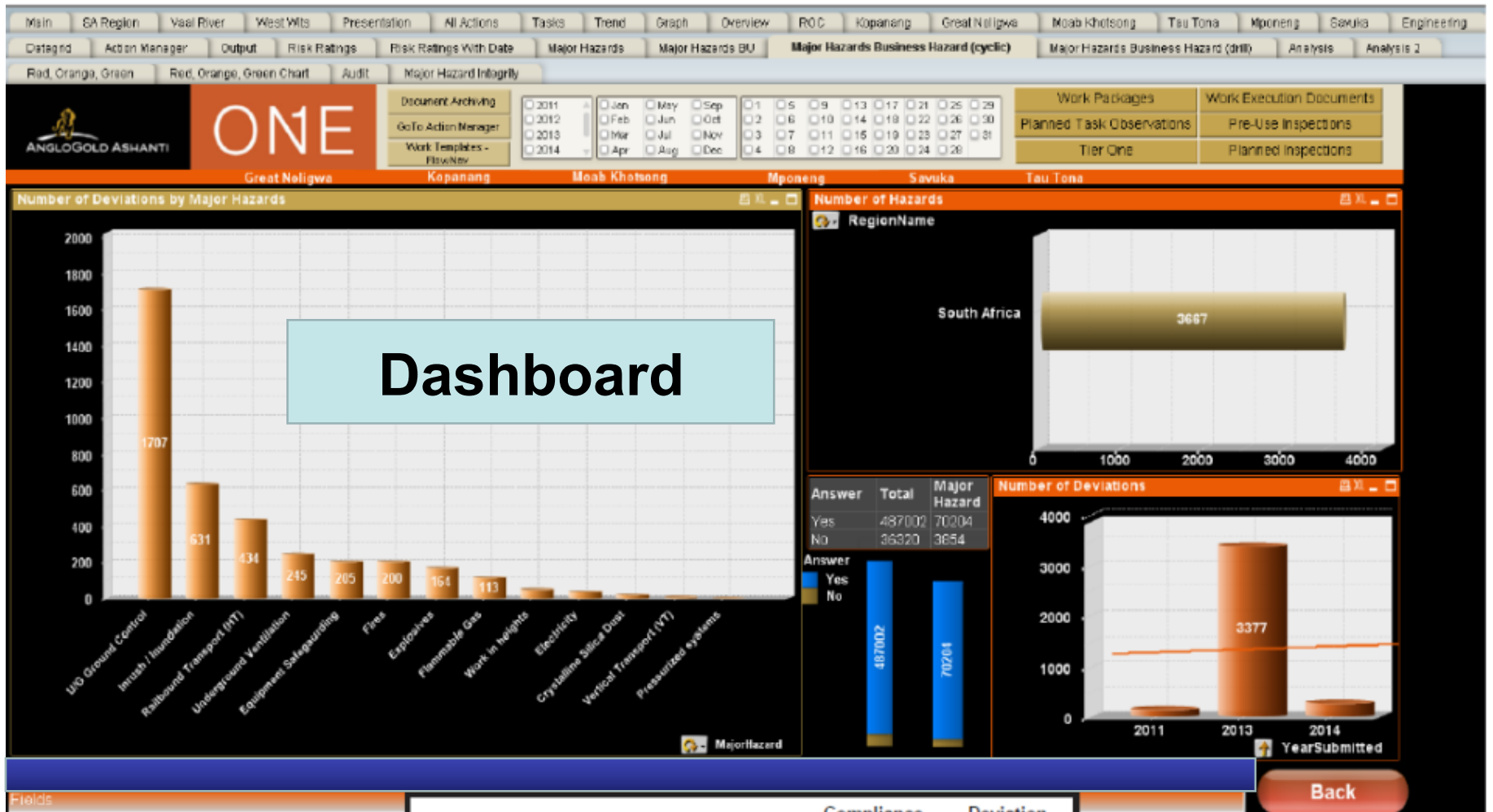


CCMP for
Vehicle
Collisions



Figure 1: The critical control management process





Number of Deviations by Major Hazards



Major Hazard	Number of Deviations
UFO Ground Control	1707
Inrush / Inundation	631
Railbound Transport (RT)	434
Underground Ventilation	245
Equipment Safeguarding	205
Fires	200
Explosives	164
Flammable Gas	113
Work in Heights	
Electricity	
Crystalline Silica Dust	
Vertical Transport (VT)	
Pressurized systems	

Number of Hazards

RegionName

South Africa: 3667

Answer	Total	Major Hazard
Yes	487002	70204
No	36320	3654

Answer: Yes (blue), No (yellow)



Number of Deviations



YearSubmitted	Number of Deviations
2011	0
2013	3377
2014	0



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Understand

Risk Component

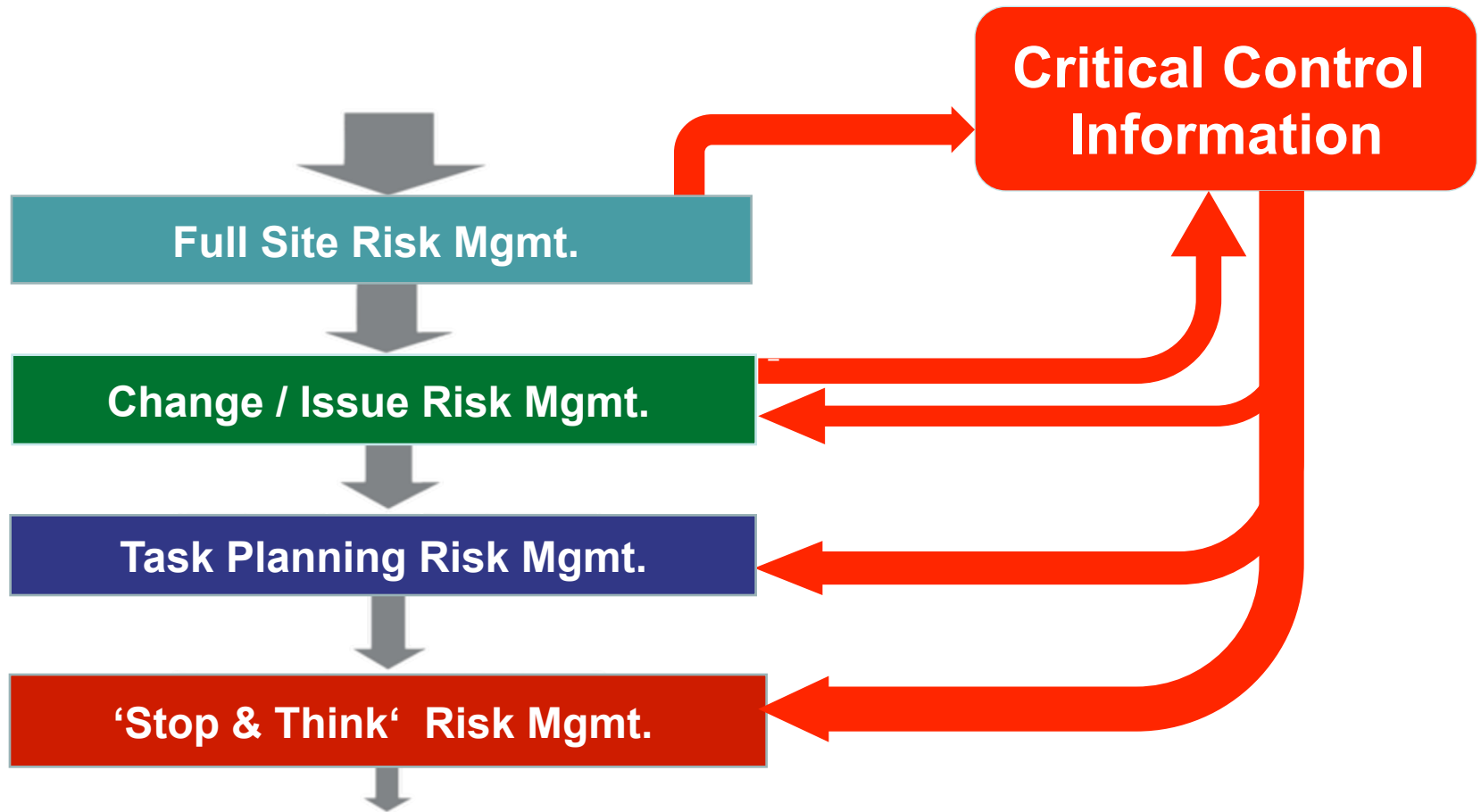
- Identify
- Analyse
- Select

Control

Control Component

- Embed
- Measure
- Verify
- Report





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Work Process CCM

CC Management

Control Effectiveness

Control Focus

Risk Rank Focus



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CCM Survey of 12 Australian Coal Mining Companies

6 large international miners, 2 large contractors, 4 moderate to small

Asked about

- 1. Interest in CCM? (11 very interested, 1 maybe)**
- 2. Current status re CCM? – general, mindsets and process detail**
- 3. Ideas to move CCM forward by 2020?**



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Work Process CCM

Is your (Australian coal) company currently operating CCM initiatives at sites?

CC Management

4

Control Effectiveness (BTA+)

1

Control Focus

7

Risk Rank Focus



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Figure 1: The critical control management process

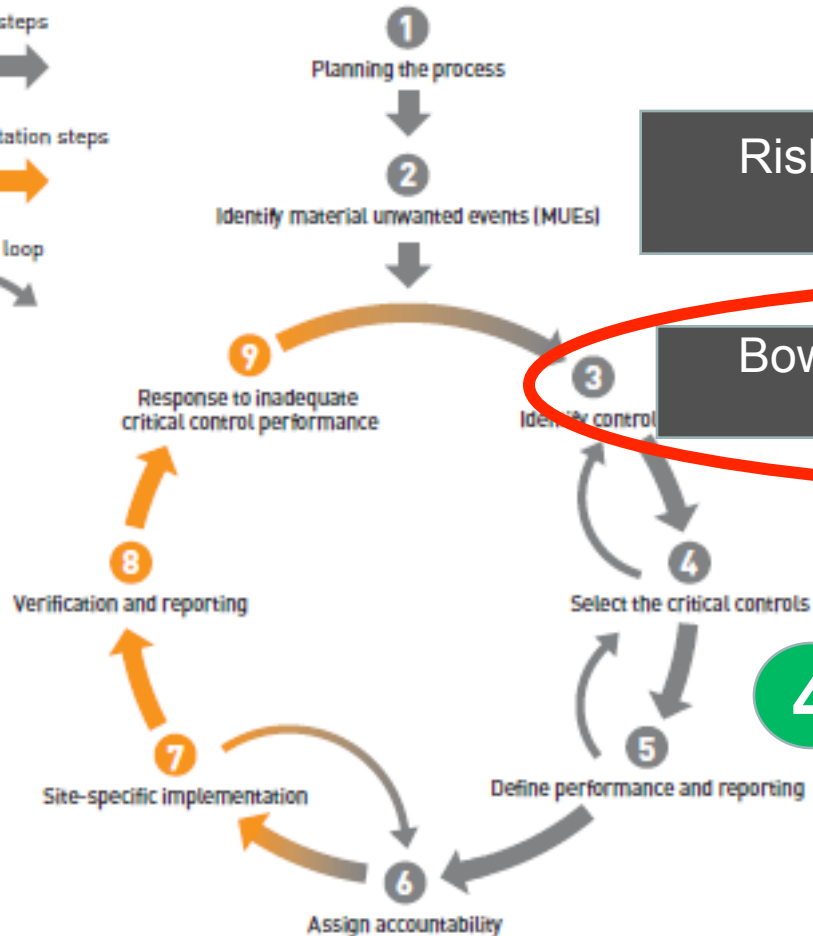
Planning steps



Implementation steps



Feedback loop



Risk Identification & Prioritisation

12

Bowtie Analysis and Control Effectiveness

4

- Site driven
- Seem OK with CC selection but....
- Systematic verification / reporting 'in progress'
- Incident investigation varies / so learning varies

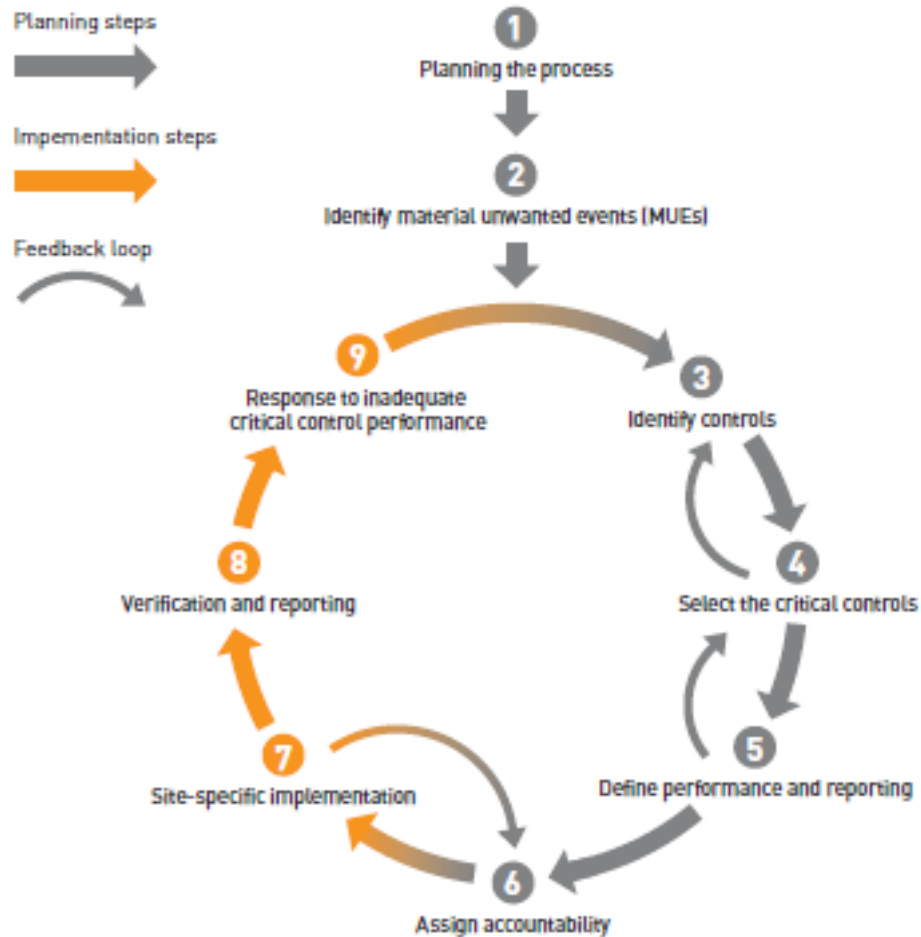
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Figure 1: The critical control management process



- CCM is a major positive step change
- Management of the change is part of the 'journey'
- Other internal & external stakeholders should join the 'journey'
- Current RM quality, leadership and 'mindset' issues can affect the changes!

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