Mastering Critical Risk Management in Mining

Christian Young

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Use the chat function

Where are you watching from?

On a scale of 1-10 how would you rate your knowledge of Critical Risk Management?

1 – Nonexistent, 10 - Expert

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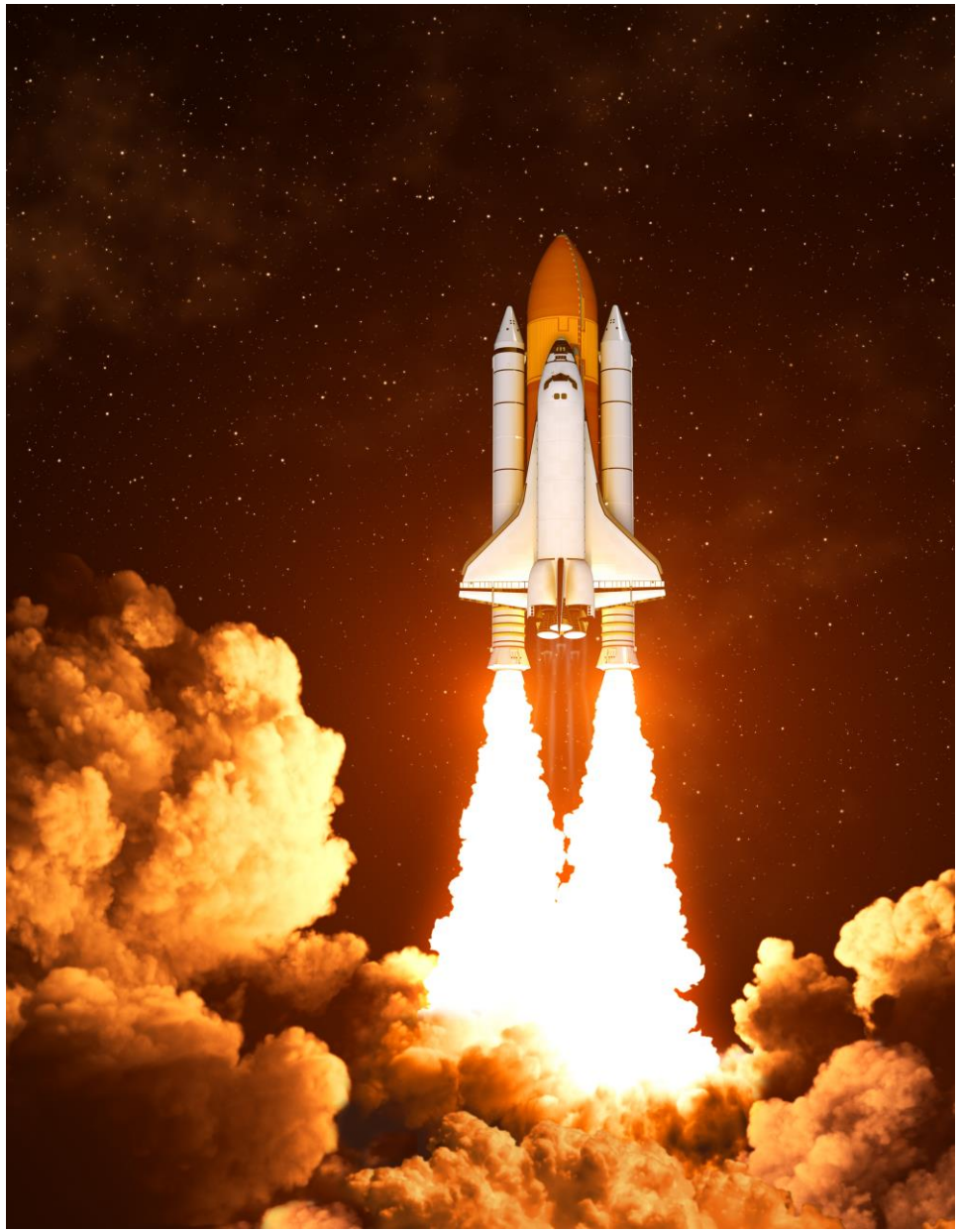
3 Gets

What is a Critical Risk?



What is a Critical Risk?

Any risk that if realised the consequence would be material to the business.

Any examples?

Where are with CRM?

What’s The Problem?

How do we know this to be true?

My Promise

Me?

I help you save lives at work

BHP

AngloAmerican

Aeris RESOURCES

SOUTH32

GLENCORE

KESTREL COAL RESOURCES

NEWCREST MINING LIMITED

Coronado

OZ MINERALS

My style

UMM!!!!

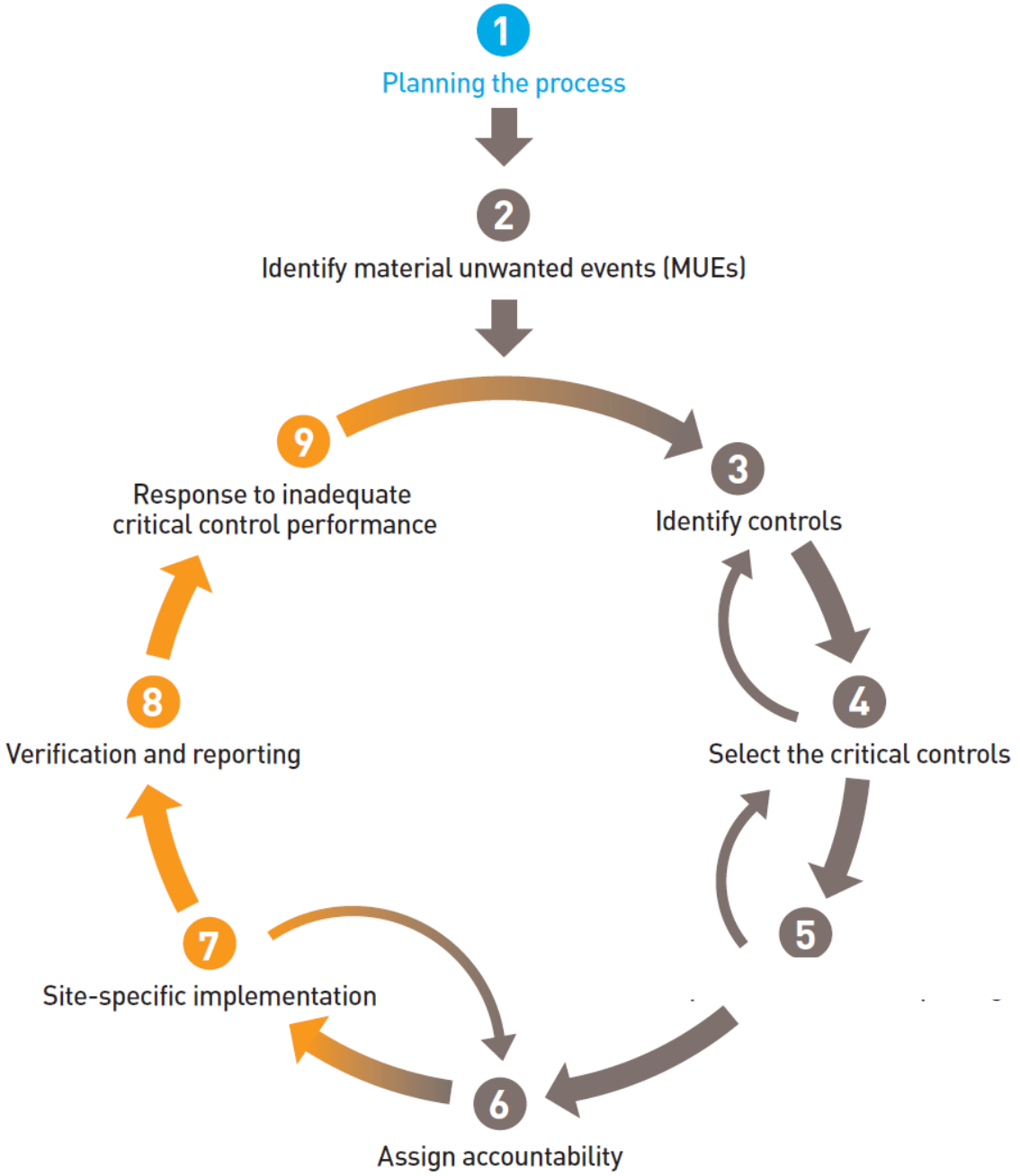
Shorten it to “CRM”

We’ll move fast

I need you

Content

- The Fundamentals
- Q&A
- My all won’t be enough



Stick around

Slides

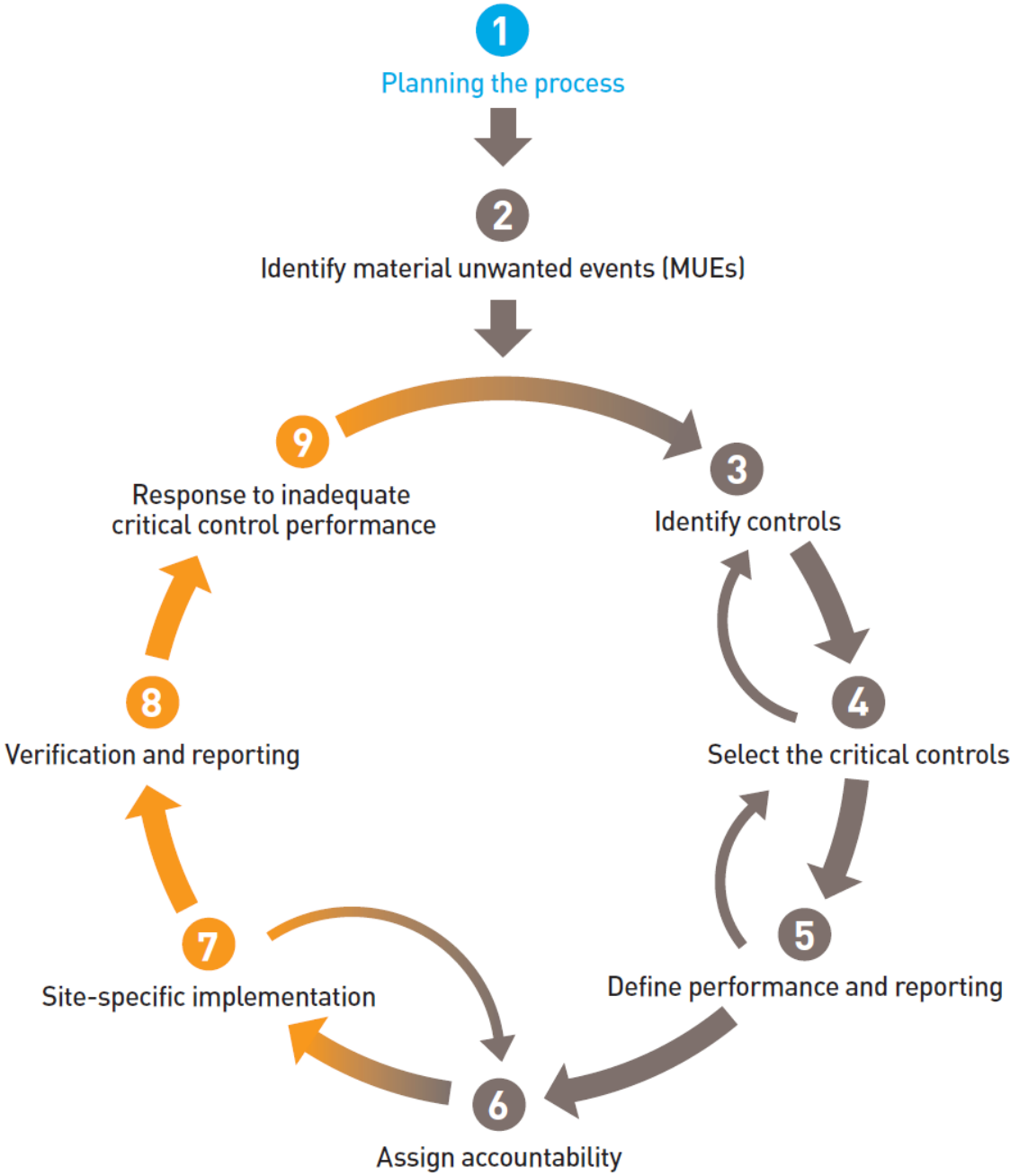
This Recoding

Free bonus?

Question

What’s the hardest part about getting CRM right in your business or from your experience?

CRM Framework

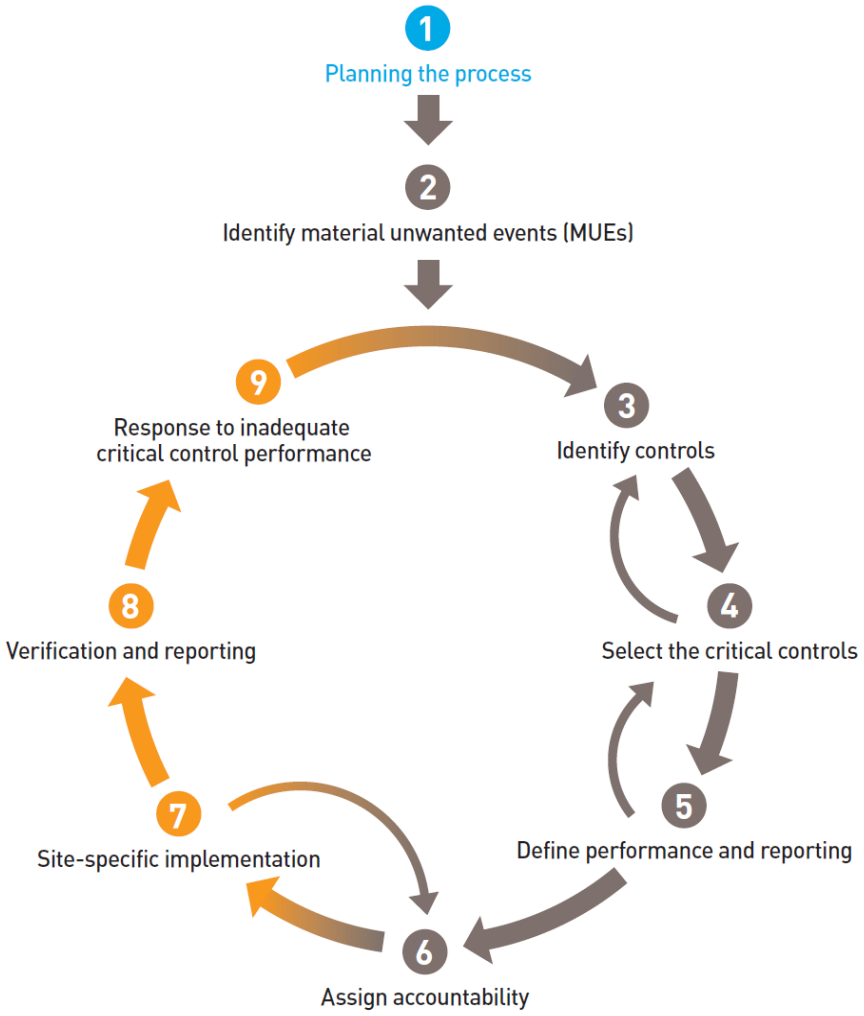


Imagine if

You are the safety manager at a new surface coal mine in Queensland.

You have been tasked with implementing a CRM process with specific focus on managing the risk of Surface fire

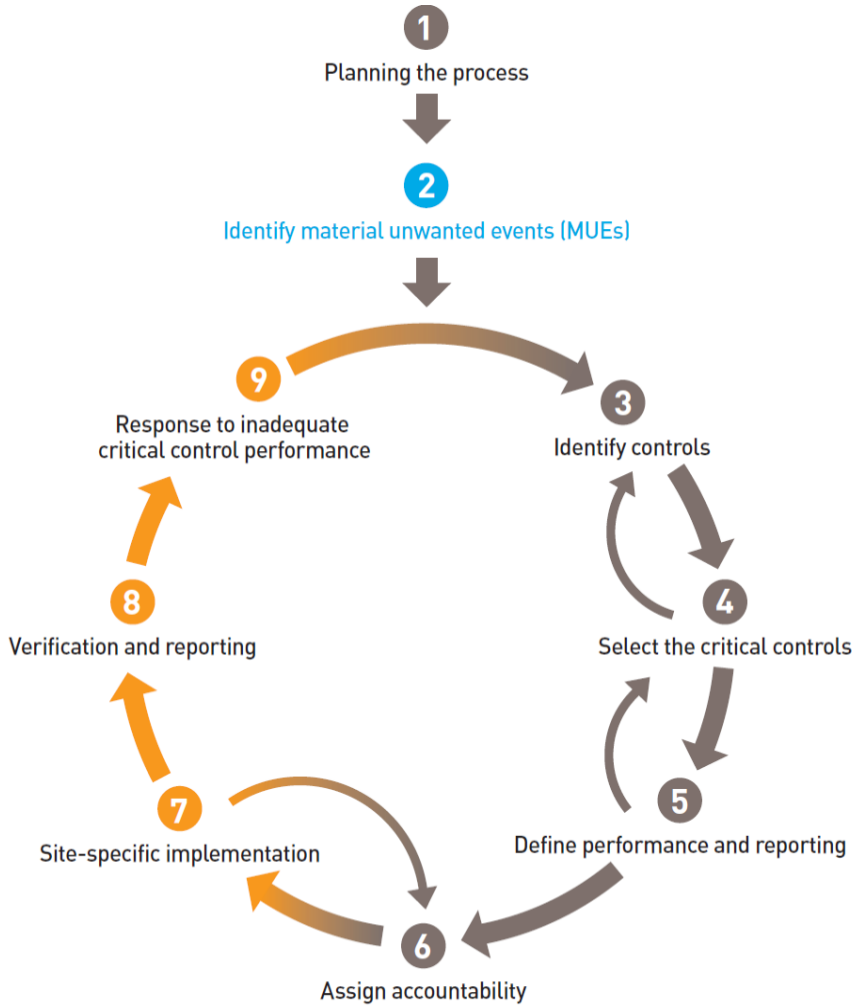
CRM Planning



Desired outcome:

- Defined a plan for;
  - CRM Implementation
  - BAU CRM
- What good looks like?
  - A document (or section within a document) which defines the CRM process end to end.
  - Risk Owners, Control Owners understand the CRM process.
  - Defined Materiality Criteria
- How does your business perform? (rating out of 10)

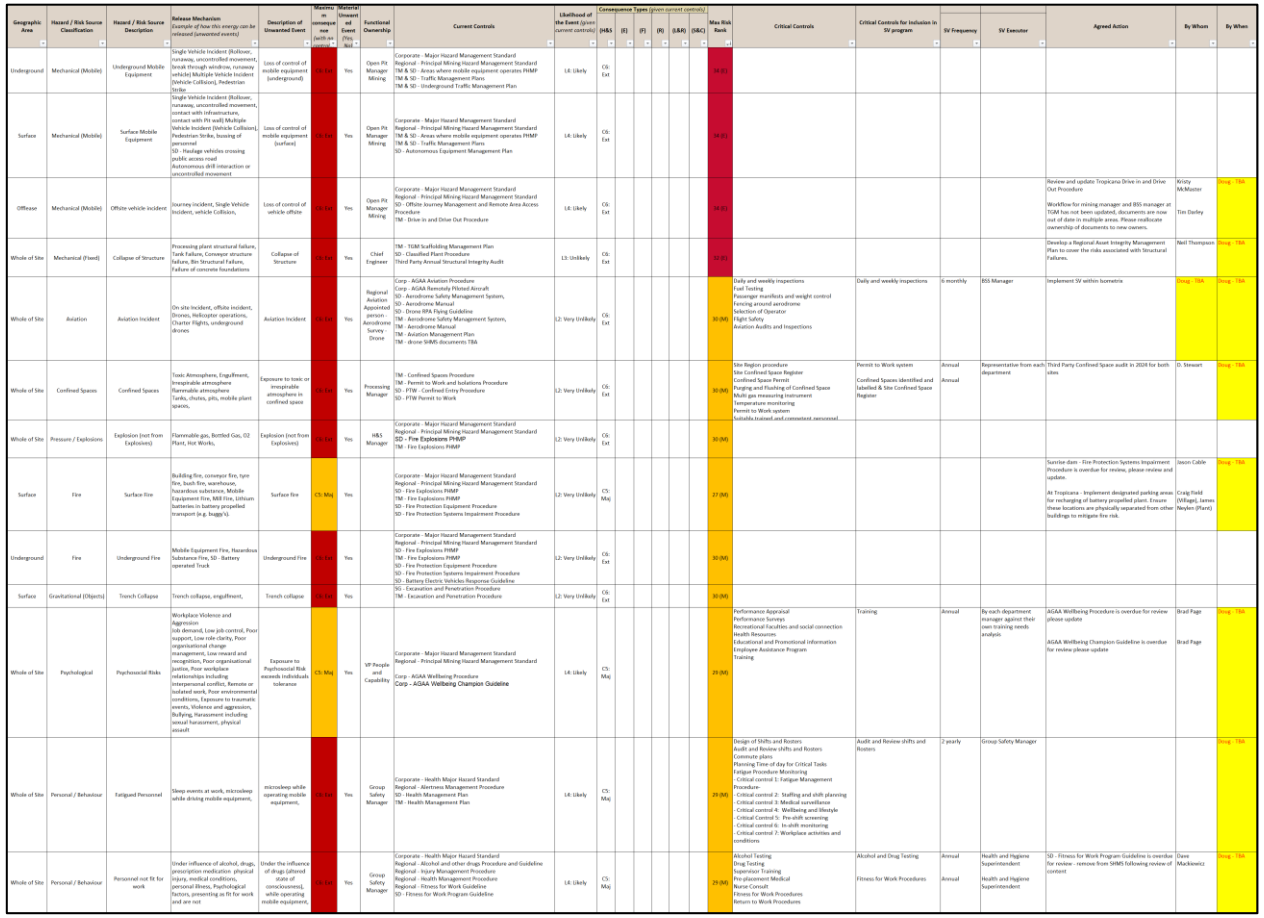
Identify Critical Risks



Desired outcome:

- Defined list of Critical Risks

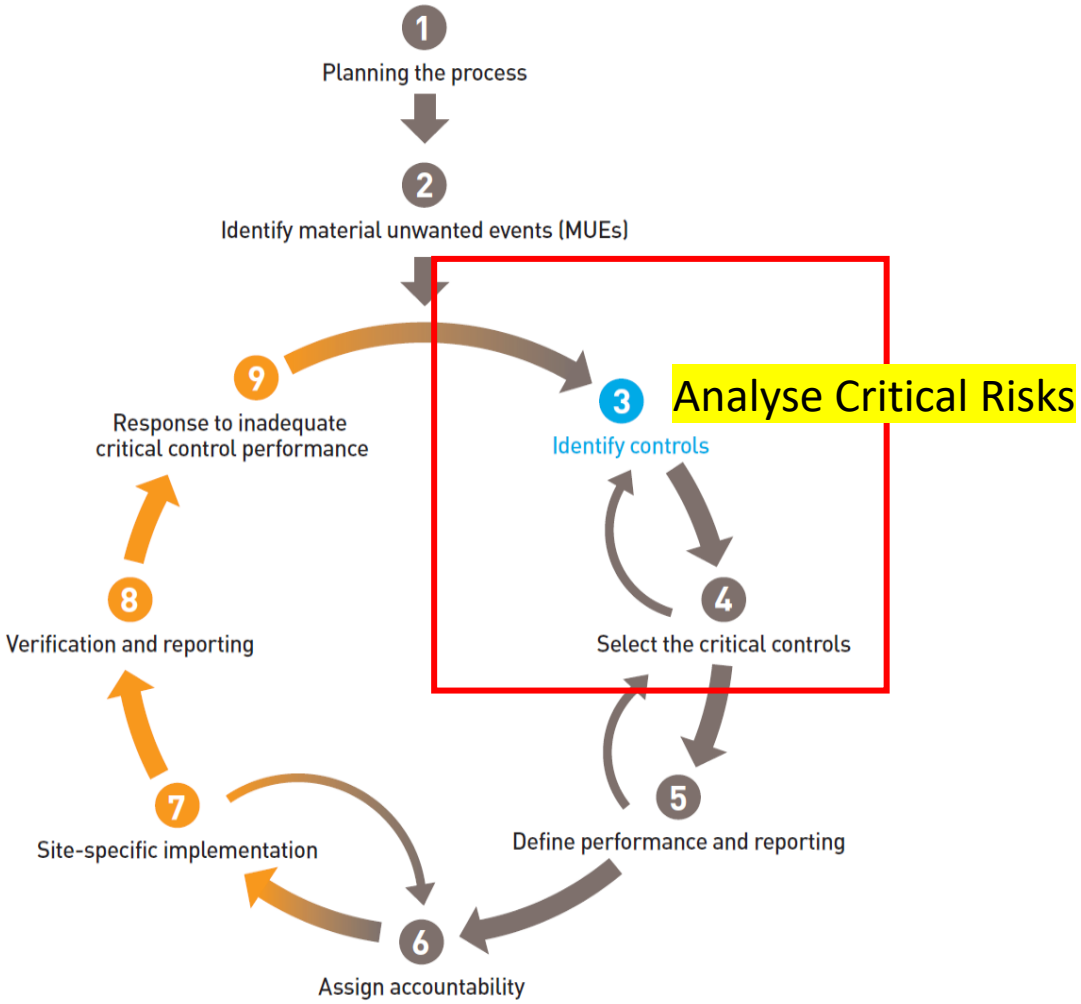
Identify Critical Risks



Geographic Area	Hazard / Risk Source Classification	Hazard / Risk Source Description	Release Mechanism (Example of how this energy can be released (unwanted events))	Description of Unwanted Event	Maximum consequence (with no controls)	Material Unwanted Event (Yes / No)	Functional Ownership	Current Controls	Likelihood of the Event (given current controls)	Consequence Types (given current controls) (H&S)	(E)	(F)	(R)	(L&R)	(S&C)	Max Risk Rank	Critical Controls	Critical Controls for Inclusion in SV program	SV Frequency	SV Executor	Agreed Action	By Whom	By When
Underground	Mechanical (Mobile)	Underground Mobile Equipment	Single Vehicle Incident (Rollover, runaway, uncontrolled movement, break through windrow, runaway vehicle) Multiple Vehicle Incident (Vehicle-Collision), Pedestrian Strike	Loss of control of mobile equipment (underground)	C5: Ext	Yes	Open Pit Manager Mining	Corporate - Major Hazard Management Standard Regional - Principal Mining Hazard Management Standard TM & SD - Areas where mobile equipment operates PHMP TM & SD - Traffic Management Plans TM & SD - Underground Traffic Management Plan	L4: Likely	C5: Ext						24 (E)						
Surface	Mechanical (Mobile)	Surface Mobile Equipment	Single Vehicle Incident (Rollover, runaway, uncontrolled movement, contact with infrastructure, contact with Pit wall) Multiple Vehicle Incident (Vehicle Collision), Pedestrian Strike, housing of personnel SD - Haulage vehicles crossing public access road Autonomous drill interaction or uncontrolled movement	Loss of control of mobile equipment (surface)	C5: Ext	Yes	Open Pit Manager Mining	Corporate - Major Hazard Management Standard Regional - Principal Mining Hazard Management Standard TM & SD - Areas where mobile equipment operates PHMP TM & SD - Traffic Management Plans SD - Autonomous Equipment Management Plan	L4: Likely	C5: Ext						24 (E)						
Offlease	Mechanical (Mobile)	Offsite vehicle-incident	Journey incident, Single Vehicle Incident, vehicle Collision,	Loss of control of vehicle offsite	C4: Ext	Yes	Open Pit Manager Mining	Corporate - Major Hazard Management Standard Regional - Principal Mining Hazard Management Standard SD - Offsite Journey Management and Remote Area Access Procedure TM - Drive in and Drive Out Procedure	L4: Likely	C5: Ext						24 (E)					Review and update Tropicana Drive in and Drive Out Procedure Workflow for mining manager and BSS manager at TGM has not been updated, documents are now out of date in multiple areas. Please reallocate ownership of documents to new owners.	Kristy McMaster Tim Darley	Doug - TBA
Whole of Site	Mechanical (Fixed)	Collapse of Structure	Processing plant structural failure, Tank Failure, Conveyor structure failure, Bin Structural Failure, Failure of concrete foundations	Collapse of Structure	C4: Ext	Yes	Chief Engineer	TM - TGM Scaffolding Management Plan SD - Classified Plant Procedure Third Party Annual Structural Integrity Audit	L3: Unlikely	C5: Ext						12 (E)					Develop a Regional Asset Integrity Management Plan to cover the risks associated with Structural Failures.	Neil Thompson	Doug - TBA
Whole of Site	Aviation	Aviation Incident	On site incident, offsite incident, Drones, Helicopter operations, Charter Flights, underground drones	Aviation Incident	C4: Ext	Yes	Regional Aviation Appointed person - Aerodrome Survey - Drone	Corp - AGAA Aviation Procedure Corp - AGAA Remotely Piloted Aircraft SD - Aerodrome Safety Management System, SD - Aerodrome Manual SD - Drone RPA Flying Guideline TM - Aerodrome Safety Management System, TM - Aerodrome Manual TM - Aviation Management Plan TM - drone SHMS documents TBA	L2: Very Unlikely	C5: Ext						20 (M)	Daily and weekly inspections Fuel Testing Passenger manifests and weight control Fencing around aerodrome Selection of Operator Flight Safety Aviation Audits and Inspections	Daily and weekly inspections	6 monthly	BSS Manager	Implement SV within bometrix	Doug - TBA	Doug - TBA
Whole of Site	Confined Spaces	Confined Spaces	Toxic Atmosphere, Engulfment, Irrespirable atmosphere flammable atmosphere Tanks, chutes, pits, mobile plant spaces,	Exposure to toxic or irrespirable atmosphere in confined space	C4: Ext	Yes	Processing Manager	TM - Confined Spaces Procedure TM - Permit to Work and Isolations Procedure SD - PTW - Confined Entry Procedure SD - PTW Permit to Work	L2: Very Unlikely	C5: Ext						20 (M)	Site Region procedure Site Confined Space Register Confined Space Permit Purging and Flushing of Confined Space Multi gas measuring instrument Temperature monitoring Permit to Work system Suitably trained and competent personnel	Permit to Work system Confined Spaces identified and labelled & Site Confined Space Register	Annual Annual	Representative from each department	Third Party Confined Space audit in 2024 for both sites	D. Stewart	Doug - TBA
Whole of Site	Pressure / Explosions	Explosion (not from Explosives)	Flammable gas, Bottled Gas, 02 Plant, Hot Works,	Explosion (not from Explosives)	C4: Ext	Yes	H&S Manager	Corporate - Major Hazard Management Standard Regional - Principal Mining Hazard Management Standard SD - Fire Explosions PHMP TM - Fire Explosions PHMP	L2: Very Unlikely	C5: Ext						20 (M)							
Surface	Fire	Surface fire	Building fire, conveyor fire, tyre fire, bush fire, warehouse, hazardous substance, Mobile Equipment Fire, MB Fire, Lithium batteries in battery propelled transport (e.g. buggy's).	Surface fire	C5: Maj	Yes		Corporate - Major Hazard Management Standard Regional - Principal Mining Hazard Management Standard SD - Fire Explosions PHMP TM - Fire Explosions PHMP SD - Fire Protection Equipment Procedure SD - Fire Protection Systems Impairment Procedure	L2: Very Unlikely	C5: Maj						27 (M)					Survivor dam - Fire Protection Systems Impairment Procedure is overdue for review, please review and update. At Tropicana - Implement designated parking areas for recharging of battery propelled plant. Ensure these locations are physically separated from other buildings to mitigate fire risk.	Jason Cable Craig Field (Village), James Neylen (Plant)	Doug - TBA
Underground	Fire	Underground Fire	Mobile Equipment Fire, Hazardous Substance Fire, SD - Battery operated Truck	Underground Fire	C4: Ext	Yes		Corporate - Major Hazard Management Standard Regional - Principal Mining Hazard Management Standard SD - Fire Explosions PHMP TM - Fire Explosions PHMP SD - Fire Protection Equipment Procedure SD - Fire Protection Systems Impairment Procedure SD - Battery Electric Vehicles Response Guideline	L2: Very Unlikely	C5: Ext						20 (M)							
Surface	Gravitational (Objects)	Trench Collapse	Trench collapse, engulfment,	Trench collapse	C4: Ext	Yes		SG - Excavation and Penetration Procedure TM - Excavation and Penetration Procedure	L2: Very Unlikely	C5: Ext						20 (M)							
Whole of Site	Psychological	Psychosocial Risks	Workplace Violence and Aggression Job demand, Low job control, Poor support, Low role clarity, Poor organisational change management, Low reward and recognition, Poor organisational justice, Poor workplace relationships including interpersonal conflict, Remote or isolated work, Poor environmental conditions, Exposure to traumatic events, Violence and aggression, Bullying, Harassment including sexual harassment, physical assault	Exposure to Psychosocial Risk exceeds individuals tolerance	C5: Maj	Yes	VP People and Capability	Corporate - Major Hazard Management Standard Regional - Principal Mining Hazard Management Standard Corp - AGAA Wellbeing Procedure Corp - AGAA Wellbeing Champion Guideline	L4: Likely	C5: Maj						20 (M)	Performance Appraisal Performance Surveys Recreational Facilities and social connection Health Resources Educational and Promotional information Employee Assistance Program Training	Training	Annual	By each department manager against their own training needs analysis	AGAA Wellbeing Procedure is overdue for review please update AGAA Wellbeing Champion Guideline is overdue for review please update	Brad Page Brad Page	Doug - TBA
Whole of Site	Personal / Behaviour	Fatigued Personnel	Sleep events at work, microsleep while driving mobile equipment,	microsleep while operating mobile equipment,	C4: Ext	Yes	Group Safety Manager	Corporate - Health Major Hazard Standard Regional - Alertness Management Procedure SD - Health Management Plan TM - Health Management Plan	L4: Likely	C5: Maj						20 (M)	Design of Shifts and Rosters Audit and Review shifts and Rosters Commute plans Planning Time of day for Critical Tasks Fatigue Procedure Monitoring - Critical control 1: Fatigue Management Procedure- - Critical control 2: Staffing and shift planning - Critical control 3: Medical surveillance - Critical control 4: Wellbeing and lifestyle - Critical Control 5: Pre-shift screening - Critical control 6: In-shift monitoring - Critical control 7: Workplace activities and conditions	Audit and Review shifts and Rosters	2 yearly	Group Safety Manager			Doug - TBA
Whole of Site	Personal / Behaviour	Personnel not fit for work	Under influence of alcohol, drugs, prescription medication physical injury, medical conditions, personal illness, Psychological factors, presenting as fit for work and are not	Under the influence of drugs (altered state of consciousness), while operating mobile equipment,	C5: Ext	Yes	Group Safety Manager	Corporate - Health Major Hazard Standard Regional - Alcohol and other drugs Procedure and Guideline Regional - Injury Management Procedure Regional - Health Management Procedure Regional - Fitness for Work Guideline SD - Fitness for Work Program Guideline	L4: Likely	C5: Maj						20 (M)	Alcohol Testing Drug Testing Supervisor Training Pre-placement Medical Nurse Consult Fitness for Work Procedures Return to Work Procedures	Alcohol and Drug Testing Fitness for Work Procedures	Annual Annual	Health and Hygiene Superintendent Health and Hygiene Superintendent	SD - Fitness for Work Program Guideline is overdue for review - remove from SHMS following review of content	Dave Mackiewicz	Doug - TBA

- Desired outcome:
  - Defined list of Critical Risks
- What good looks like?
  - Broad Brush Risk Assessment (BBRA) reviewed annually
  - Risk Owners identified
  - SHMS Gap Analysis
    - (i.e. is there an in date, SHMS document for each Critical Risk)
- How does your business perform?

Analyse Critical Risks

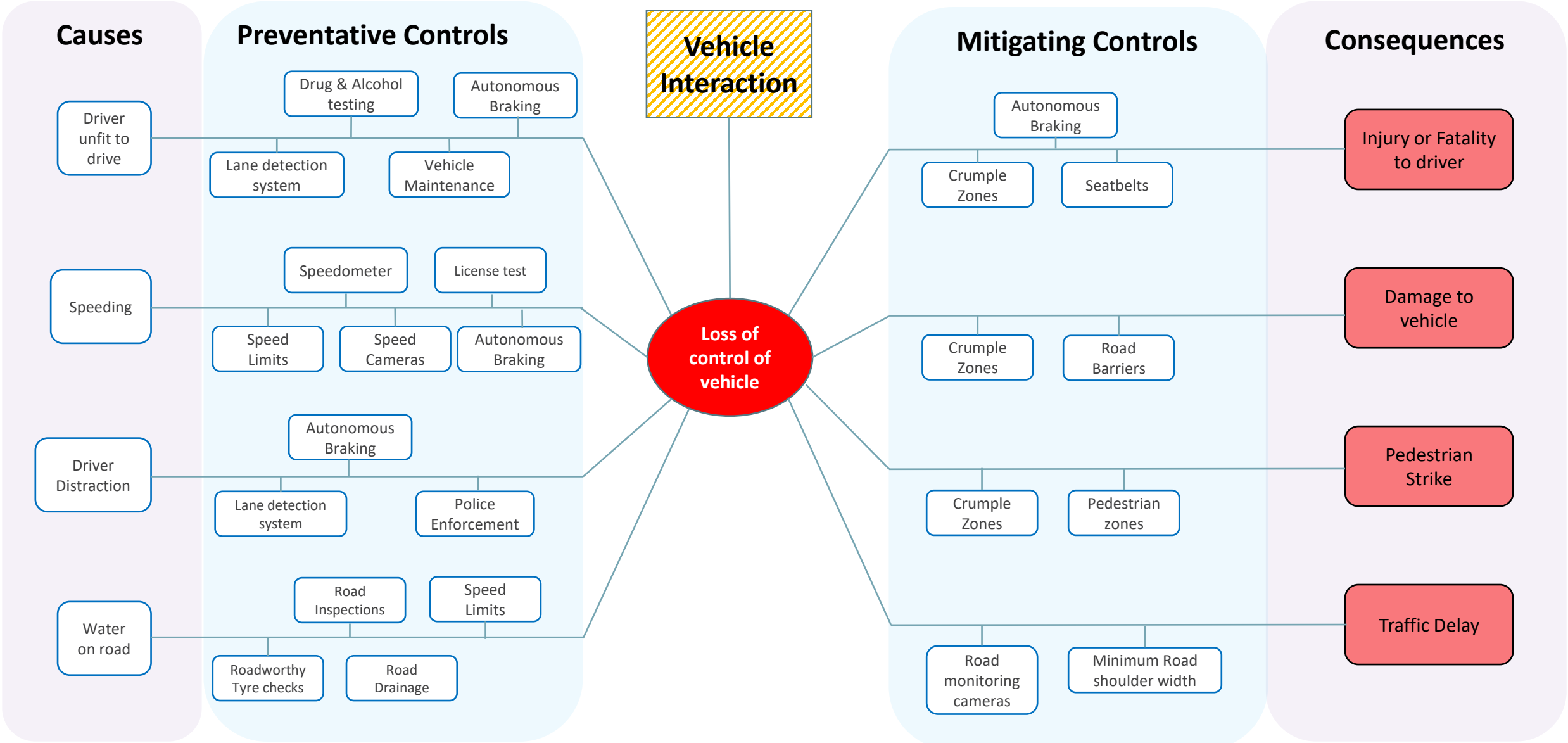


Desired outcome:

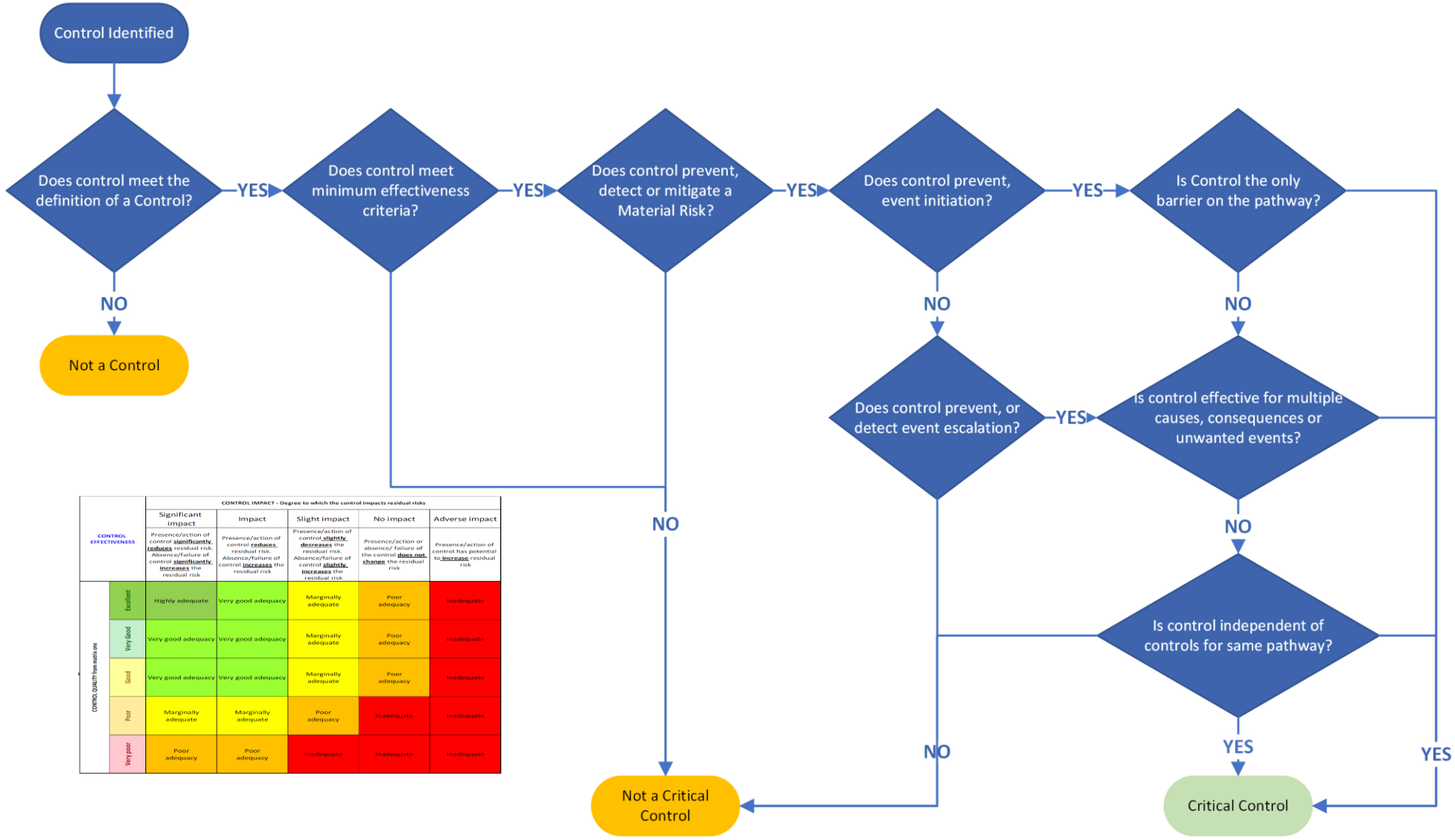
- A Risk Analysis is performed of each Critical Risk to identify;
  - Causes
  - Consequences
  - SMART Preventative and Mitigating Controls
  - Control Effectiveness Score
  - Critical Controls
  - Critical Control failure modes and Prevention Strategies.

What is the most popular risk assessment tool to analyse a Critical Risk?

Example Bowtie



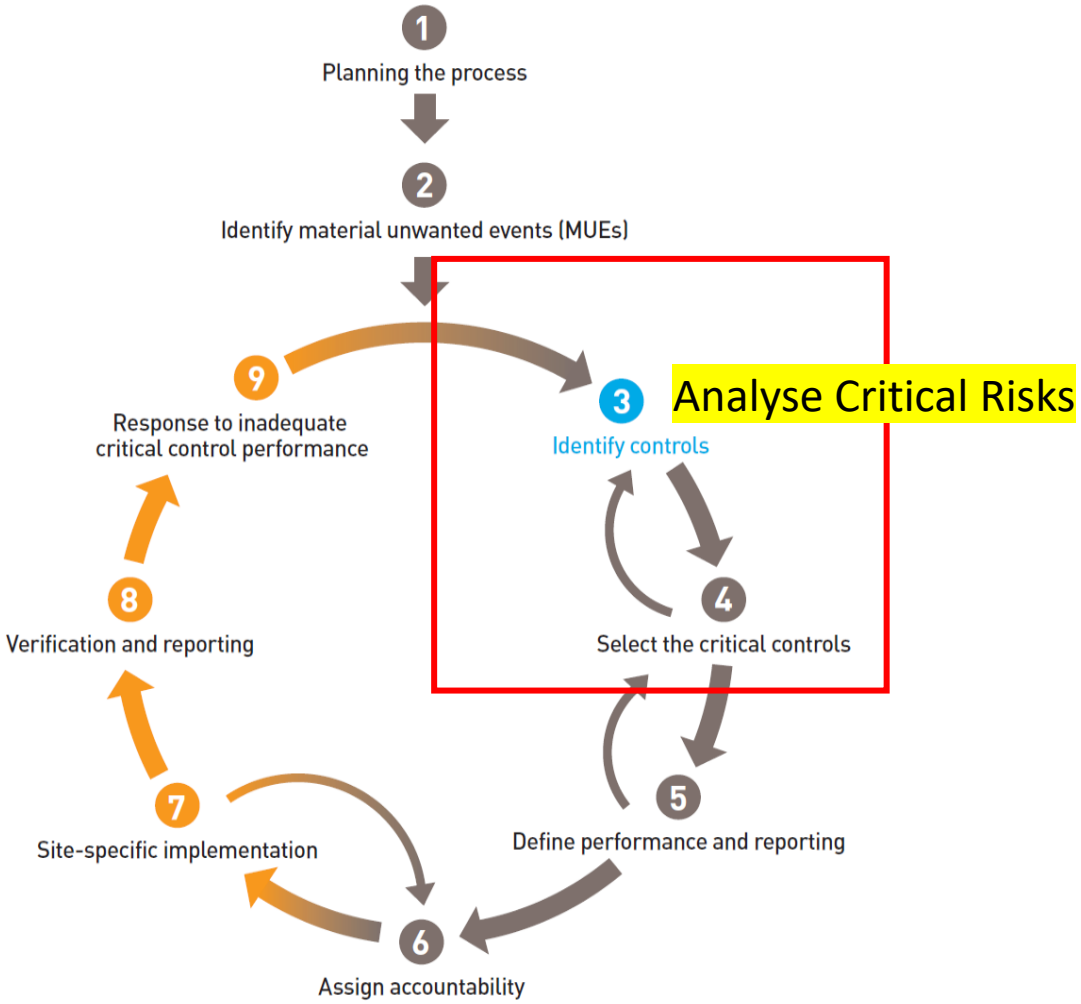
Critical Control Selection Flowchart



CONTROL EFFECTIVENESS	CONTROL IMPACT - Degree to which the control impacts residual risks				
	Significant impact	Impact	Slight impact	No impact	Adverse impact
	Presence/action of control significantly reduces residual risk. Absence/failure of control significantly increases the residual risk	Presence/action of control reduces residual risk. Absence/failure of control increases the residual risk	Presence/action of control slightly decreases the residual risk. Absence/failure of control slightly increases the residual risk	Presence/action or absence/ failure of the control does not change the residual risk	Presence/action of control has potential to increase residual risk
Excellent	Highly adequate	Very good adequacy	Marginally adequate	Poor adequacy	Inadequate
Very Good	Very good adequacy	Very good adequacy	Marginally adequate	Poor adequacy	Inadequate
Good	Very good adequacy	Very good adequacy	Marginally adequate	Poor adequacy	Inadequate
Poor	Marginally adequate	Marginally adequate	Poor adequacy	Inadequate	Inadequate
Very poor	Poor adequacy	Poor adequacy	Inadequate	Inadequate	Inadequate

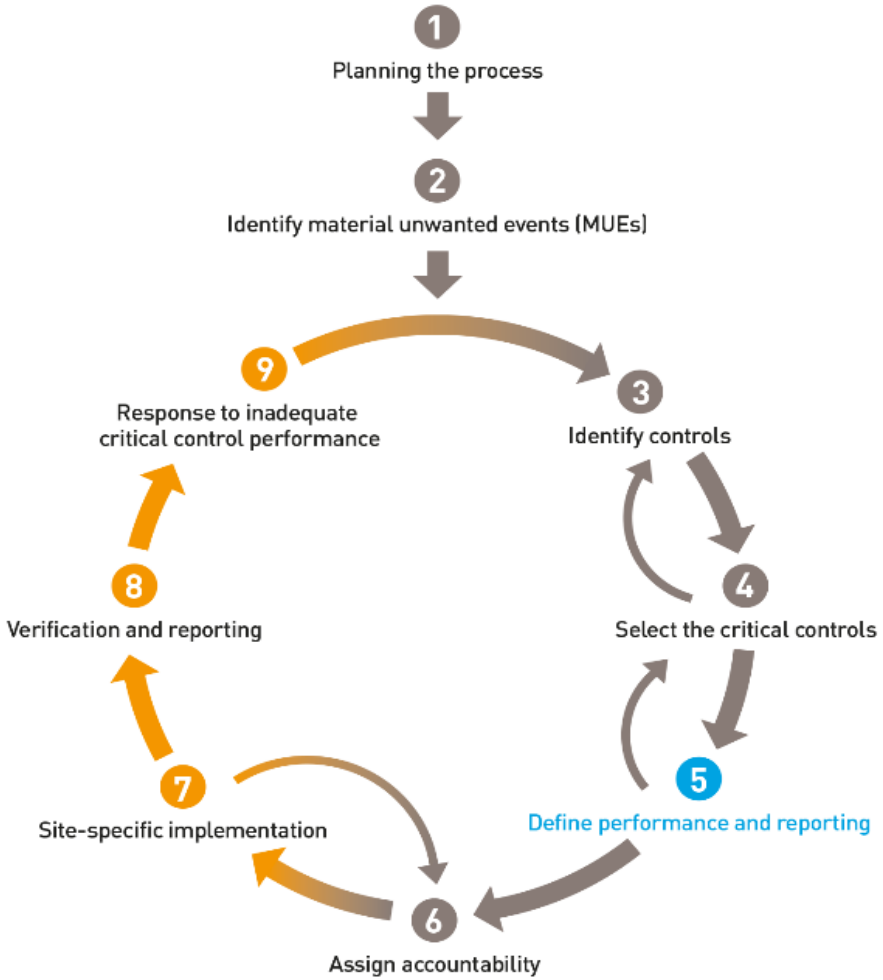
CONTROL QUALITY from matrix one

Analyse Critical Risks



- Desired outcome:
  - A Risk Analysis is performed of each Critical Risk
- What good looks like?
  - 1 Bowtie per Critical Risk.
  - Controls are SMART.
  - Effectiveness Assessment of each Control.
  - Critical Controls identified via a selection flowchart.
  - Critical Control Failure modes and prevention strategies identified.
  - Critical Control Risk Owners identified
- How does your business perform?

Define Performance Requirements



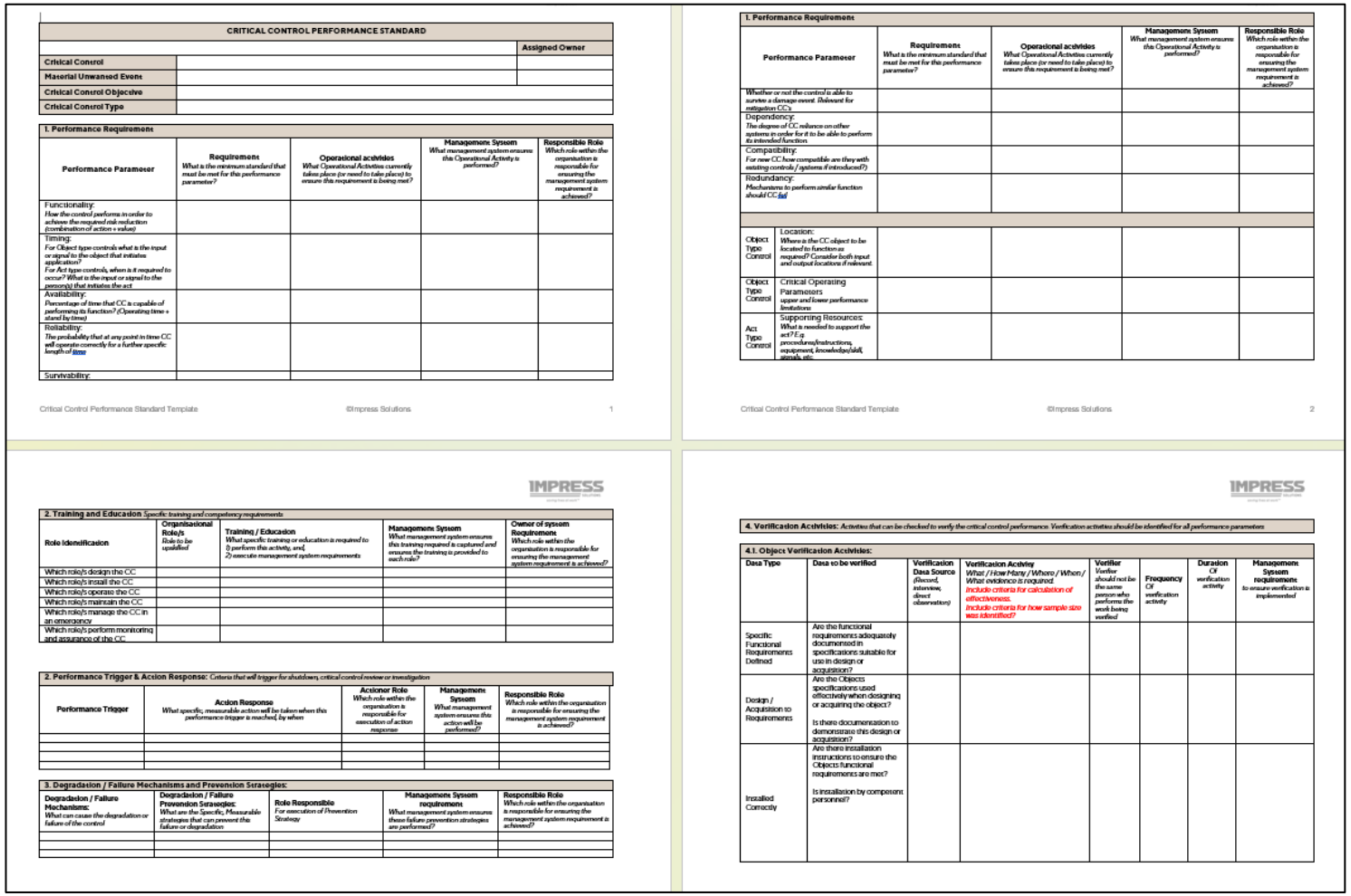
Desired outcome:

- Define the required performance of each Critical Control on aspects such as;
  - Activities that ensure Critical Control Operation
  - Ownership
  - Training
  - Failure Modes
  - Performance Triggers
  - Verification Strategies

What is a popular tool used to define Critical Control requirements?

Example Critical Control Performance Standard

- Objective: What is the Purpose of the CC
- Functionality: How the CC performs in order to achieve the required risk reduction
- Critical Operating Parameters: Upper and Lower performance limitations
- Timing: What is the input or signal that initiates the CC
- Availability: Percentage of time that CC is capable of performing its function
- Reliability: Probability that at any point in time CC will operate correctly
- Survivability: Ability of CC to survive a damage event
- Dependency: Degree of reliance on other systems for it to perform.
- Redundancy: Mechanisms to perform similar function should CC fail
- Control Type Specific requirements:
- Object Type Control
- Location: Where is the CC object to be located to function as required
- Act Type Control
- Supporting Resources: What is needed to support the act?
- Performance Trigger: Criteria that will trigger shutdown, critical control review or investigation
- Verification Activities: Activities that can be checked to verify critical control performance (Monitoring Activities)
- Degradation / Failure Mechanisms: What can cause the degradation or failure of the control
- Degradation / Failure Prevention Strategies: Strategies that mitigate control failure or degradation
- Control Effectiveness Assessment: How effectiveness will be measured



CRITICAL CONTROL PERFORMANCE STANDARD

		Assigned Owner
Critical Control		
Material Unwanted Event		
Critical Control Objective		
Critical Control Type		

1. Performance Requirements

Performance Parameter	Requirement *What is the minimum standard that must be met for this performance parameter?*	Operational activities *What Operational Activities currently takes place (or need to take place) to ensure this requirement is being met?*	Management System *What management system ensures this Operational Activity is performed?*	Responsible Role *Which role within the organisation is responsible for ensuring the management system requirement is achieved?*
Functionality: *How the control performs in order to achieve the required risk reduction (combination of action + value)*				
Timing: *For Object type controls what is the input or signal to the object that initiates application?* *For Act type controls, when is it required to occur? What is the input or signal to the person(s) that initiates the act*				
Availability: *Percentage of time that CC is capable of performing its function? (Operating time + stand by time)*				
Reliability: *The probability that at any point in time CC will operate correctly for a further specific length of time*				
Survivability:				

Critical Control Performance Standard Template ©Impress Solutions 1

1. Performance Requirements

Performance Parameter		Requirement *What is the minimum standard that must be met for this performance parameter?*	Operational activities *What Operational Activities currently takes place (or need to take place) to ensure this requirement is being met?*	Management System *What management system ensures this Operational Activity is performed?*	Responsible Role *Which role within the organisation is responsible for ensuring the management system requirement is achieved?*
Whether or not the control is able to survive a damage event. Relevant for mitigation CCs					
Dependency: *The degree of CC reliance on other systems in order for it to be able to perform its intended function.*					
Compatibility: *For new CC how compatible are they with existing controls / systems if introduced?)*					
Redundancy: *Mechanisms to perform similar function should CC fail*					
Object Type Control	Location: *Where is the CC object to be located to function as required? Consider both input and output locations if relevant.*				
Object Type Control	Critical Operating Parameters *upper and lower performance limitations*				
Act Type Control	Supporting Resources: *What is needed to support the act? E.g. procedures/instructions, equipment, knowledge/skill, signals, etc.*				

Critical Control Performance Standard Template ©Impress Solutions 2

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2. Training and Education *Specific training and competency requirements*

Role Identification	Organisational Role/s *Role to be upskilled*	Training / Education *What specific training or education is required to 1) perform this activity, and, 2) execute management system requirements*	Management System *What management system ensures this training required is captured and ensures the training is provided to each role?*	Owner of system Requirement *Which role within the organisation is responsible for ensuring the management system requirement is achieved?*
Which role/s design the CC				
Which role/s install the CC				
Which role/s operate the CC				
Which role/s maintain the CC				
Which role/s manage the CC in an emergency				
Which role/s perform monitoring and assurance of the CC				

2. Performance Trigger & Action Response: *Criteria that will trigger for shutdown, critical control review or investigation*

Performance Trigger	Action Response *What specific, measurable action will be taken when this performance trigger is reached, by when*	Actioner Role *Which role within the organisation is responsible for execution of action response*	Management System *What management system ensures this action will be performed?*	Responsible Role *Which role within the organisation is responsible for ensuring the management system requirement is achieved?*

3. Degradation / Failure Mechanisms and Prevention Strategies:

Degradation / Failure Mechanisms: *What can cause the degradation or failure of the control*	Degradation / Failure Prevention Strategies: *What are the Specific, Measurable strategies that can prevent this failure or degradation*	Role Responsible *For execution of Prevention Strategy*	Management System requirements *What management system ensures these failure prevention strategies are performed?*	Responsible Role *Which role within the organisation is responsible for ensuring the management system requirement is achieved?*

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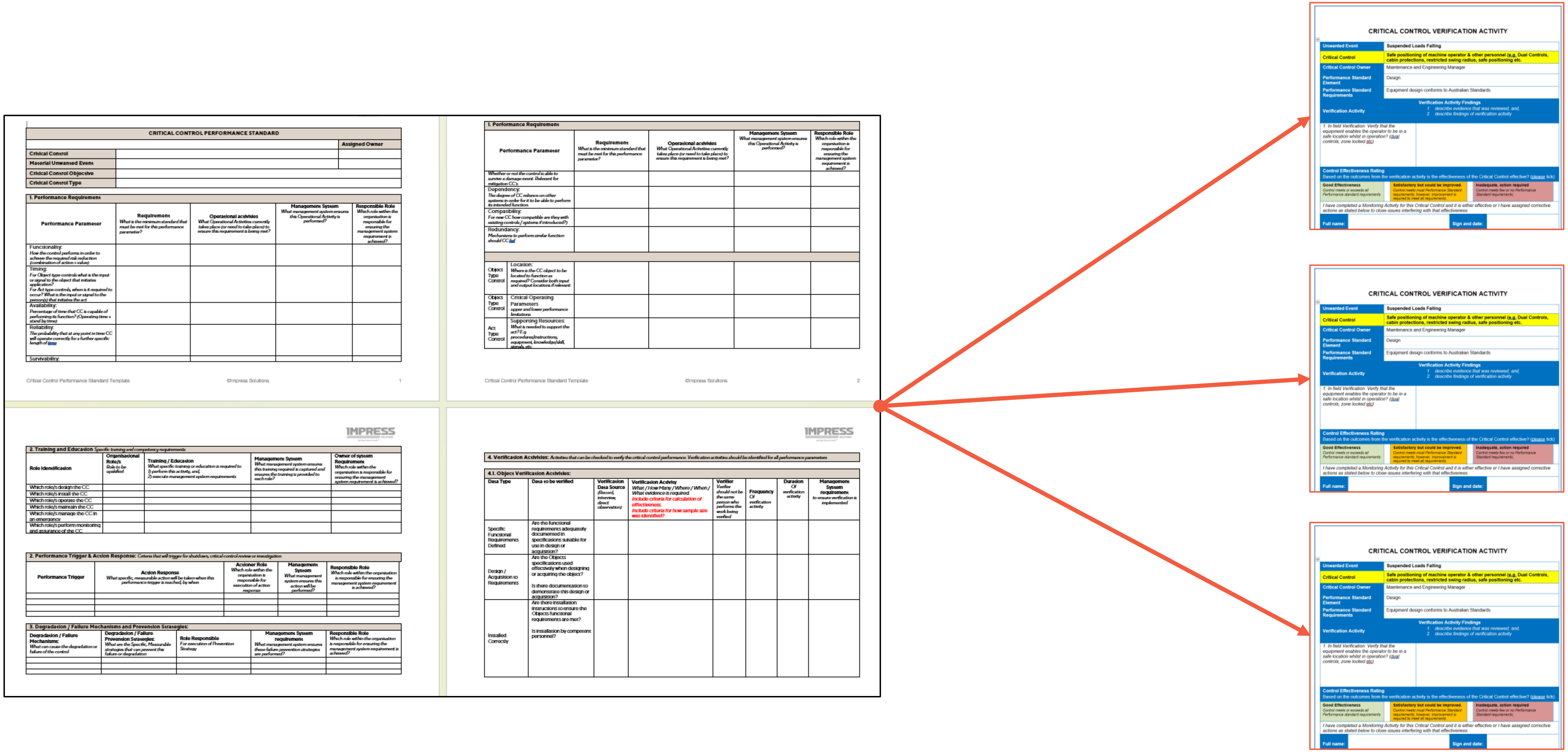
4. Verification Activities: *Activities that can be checked to verify the critical control performance. Verification activities should be identified for all performance parameters*

4.1. Object Verification Activities:

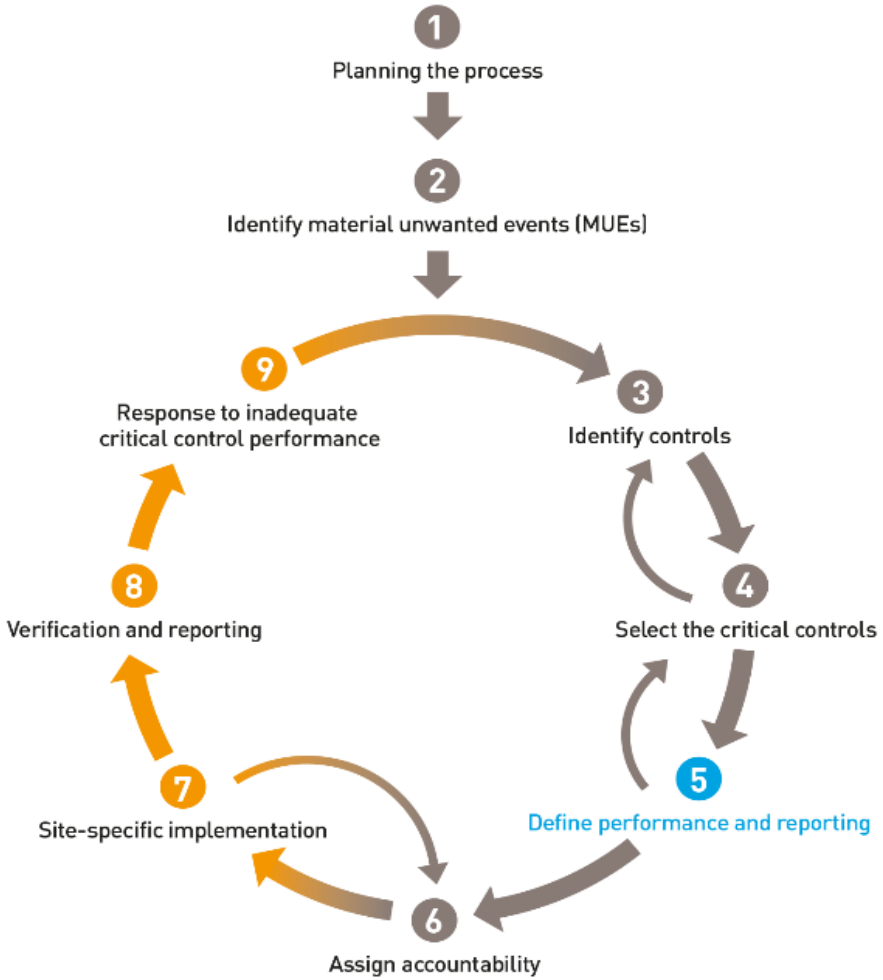
Data Type	Data to be verified	Verification Data Source *(Record, interview, direct observation)*	Verification Activity *What / How Many / Where / When / What evidence is required.* *Include criteria for calculation of effectiveness.* *Include criteria for how sample size was identified?*	Verifier *Verifier should not be the same person who performs the work being verified*	Frequency *Of verification activity*	Duration *Of verification activity*	Management System requirements *to ensure verification is implemented*
Specific Functional Requirements Defined	Are the functional requirements adequately documented in specifications suitable for use in design or acquisition?						
Design / Acquisition to Requirements	Are the Objects specifications used effectively when designing or acquiring the object? Is there documentation to demonstrate this design or acquisition?						
Installed Correctly	Are there installation instructions to ensure the Objects functional requirements are met? Is installation by competent personnel?						

Critical Control Verification Strategies

Who, checks what, how often

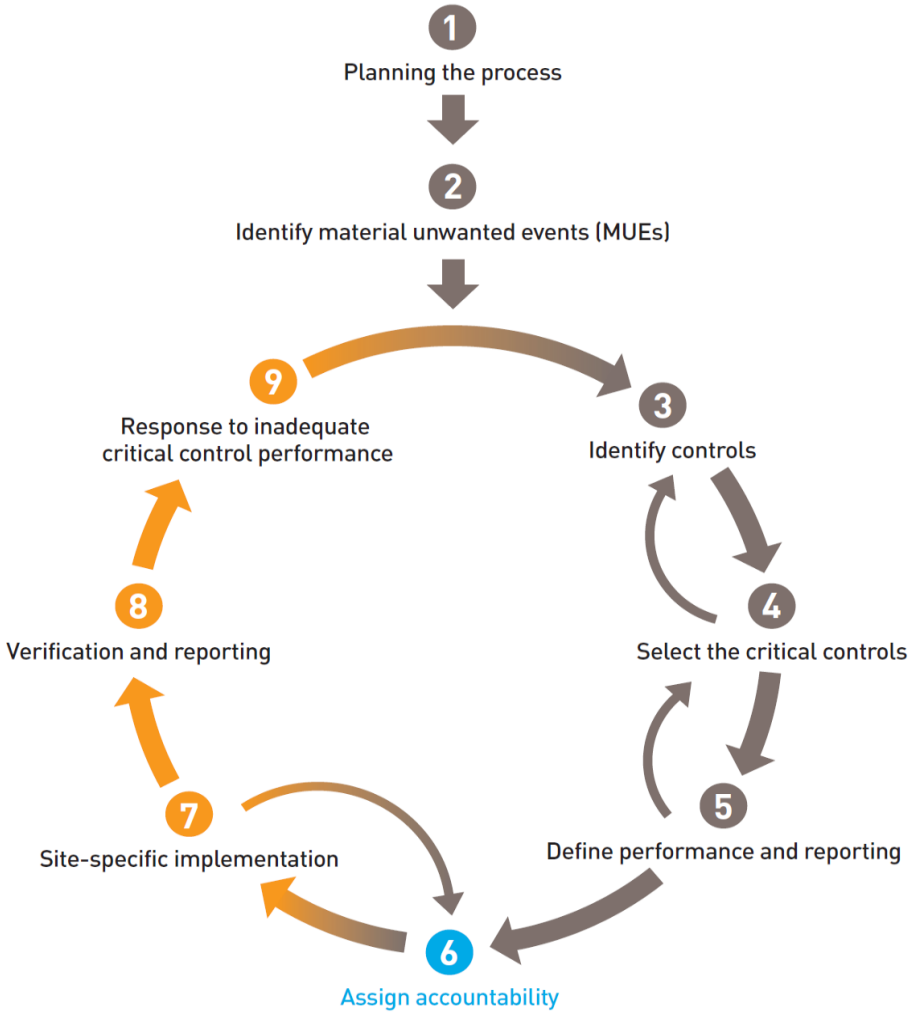


Define Performance Requirements



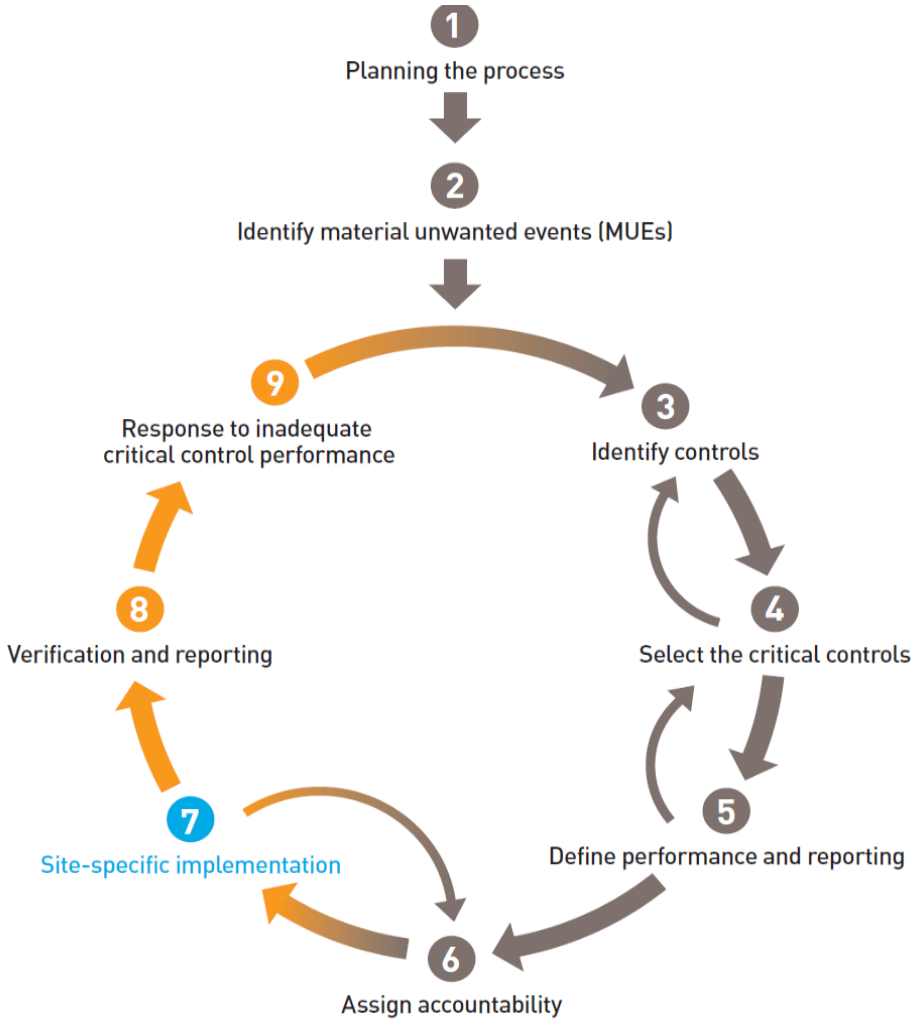
- Desired outcome:
  - Defined Critical Control Performance
- What good looks like?
  - 1x Performance Standard for each Critical Control (which covers all essential elements).
  - Each Performance Standard covers the essential elements.
  - Critical Control Verification Strategy
- How does your business perform?

Assign Accountability



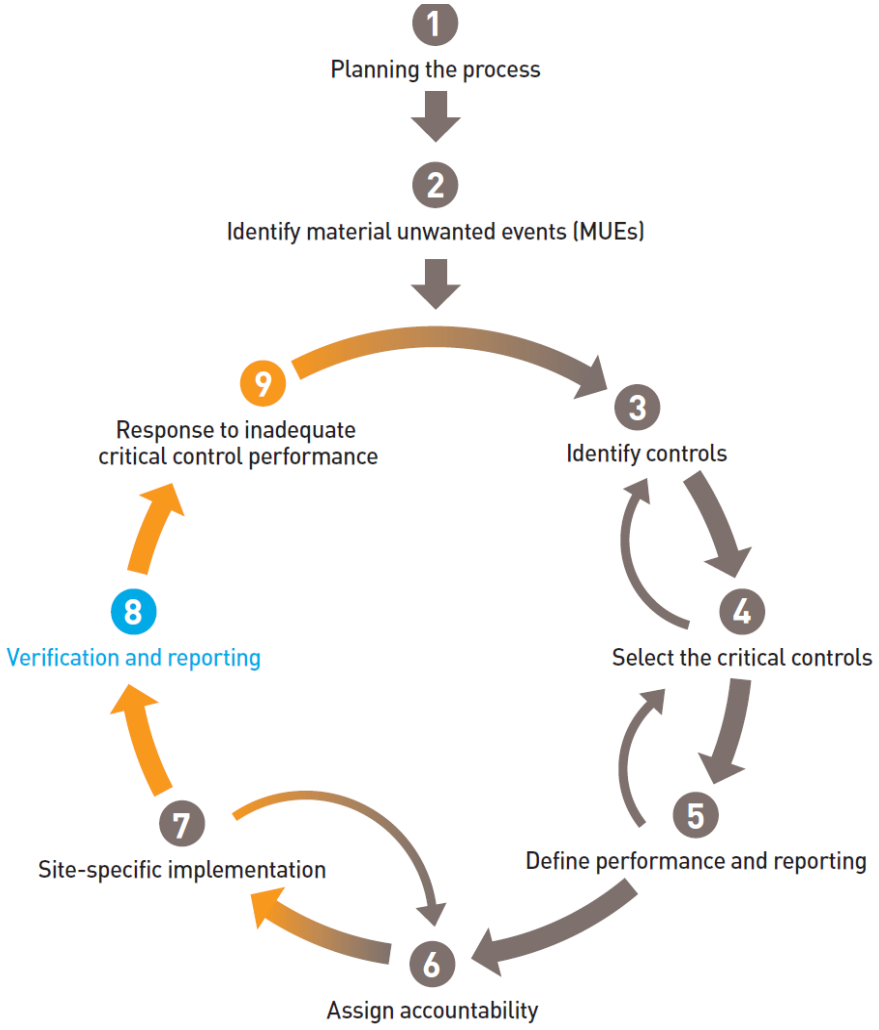
- Desired outcome:
  - Owners identified for Critical Risks, Critical Controls, Verification Strategies.
- What good looks like?
  - Formal appointments of Risk Owners and Critical Control Owners.
  - Training for key roles mapped into Training Needs Analysis
- How does your business perform?

Site Implementation



- Desired outcome:
  - Implement CRM Process.
  - Implement actions from upstream activities
- What good looks like?
  - All actions from BBRA and Bowties implemented.
  - Verification programs scheduled in system.
  - Safety and Health Management System documents created.
  - Training provided to key stakeholders (Risk Owner, Control Owner, Frontline worker)
- How does your business perform?

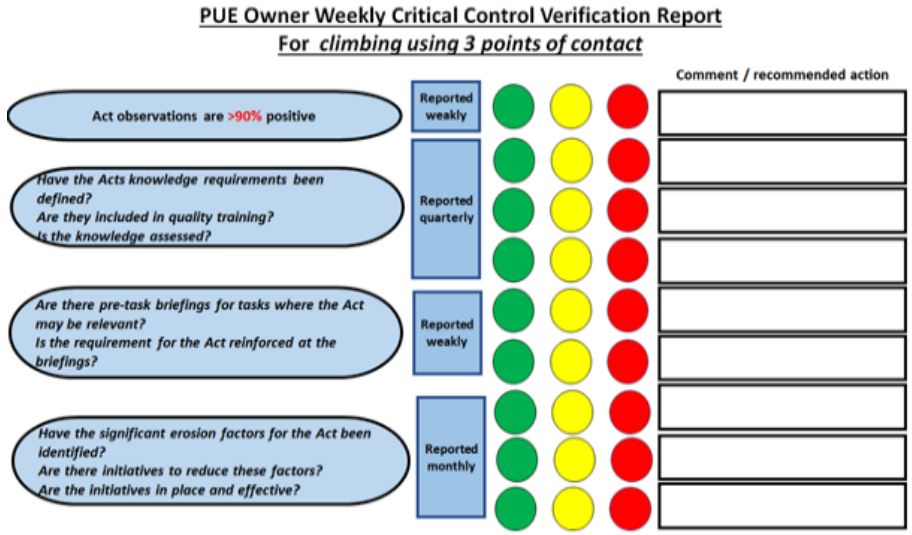
Verification and Reporting



- Desired outcome:
  - Implement verification activities
  - Report on process, risks and controls.

Reporting Considerations

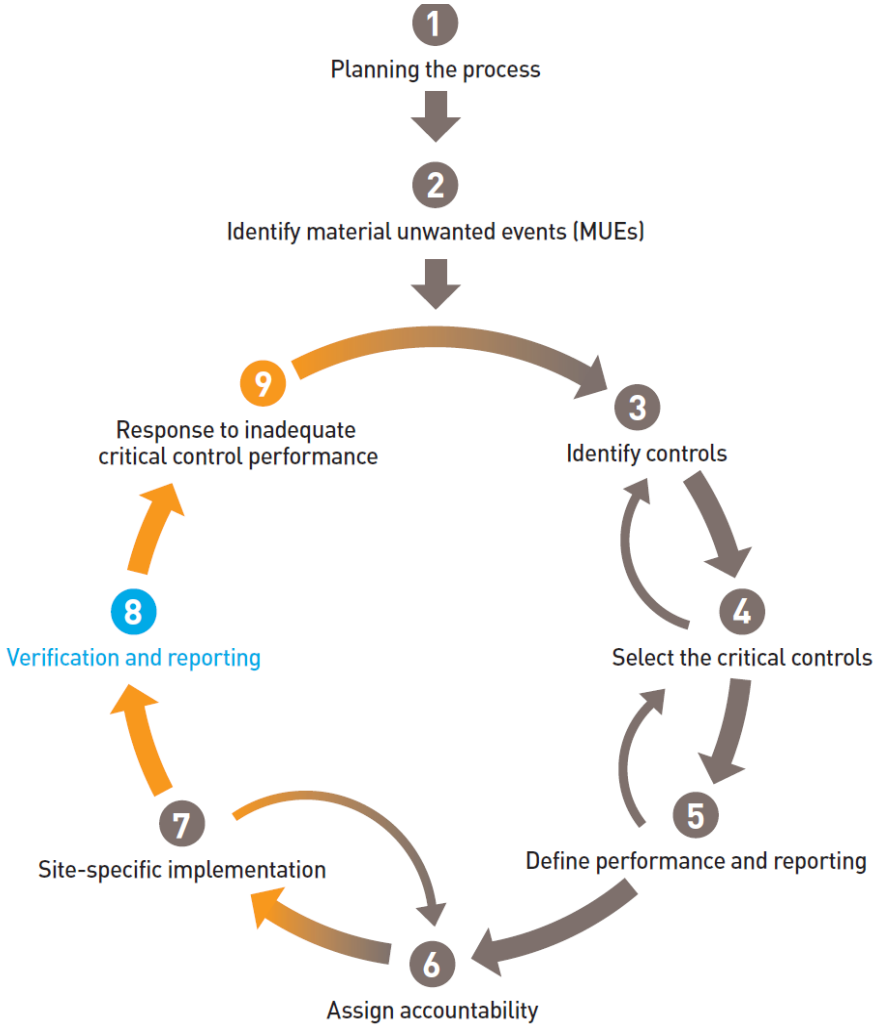
Score	Criteria
	Good Effectiveness - Control meets or exceeds all Performance standard requirements
	Satisfactory but could be improved - Control meets most Performance Standard requirements; however, improvement is required to meet all requirements.
	Inadequate, action required - Control meets few or no Performance Standard requirements;



Possible Process Metrics

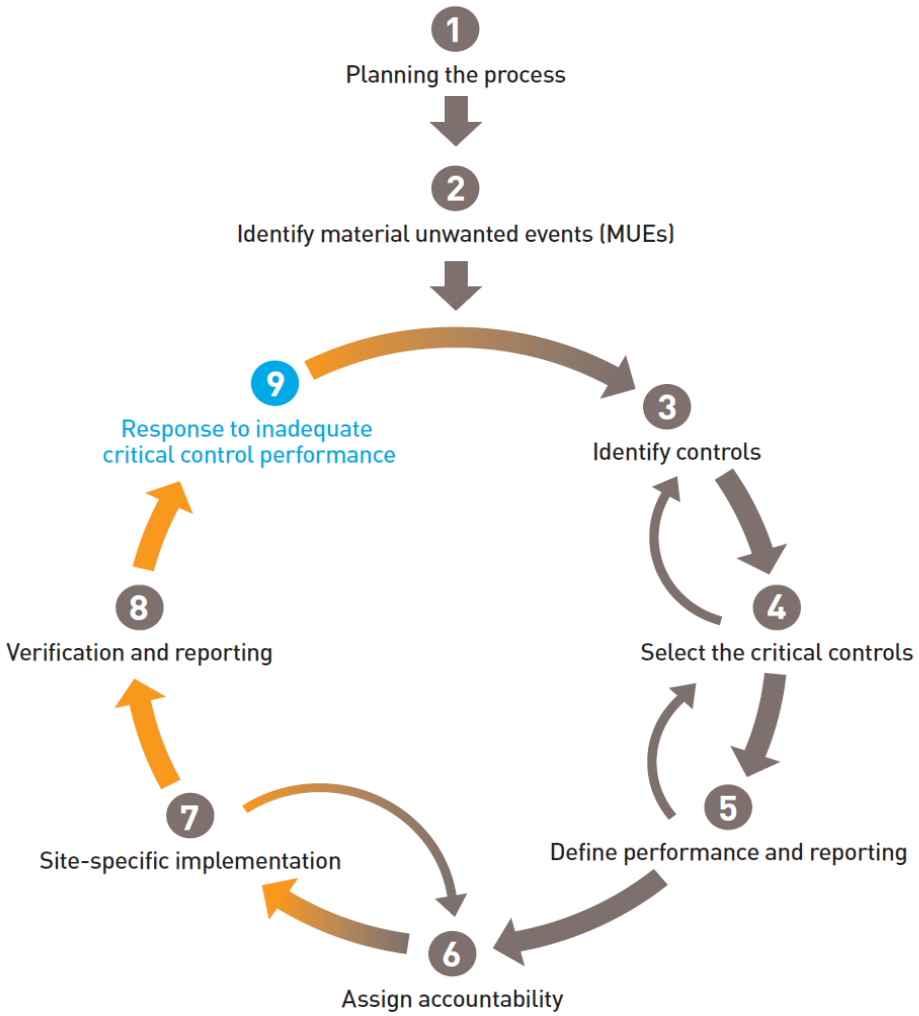
- Verification activities completed in compliance to schedule.
- Actions from verification activities completed in accordance to schedule
- Competent personnel completing verification activities
- Verification activities completed within window of allocation (between start and finish date)
- Amount of CRM actions closed
- Amount of CRM actions created
- CCVs with evidence attached
- Risk Owner and CC Owner training compliance
- Number of internal audits on CRM process
- Scheduled CRM related SHMS document reviews (Compliance to Plan)

Verification and Reporting



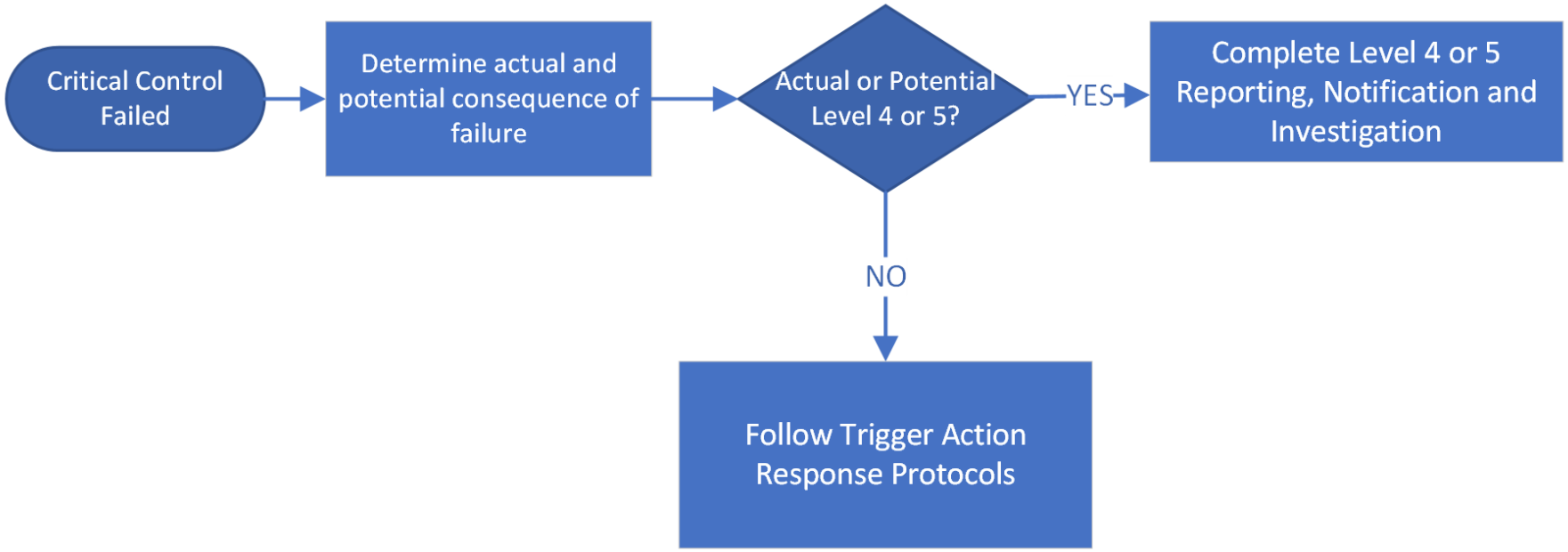
- Desired outcome:
  - Implement verification activities
  - Report on process, risks and controls.
- What good looks like?
  - KPIs implemented for CRM process.
  - Verification activities completed in accordance to schedule and evidence provided.
  - Critical Control failures fixed, reported as an incident (and seen as a good thing)
- How does your business perform?

Response to Inadequate Performance

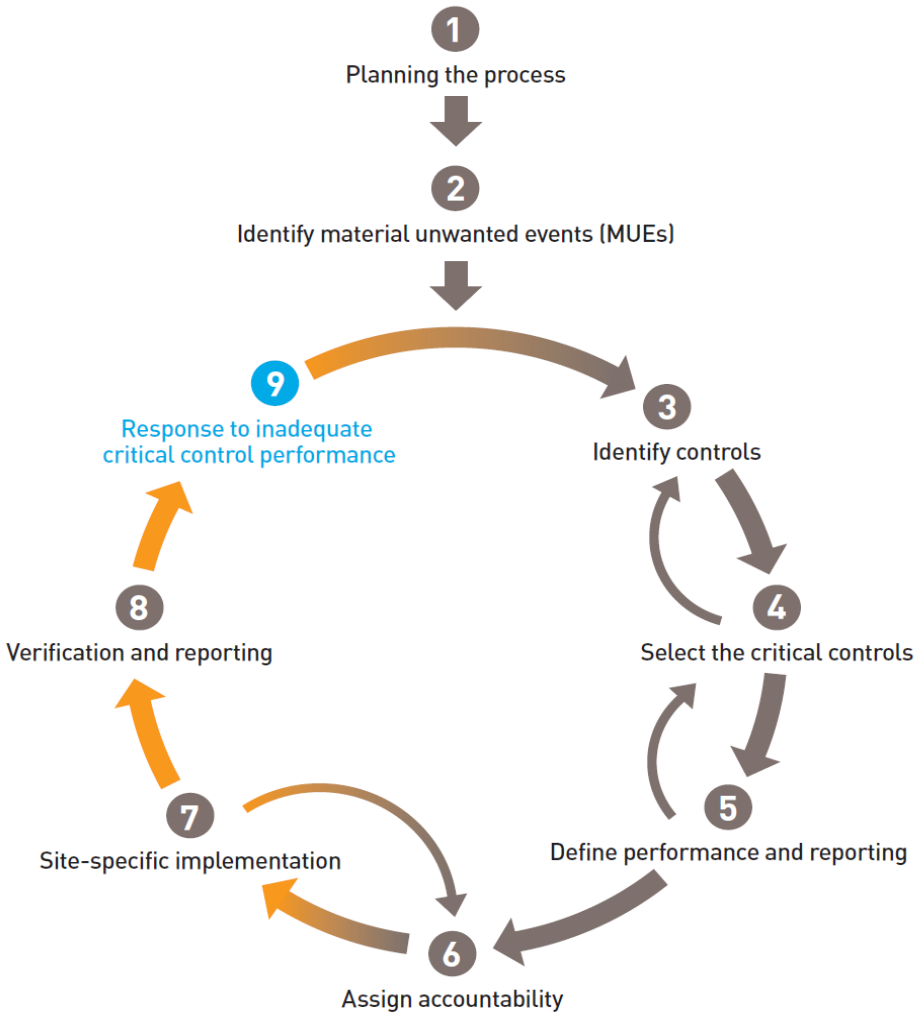


- Desired outcome:
  - Critical control and Risk owners are aware of critical control performance.
  - Critical Control Failures are investigated, and improvement actions implemented.

Control Failure Assessment process



Response to Inadequate Performance



- Desired outcome:
  - Critical control and Risk owners are aware of critical control performance.
  - Critical Control Failures are investigated, and improvement actions implemented.
- What good looks like?
  - Control failure assessment process defined
  - Incident Investigation process includes consideration of Critical Controls.
  - CRM Deliverables are updated based on findings from Investigations (e.g. Bowtie, BBRA, Performance Standard)
- How does your business perform?

Effective CRM process consists of multiple steps that build from the previous.

There are many activities and deliverables that need to be in place

The obvious question

How do I do it?

Slow or Fast

Trial and Error Vs system

Help is here

Free Gap Analysis of your CRM Process / Documents

It’s not for everyone.

Save lives at work

How it Works

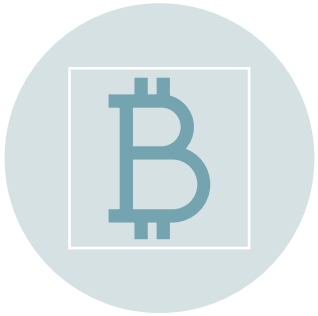
Email your CRM Procedure and Templates (BBRA, Bowtie, Performance Standard, PHMP) to admin@impresssolutions.com.au

We complete the Gap Analysis using our proprietary CRM Audit tool.

We have a 15-minute call to review the Gap Analysis outcomes

Benefits

We do all the work.



Cost you nothing.

Use our 25 years of CRM skills and experience to improve your process.

Identify low hanging fruit that can make meaningful change.

Only taking submissions for the next 2 weeks only.

LIVE

Uncover the Hidden Pitfalls in Bowtie Analysis:

NAVIGATE THE CHALLENGES LIKE A PRO!

WITH

Christian Young

January 16, 2023
11AM AEST

REGISTER NOW

LIVE

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CHRISTIAN YOUNG

NAOMI ARMITAGE

Unveiling the Hidden Threats:

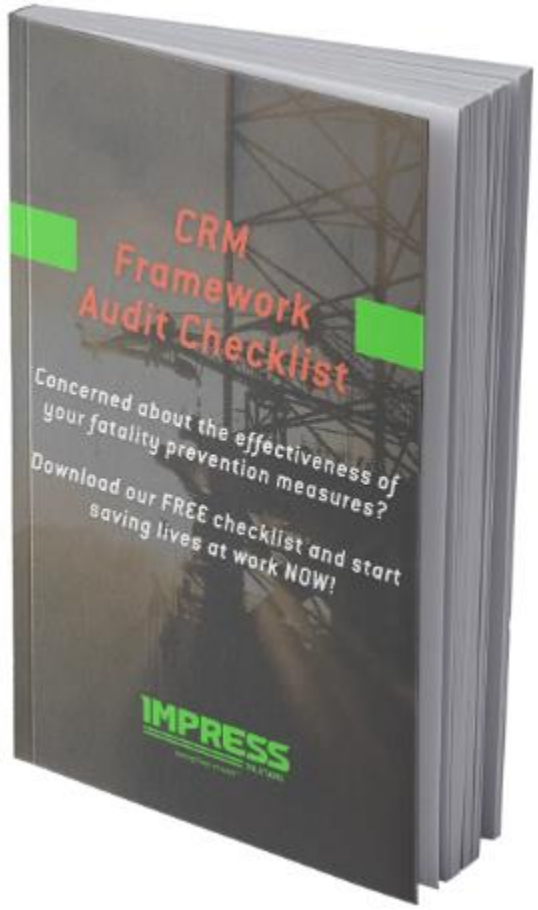
MASTERING PSYCHOSOCIAL RISK MANAGEMENT FOR A RESILIENT WORKPLACE

January 17, 2024 (12PM AEST)

Questions / Comments

Resources

- Email admin@impresssolutions.com.au
- Slides + Audio
- Bonus (CRM Audit Checklist)
- Once recording is edited, we will send through materials



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Thankyou