



Evolving Operational Risk Management in the Mining Industry

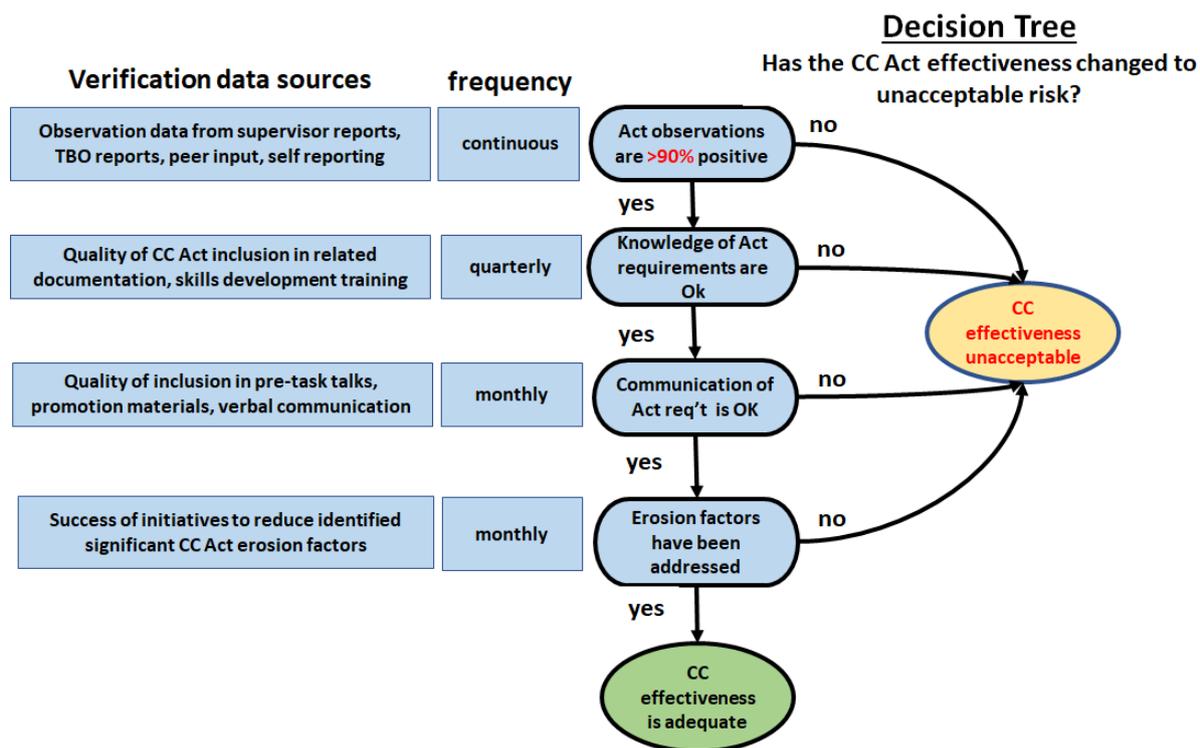
By Jim Joy

Article 12 – Linking the Critical Control performance requirements to the design of the verification process

Welcome to the 12th article in the series, intended to generate discussion amongst H&S risk professionals and managers about improvements to the site Operational Risk Management (ORM) thinking and methods, specifically related to control-based risk management and Critical Control Management (CCM).

The content of this article has been developed in conjunction with another retired risk management professional, Andrew Morrell. Andrew and I had several discussions before the last article was published, helping to demonstrate the importance of linking the Critical Control (CC) verification process with performance requirements. This is especially relevant if the company or site selects Acts as a CCs.

Several examples of companies or sites at different stages of the CCM journey were suggested in previous articles. This article will continue with the discussion of verification for companies or sites that are advanced in their control-focused maturity.

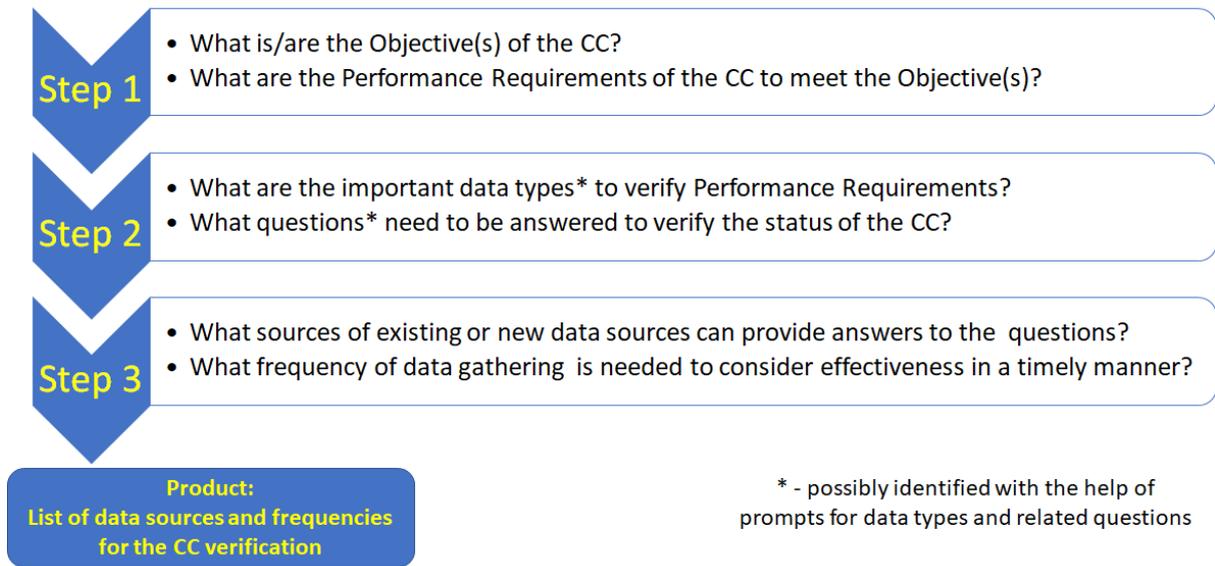


In the last article the illustration above was used to suggest a basic verification algorithm for establishing the effectiveness of a CC Act. Four binary statements are used to create a decision tree that could establish if a CC Act is acceptably effective. Boxes on the left list potential sources of data to address the statements, as well as example frequencies for gathering the required data.

The previous article also mentioned the relationship between verification to determine CC effectiveness and the performance requirements. (Verification is defined in the ICMG guide as “the process of checking the extent to which the performance requirements set for a critical control are being met in practice.”)

However, it may be valuable to take a more systematic approach to this relationship. The illustration below starts to build on the approach by suggesting a three-step process from CC selection to verification process design. Note that the illustrated process is linear but, the process is usually iterative.

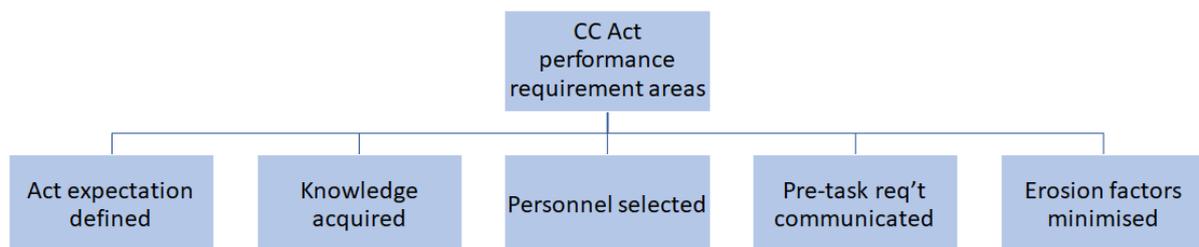
Critical Control (CC) Verification Process Design



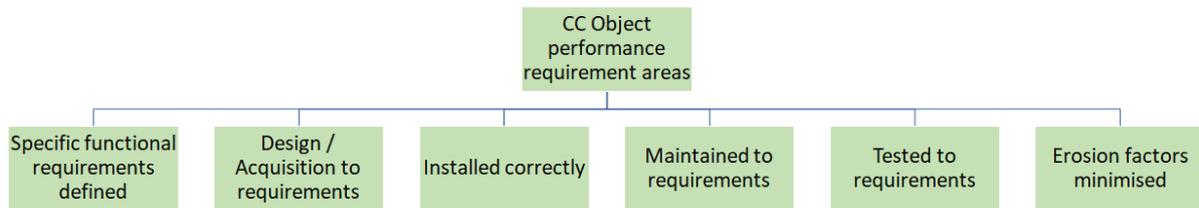
Step 1 was outlined in Article 10 of the series. The first illustration in this article, also found in article 11, is a basic illustration of Step 3. However, Step 2 has not been significantly discussed in earlier articles. Step 2 provides a systematic link between Performance Requirements and Verification design and, iteratively, may assist with the development of Performance Requirements.

Following are two examples of prompts for 'data types' as suggested in Step 2. **Note that these topics go beyond the often limited direct observation of acts or objects that gather data on effectiveness.** The 'data types' below generally describe an Act or Object lifecycle from left to right.

CC Act Performance Requirements



CC Object Performance Requirements

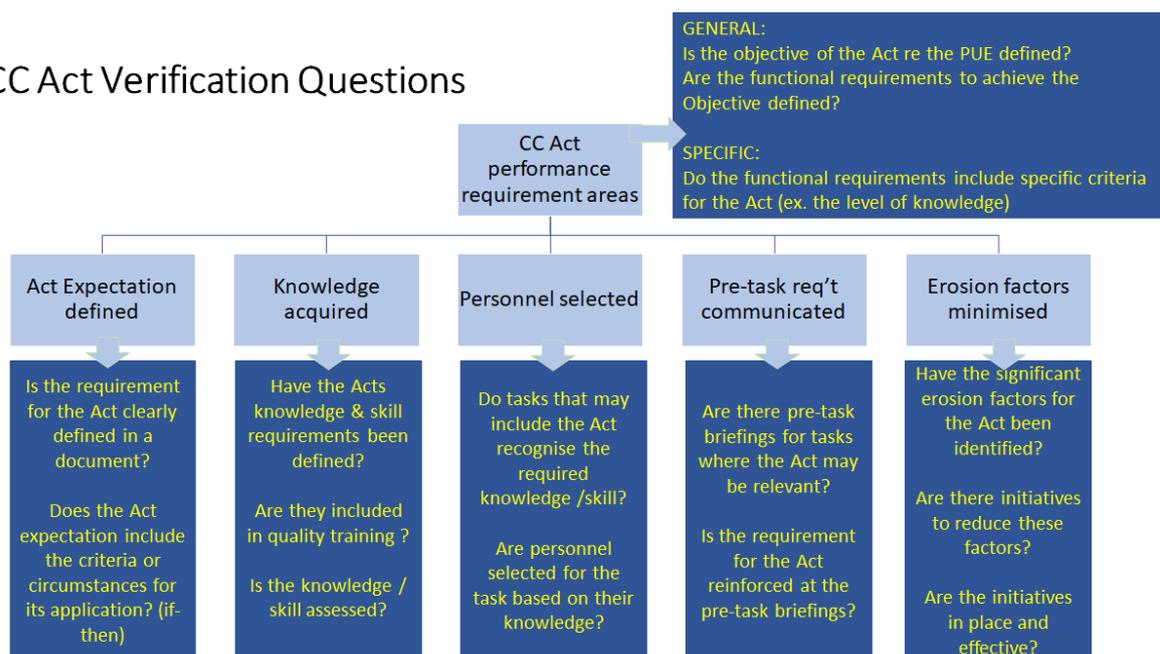


The above illustrations suggest a basic set of ‘data types’ for a CC Act or Object that might be considered for topics to help define CC Performance Requirements, in addition to any direct observation data. Depending on the specific CC, some ‘data type’s may be more important than others. This should be reflected in the specific Performance Requirement description.

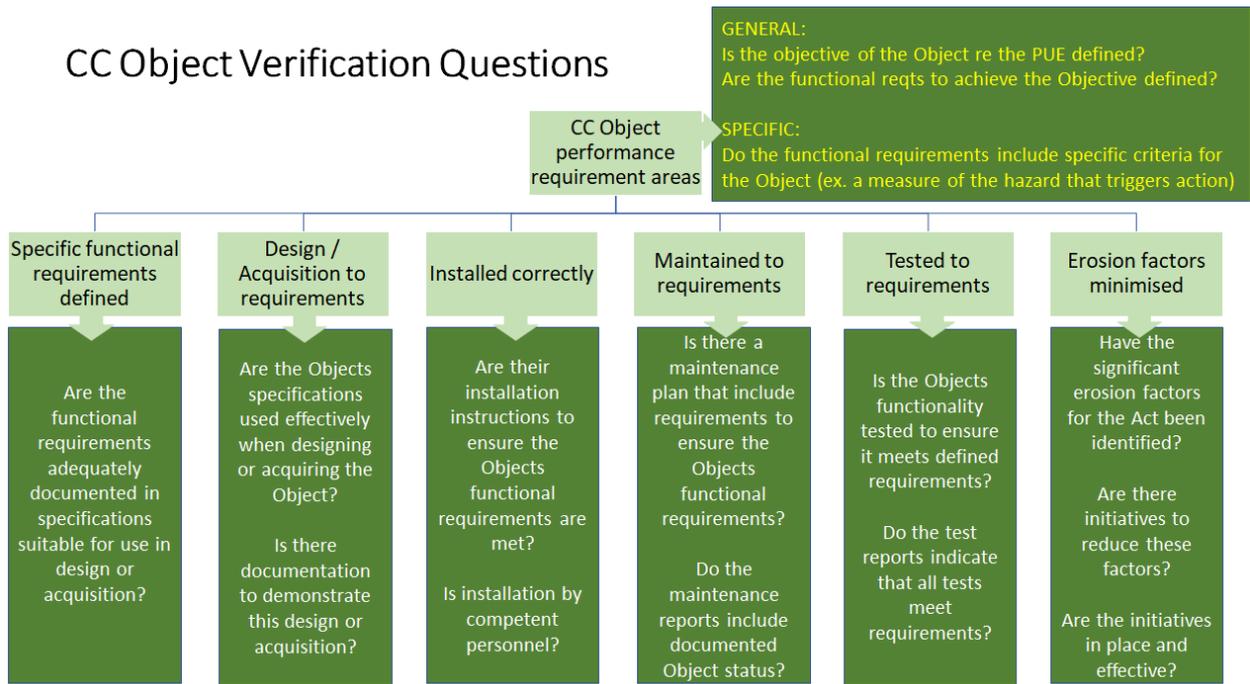
Once the Performance Requirements, aligned with the data types, are defined, questions to determine whether the data type issue is adequately addressed need to be developed.

Questions could range from general to very specific depending on the Performance Requirements, as per the example illustrations below.

CC Act Verification Questions



CC Object Verification Questions



Consider two different CC Acts as examples. In past articles we have considered the act of **climbing using 3 points of contact**.

What is/are the Objective(s) of the CC? *This Objective of the Act is to have a person **climbing** equipment or structure protected from falling a distance that could lead to a fatality or permanent disability by requiring the person to **have three points of contact** while climbing that are secure and stable.*

What are the Performance Requirements of the CC to meet the Objective(s)?

1. Act expectation defined – *The requirement to **climb using 3 points of contact** and the situations where is a requirement are clearly documented.*
2. Knowledge acquired – *Training for all relevant personnel is in place to introduce the Act requirements and the relevant situations for its' application. Assessment to ensure understanding is part of the training.*
3. Personnel selected – *Tasks where climbing equipment or structure is required are only done by those who have had successful training.*
4. Pre-task requirement communicated – *Pre-task or pre-shift briefing where the tasks may include climbing equipment or structure involve reinforcement of **climbing using 3 points of contact** by the briefing leader.*

5. Erosion factors minimised – *Erosion factors such as the need to carry materials / items when climbing, as well as the provision of secure climbing hand and foot holds on all relevant equipment and structures should be examined and actions clearly undertaken to address these or any other erosion factors that may compromise adherence to the requirement.*

What are the important data types to verify Performance Requirements? *All 5 areas are relevant but areas 2, 4 and 5 are likely the most important for verification. The **climbing using 3 points of contact Act** is not complex, but training (2) is important to ensure all understand the situation where it is relevant – such as a height or fall exposure criteria. Timely reinforcement (4) in pre-task briefing before relevant tasks helps reduce errors related to mistakes. Area 5 is very important at all sites where climbing locations, surfaces, hand/foot etc holds may be inadequate.*

What questions need to be answered to verify the status of the CC? *Recognising the aforementioned most important areas, the following questions are suggested.*

- a) *Have the Acts knowledge requirements been defined?*
- b) *Are they included in quality training?*
- c) *Is the knowledge assessed?*
- d) *Are there pre-task briefings for tasks where the Act may be relevant?*
- e) *Is the requirement for the Act reinforced at the pre-task briefings?*
- f) *Have the significant erosion factors for the Act been identified?*
- g) *Are there initiatives to reduce these factors?*
- h) *Are the initiatives in place and effective?*

What sources of existing or new data sources can provide answers to the questions? *The site can identify the sources of information that will answer the questions. Some will involve reviewing documentation and systems information, while other will involve observation. For example, a, b, c, f, and g would involve finding and reviewing documentation that answers the questions satisfactorily. Questions d and e would involve observation of task briefings.*

What frequency of data gathering is needed to consider effectiveness in a timely manner? *Documentation review to answer questions a, b, c, f and g could be done every quarter while task briefing observations (question d and e) should be done more often such as once a month or once a week. Note that one company assigns review and observation tasks to supervisors or managers who are NOT technically familiar with the Act which provides a potentially more critical perspective.*

Our second example is an act intended to mitigate an unwanted event; ***call for additional support for changing roof conditions in an underground mine***. The second example is intended to generate thoughts about more complex Acts where knowledge and skill are more critical for success, as well as the application of the Act is much more infrequent, thereby less practiced and possibly less reliant on experience.

Much of the content from the previous example Act is relevant to this second example so only information that varies greatly, based on the rationale in the previous paragraph, is provided below.

What is/are the Objective(s) of the CC? *This Objective of the Act is to have a person who observes a significant negative change in heading ground conditions call for additional support to be installed. Significant negative changes would include the following observable conditions*

What are the important data types to verify Performance Requirements? *All 5 areas (see previous example for list) are relevant but areas 2, 3 and 5 are likely the most important for verification. The ***call for additional support for changing roof conditions*** Act is potentially complex. Training (2) and experience to ensure adequate knowledge and skill are very important to successful application of the Act. Selection of personnel (3) that may be exposed to the ground conditions that initiate the Act is also very important. Area 5 may be important if the site recognises that factors such as, for example, production pressure or limited resources may compromise the Act.*

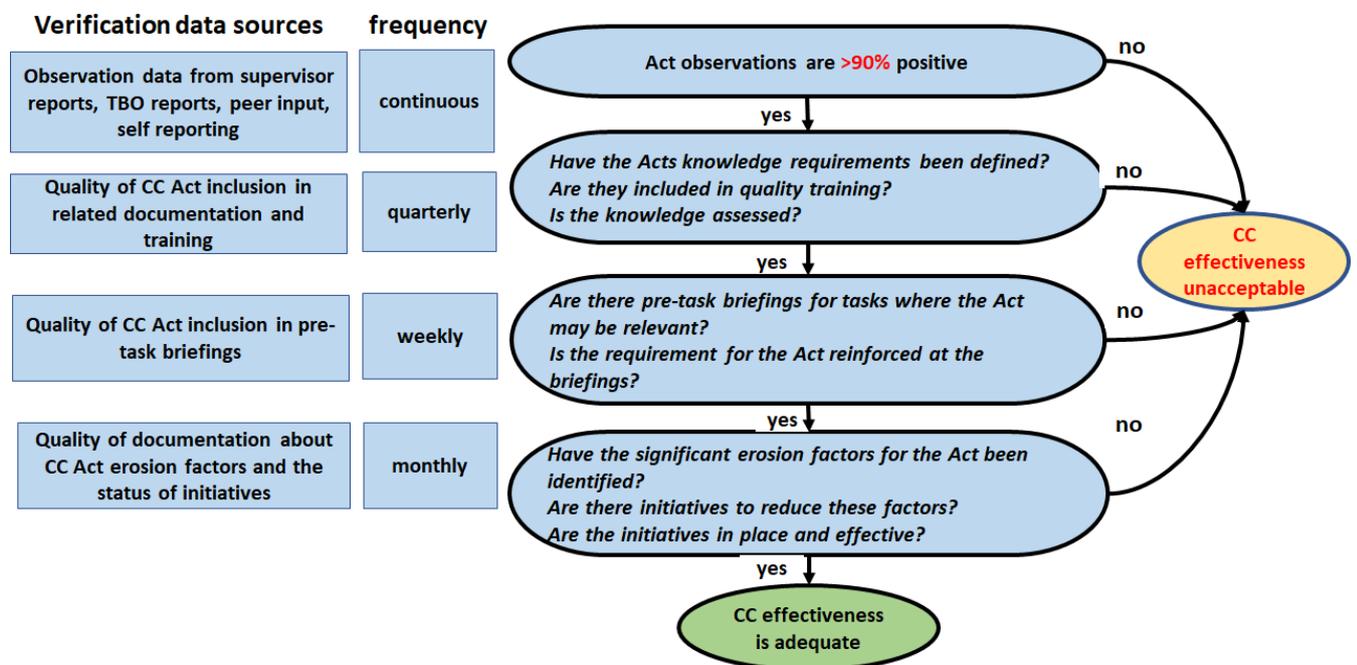
What questions need to be answered to verify the status of the CC? *Recognising the aforementioned most important areas, the following questions are suggested.*

- a) Have the Acts complex knowledge and skill requirements been defined?
- b) Are they included in quality training?
- c) Is the knowledge and skill assessed?
- d) Do tasks that may require the Act recognise the required knowledge and skill?
- e) Are personnel selected for the tasks based on their relevant training, experience, knowledge and skill?
- f) Have the significant erosion factors for the Act been identified?
- g) Are there initiatives to reduce these factors?
- h) Are the initiatives in place and effective?

Note the verification emphasis has changed somewhat in example two due, mainly, to the difference in complexity between the example Acts.

We can now modify the first illustration in this article to create a specific CC Act basic algorithm that includes the verification data sources and frequency of verification. Note that a similar process of algorithm definition can be done using the CC Object information.

Decision Tree for climbing using 3 points of contact



For a Critical Control the answers to the questions should always be an unqualified yes, Any verification information that indicates anything less should be captured and immediately addressed via the reporting system (the next article).