

Practical Leadership for Process Safety Management

Ian Travers, Ian Travers Ltd, Heswall, UK, www.iantravers.co.uk

We have come a long way in the last 10 years on establishing effective leadership within major hazard organisations. But what does this look like in practice? This paper presents a practical leadership model to be adopted by high risk enterprises that puts information and intelligence on process safety performance at the heart of effective leadership. This is a step-by-step guide to becoming an effective leadership team. The approach aligns with the UK COMAH Competent Authority's proposed intervention program on leadership.

Introduction

This paper sets out a practical leadership model which covers each aspect of risk management for senior executives and Board members within a high hazard organisation. It builds on the author's many years of practical experience of both good and inadequate leadership within the process and major hazard industries. The model puts proactive discovery of information on the status of risks at the centre of effective leadership. The model builds on existing good practice guidance such as the OECD Guidelines on Corporate Governance in Process Safety ¹ and on the UK Process Safety Leadership Principles of Process Safety Leadership ².

Adopting this model will help senior executives make sense of the complexity of process safety systems and the reality of how well risks are being managed on a day to day basis. It will equip leaders with the skills and knowledge to ask the right questions, challenge what they are being told and to be much more pro-active.

You can only be an effective leader if you fully understand the objectives you wish to achieve and the measures and the strategies needed to reach those objectives in the most efficient and effective way. The problem that has handicapped improvements in effective process safety leadership in recent years has been a lack of thorough understanding by senior managers of the measures and strategies needed to be in place to control major hazard risks. So even in organisations with strong and well-developed process safety management systems senior managers often find themselves making decisions on information provided to them about risks without fully understanding the context or value of that information or how to challenge and probe the reality of the situation presented to them. This would not be tolerated in any other aspect of business management and decision making. Because the meaning and purpose of process safety management is difficult to grasp for senior executives and for non-process safety practitioners then it is no surprise that companies still tend to see their performance and safety success through the lens of personal safety and lost time incident rates.

This paper sets out a step by step guide for leaders to follow the simple 'plan, do, check and act' management model with a focus on major hazard risks. An overview of the model is shown in Figure 1.

For major hazard enterprises based in the UK the provision of this model is timely as the COMAH Competent Authority, CA, are about to embark on a strategic inspection program on leadership and will also closely examine the role of leadership in the investigation of major accidents ³. The CA Inspection Delivery Guide and Major Hazard Leadership Tool are to be published early in 2019.

Inspections at COMAH establishments will seek to benchmark the operator's arrangements against the CA's Major Hazard Leadership Intervention tool. This covers eight key areas:

1. Safety leadership is at the core of managing a major hazard business,
2. Major hazard leadership requires Board level involvement and competence,
3. Good major hazard management does not happen by chance and requires constant active engagement,
4. Board-level visibility and promotion of major hazard leadership is essential to set a positive safety culture throughout the organisation,
5. Engagement of the workforce is needed in the promotion and achievement of good major hazard control leadership,
6. Monitoring major hazard performance is central to ensuring business risks are being effectively managed,
7. Publication of major hazard performance information provides important assurance about the management of risks by an organisation, and
8. Sharing best practice across industry sectors, and learning & implementing lessons from relevant incidents in other organisations, are important to maintain the currency of corporate knowledge and competence.

In addition, the role of senior managers will be examined during investigations to establish whether, how and where leadership failures at senior and Board level may have contributed to a major incident.



Figure 1: Overview of the key stages of practical leadership for major hazards.

Discover how well risks are being managed.

The first stage of the leadership model outlined in this paper places a strong emphasis on active discovery by senior managers of the hazards and risks present within the business. This is in sharp contrast to the current common approach where leaders wait to be told about risk and performance and therefore are open to being presented with a filtered or ‘photo shopped’ version of reality. My experience from investigating major incidents is that CEOs and senior managers have a false sense of positive reality in terms of how well risks were being managed. Below are some commonly expressed responses to the incredulity that an incident has occurred:

*Safety is our number one priority – we always put safety first,
I just don’t understand how it could happen,
No one ever mentioned we had a problem,
We have professional safety experts,
We never skimp on safety,
We have extensive systems and procedures,
HSE has regulated us for years and we have never had anything serious wrong,
We have a comprehensive safety report scrutinised by the Competent Authority, and
We have never had a major incident before.*

And yet an investigation often went on to reveal deep-seated and systematic failures in the management of process safety risks which had persisted for quite some time. This false sense of security could arise from a poor safety culture within the organisation which only sought to report good news upwards, often from fear of retribution. This distortion of reality has to be backed up with either a large degree of hubris about how well risks are being managed or a lack of comprehension of how to make sense of hazards and risks within the workplace and what measures are needed to keep them at bay.

To be effective, leaders have to be information hungry and actively seek out information to show what risks are present and how well they are being managed. Figure 2 illustrates the range of information and intelligence needed.

The difficulty with low probability and high consequence major incidents is that the past is a poor predictor of the future and there is often a lack of information on the background incidence of low-level process safety incidents and failures in control measures to alert senior managers to emerging problems. Process safety is further complicated by the fact that, unlike personal safety, process safety risks are not easy to visualise and can’t readily be determined by simply looking at the condition of the plant and equipment. Contrast this with the immediate and obvious personal safety feedback which can be gained by discovering that employees are not wearing the correct PPE or say working dangerously at height.

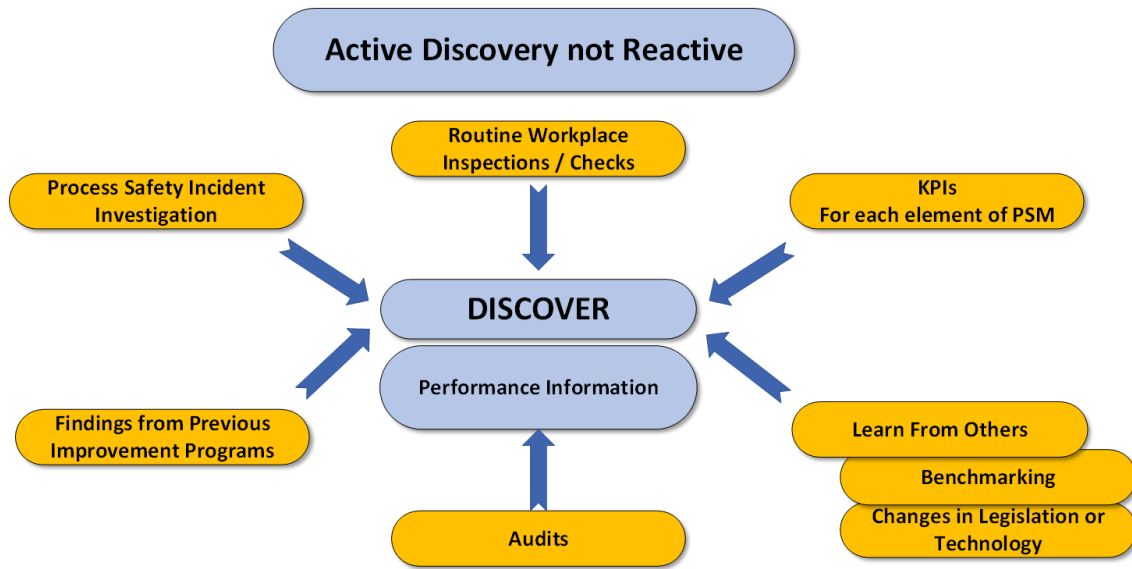


Figure 2: Active discovery of process safety risk performance

To be effective, leaders need to scavenge process safety information from every corner of the business. They should be the customers for intelligence gained from workplace inspections, safety tours and from process safety audits. Organisations should set clear definitions of a process safety incident so that low-level events can be reported and scrutinised to discover what went wrong, rather than who to blame. Information and intelligence should be extracted from incident investigations to fully understand which element of control failed to perform as it should have.

The new Competent Authority Leadership Delivery Guide and the COMAH Regulations make it clear that organisations must look externally for information on incidents which may provide insights to their own risk management arrangements. Senior managers should collaborate with other companies and other sectors to share learning and scout out effective solutions to process safety risk management.

Effective and continuous information from carefully set key performance indicators, KPIs, should be the process safety currency and form the balance sheet which shows routinely whether major hazard risks are being controlled. Leaders should not be passive in the establishment of effective KPIs as they should set the agenda on what information they require and how often. This of course in turn requires a keen understanding of process safety risks and effective control solutions.

Understand Process Safety Hazards and Risk



Figure 3: Understand process safety hazard and risk

It is self-evident that process safety hazards will not take care of themselves and that if not suitably controlled then there could (or will) be severe consequences. Most senior managers understand this but how such hazards are controlled and what the

most effective way of achieving this is often a complete mystery to leaders. How a systematic approach to risk management is achieved via the elements of a process safety management system is a complete 'black box' to many senior managers. The incredible aspect of this lack of thorough understanding is that a serious process safety incident is likely to seriously damage or even destroy the very assets by which the company makes its profits. This point was underlined in the UK COMAH Strategic Forum publication 'Managing Risks: The hazards that can destroy your business'⁴. Yet how to be successful in this aspect of business seems to be an 'unknown' to the most senior managers within the business. It is hard to envisage any other aspect of business management where this degree of uncertainty would be sustainable.

Senior managers need to develop a working knowledge of the hazards present and the likely failure scenarios which could ensue in the event of a loss of control. The elements are shown in Figure 3. This risk profile should be at the forefront of all the decision making within the business. Leaders also need a good working knowledge of the process safety management system in place to prevent a loss of control and to mitigate the consequences. Figure 4 shows a simple process safety management framework⁵. Each element has a purpose and an outcome and leaders should be familiar with each element of their own framework and what each component needs to deliver in order to control risks.

Examples of these outcome statements for a few elements of the framework are given below:

1. **Hazard Identification - Objectives:**
 - a. To ensure that all types of harm or danger which can give rise to a catastrophic failure or major accident are identified and quantified.
 - b. The organisation of this information into specific scenarios which cover how a hazard may give rise to a major incident, in what circumstances, where or when in terms of location and activity and to determine the initial consequences in terms of susceptible people, assets and the environment.
2. **Risk Assessment Objective:** To determine the detailed consequences of a catastrophic incident and to then determine the control and mitigation measures required to be in place to reduce the likelihood of a catastrophic event to an acceptable level.
3. **Plant / Process Design Objectives:**
 - a. Utilising the results of risk assessment to determine the 'basis of safety' required to prevent a catastrophic incident and then to design, construct and commission the facility to ensure that the risk reduction / mitigation objectives are effectively implemented.
 - b. Ensuring there is accurate information and records of the design specification, the rationale for selecting particular safeguards, control systems and design.
 - c. To ensure that essential process safety information is secured and available for those who may require it.

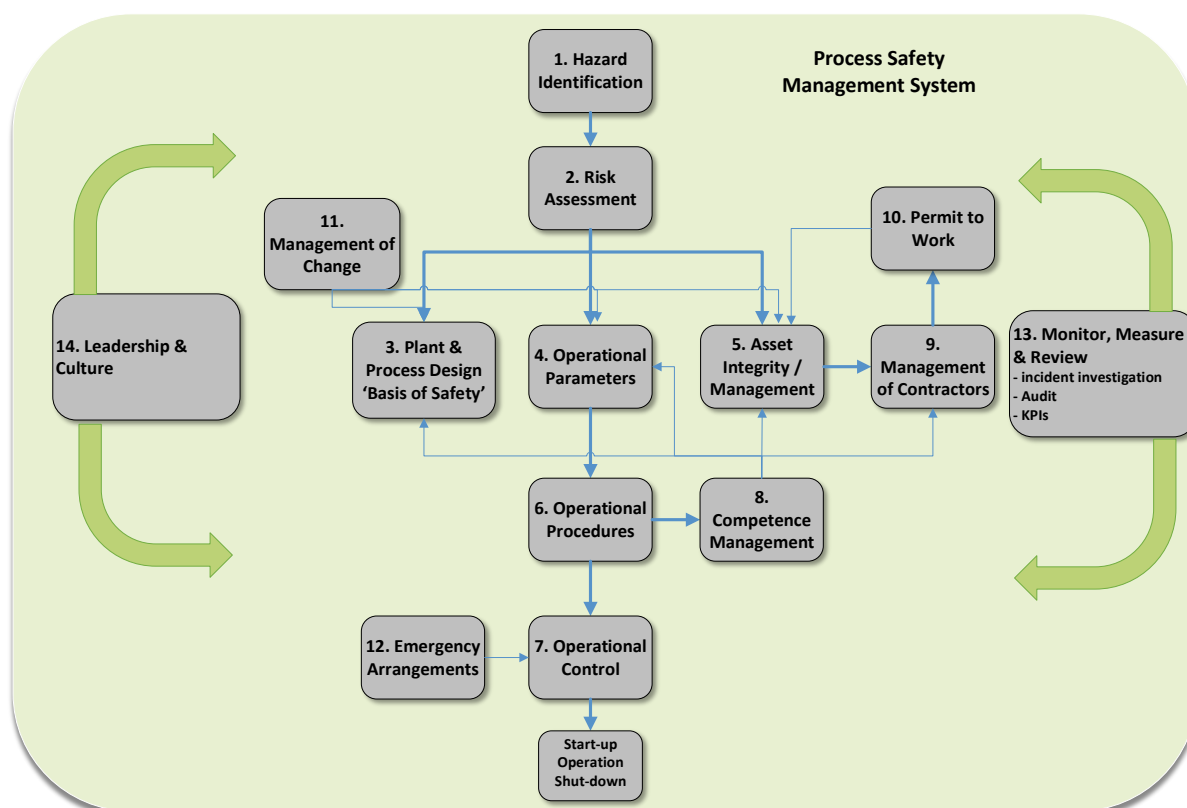


Figure 4: A Simple process safety management system framework.

In the UK, to meet the requirement under COMAH for senior level endorsement of an Operator’s Major Accident Prevention Policy, MAPP, the written document should be signed and dated by the most appropriate person, e.g. Company Director or Senior Executive. By signing the MAPP it should be a statement by that Director or Senior Executive that they understand the hazards and risks present within the establishment and furthermore they have a working knowledge of the elements and outcomes of the safety management system. Principle 2 in the CA’s Major Hazard Leadership Intervention tool makes it clear that senior executives need to be competent and so I would expect them to be tested on their understanding and to be able to demonstrate this knowledge of process safety risk management.

A working knowledge of process safety risk management also requires an understanding of the key measures which are in place to prevent a loss of control and to mitigate the consequences. It has been recognised that Bow-Tie Barrier Diagrams are an effective means of visualising the key control and mitigation measures against each major hazard scenario. This point of visual communication of control and mitigation measures using Bow Tie Diagrams was stressed recently by the CCPS in its publication ‘Bow Ties in Risk Management’⁶. An example of a Bow Tie diagram is shown in Figure 5.

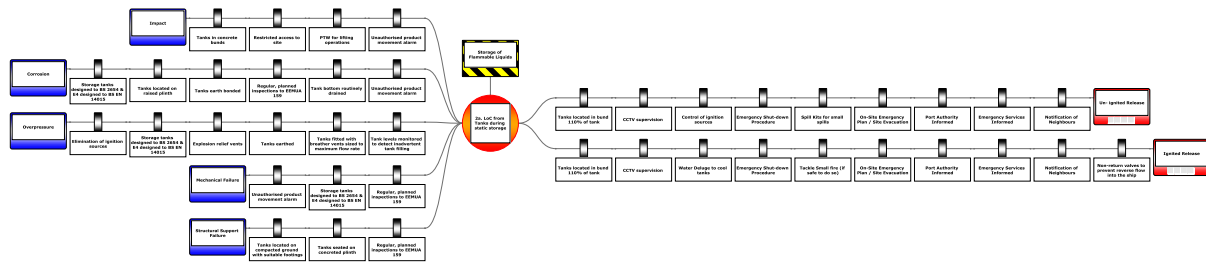


Figure 5: Bow Tie Diagram for a loss of containment

Barriers can be classified to show their criticality or importance as well as their reliability or vulnerability to failure on demand. An example of this analysis is shown in Figures 6 and 7.

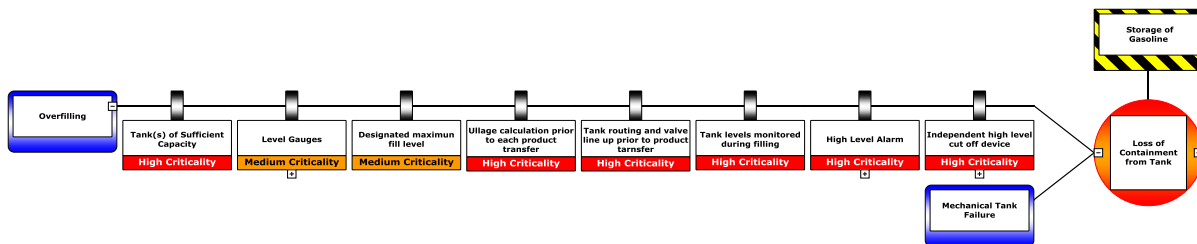


Figure 6: Barrier criticality – relative contribution to the prevention of a loss of control

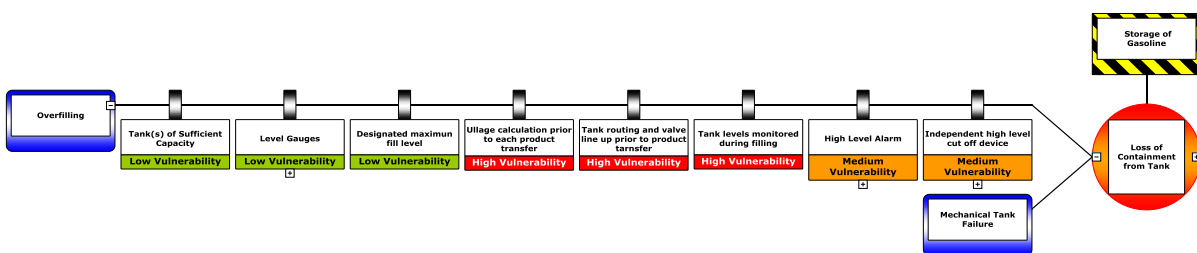


Figure 7: Barrier vulnerability to failure on demand

The combination of these two attributes leads to a focus on the high criticality and high vulnerability barriers which help senior executives get to grips with the most important aspects of risk management and to therefore evaluate the relevance of information provided to them.

Evaluate the significance of information or intelligence on risk management

This stage is about deciding on the significance of the information available on process safety risks and deciding whether a situation is tolerable or if action is needed. Decision making, to act or not act, is the core of effective risk management and such decisions can only be made when all the relevant facts are available or where the degree of uncertainty is understood. Evaluation requires careful interpretation by leaders who are sufficiently conversant with process safety management systems to allow for informed decisions. Figure 8 sets out the dimensions of this evaluation stage. There are few aspects of business management within major hazard enterprises where a decision on risk tolerance will not affect other areas of business such as productivity, asset life time, efficiency and environmental performance. These direct impacts need to be considered alongside

the impact on softer systems such as safety culture and moral which also accrue from management team decisions on risk management.

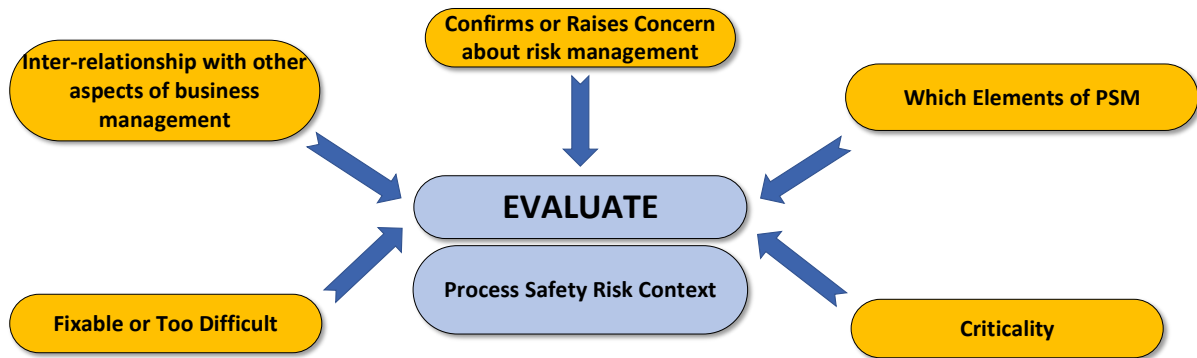


Figure 8: Evaluate information on process safety risk management

Should action be needed to rectify a problem or to improve risk management then it is important at this stage that leaders have a grasp of not just the cost of any work but also its practicality. Senior managers would be well advised to apply the principles of Management of Change, MoC, to this evaluation stage. This will help determine whether the proposed action will introduce a new hazard or make an existing risk worse. Applying MoC thinking will also help identify what supporting action may be needed to say update policies or procedures, provide information and training, change maintenance routines and update relevant documentation. These are all necessary ingredient to decide what needs to be done.

Decide on the appropriate action and agree the measures to be taken

The outcome of the evaluation stage should be a clear decision on whether action is to be taken or not and if so to set out the scope of that action. The intended action should be mapped against the relevant elements of the process safety management system, and if available, also linked to the relevant Bow Tie diagram for the plant or equipment if this is to be a technical change.

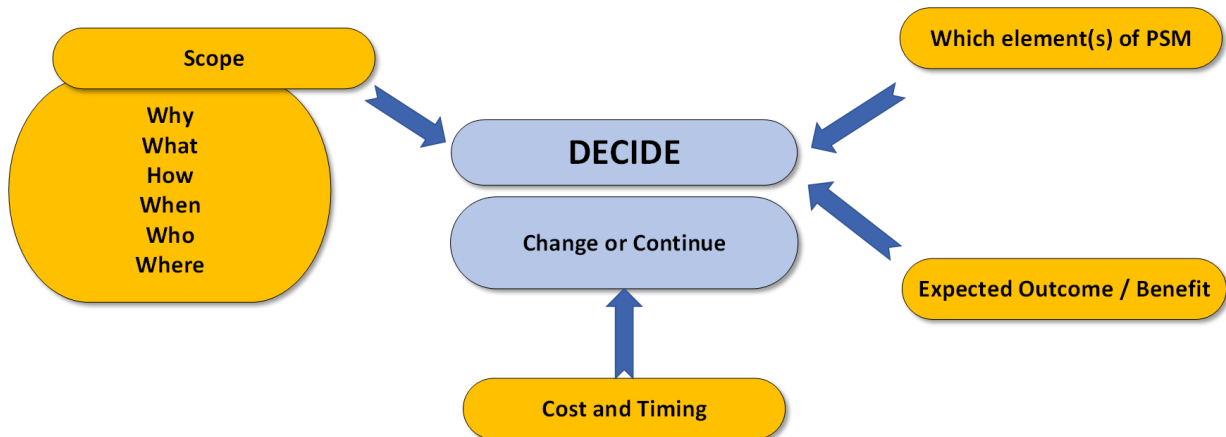


Figure 9: Decide on whether action is needed or not and how change is to be managed

It is important that the management team record and communicate the reason for the intended action, what is being proposed, how its to be implemented and when. This rational should also include who will be involved or affected and where within the business this will have an impact. As shown in Figure 9, this decision stage should also include a determination of the budget and the timing of the proposed action. Most importantly, however is for the management team to set out the expected risk reduction benefits or outcomes which will be expected. Capturing these expected outcomes in terms of risk management at this stage will help decide whether the anticipated improvements have actually been delivered once the actions have been completed.

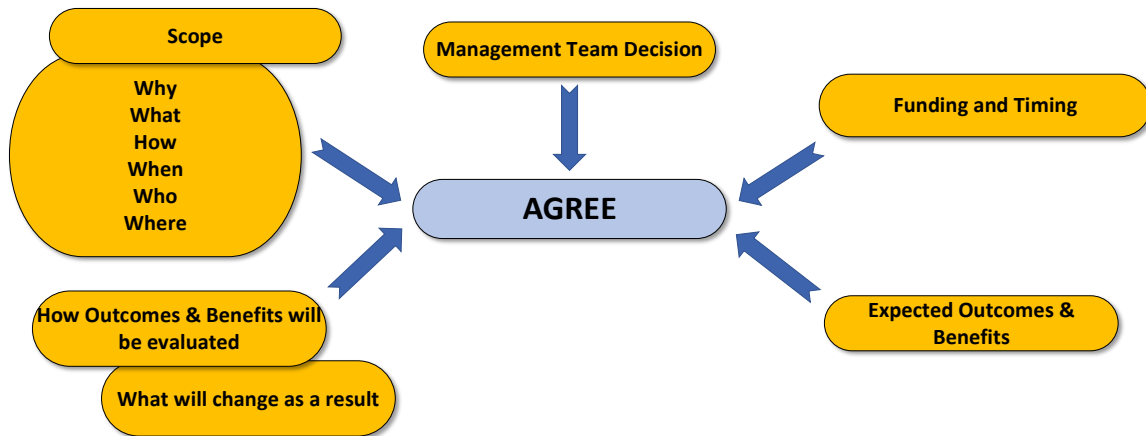


Figure 10: Agree what action is needed

The decision on the action to be taken should secure the agreement of the whole management team. This agreement of the issues to be address and how this is to be done should be binding on all members of the management team under good governance. Figure 10 shows the factors to be taken into account. Once agreement is reached individuals or separate departments should not subsequently undermine the decision or seek to change or amend the action without first seeking the agreement of the management team. Sticking to a decision and seeing it through as intended is a key part of establishing and maintaining a positive process safety culture within the business.

Communicate to secure implementation and acceptance

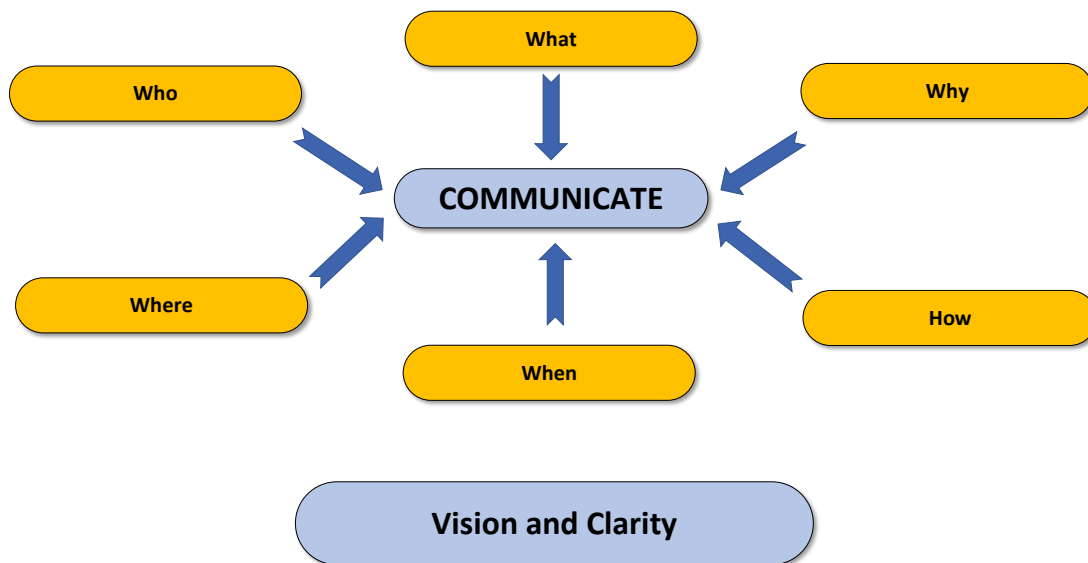


Figure 11: Communicate the decision and the rationale

Most significant changes or improvements require good engagement with staff and stakeholders to both explain and secure support for what is being proposed. So often critical decisions are simply handed down from Board level to operational facilities without sufficient briefing or explanation. This can severely hinder the implementation and achievement of desired benefits. As shown in Figure 11 effective communication should cover what is being proposed, why it is necessary, who will be involved or affected, when the changes will be made and completed and how the benefits in risk reduction will be realised and validated. Communication and feedback to the Board or the senior executive team should be open and free from jeopardy and at this point leaders need to be in active listening mode and open to modification if this seems sensible.

Implement the decision as agreed

The obvious next step is to implement what was agreed. For longer term projects or changes this will require ongoing governance and oversight. Once the outcome has been agreed then the implementation stage should focus on the management team receiving regular and routine feedback on progress and costs. Figure 12 shows the aspects to be considered. Implementation should be evaluated constantly to check the work can deliver the intended risk management benefits. This can

be helped by setting clear performance standards and evaluation criteria aimed at confirming that the anticipated risk reduction benefits can be delivered. This can ease the final validation that the work delivered the intended outcomes.

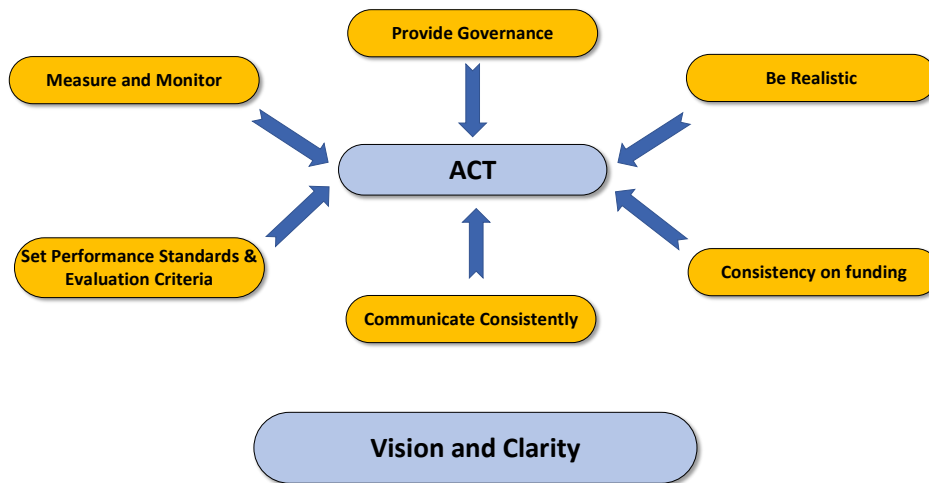


Figure 12: Implement what was intended

Validate the results

This stage of completion is to check and confirm that the changes or improvements set out in the decision phase have been implemented as intended and to cost and to time. Again, this stage is similar to that in a MoC procedure where it is validated that the change was in accordance with the approval. Figure 13 shows that leaders must test and challenge the delivery of the intended outcome and be certain that there is sufficient evidence that the changes or improvements are capable of delivering the benefits envisaged. This stage should also take account of any unexpected adverse impacts of any work or improvements. It is also vital for leaders to be certain that any relevant policies or procedures have been updated and that information and training has been provided to support any improvements. Updates in maintenance routines and relevant process documentation should also be validated at this point.

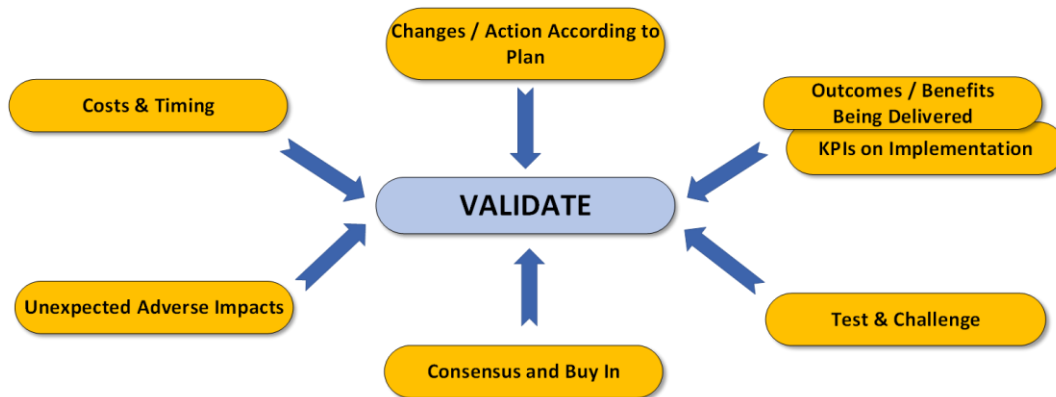


Figure 13: Validate the results and outcomes in risk reduction

Evaluate the outcome

So often management teams assume because the budget is spent and work complete that everything went according to plan and the risk reduction benefits will automatically have been delivered. It is difficult to measure the outcomes at this stage if they have not been set earlier on. Realistic risk reduction outcomes can be assessed against a reduction in the number or extent of process excursions which have the potential to give rise to a loss of containment or process control or by an increase in the reliability of prevention or mitigation barriers. The means by which such enhancements can be detected must be thought through at an early stage during the initial evaluation phase. This final evaluation stage should be used by management teams to review and record any lessons from the process and to identify things which can be improved next time. A thorough validation process to check the benefits have been achieved, as shown in Figure 14, is rarely undertaken for critical risk reduction projects.

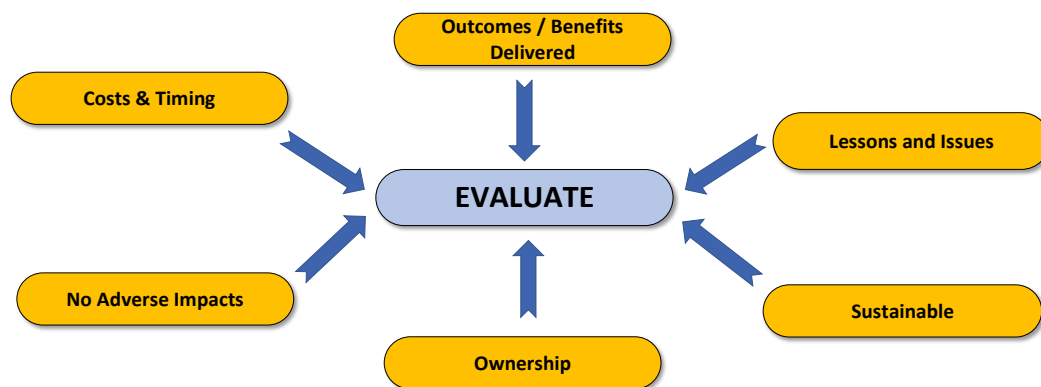


Figure 14: Evaluate the outcome

Conclusion

Effective leadership by senior managers is essential in major hazard enterprises to ensure there is continuous and sustained control over the plant, processes and key activities. Most senior executives understand this requirement, but many still feel unprepared and under skilled when it comes to being able to make fully informed decisions on process safety risk management. This places a severe handicap on progress in risk management and can only impede effective leadership. The need for a high level of competence in process safety management is underlined by the forthcoming UK COMAH Competent Authority's Intervention Program on Major Hazard Leadership.

The systematic approach set out in this paper helps to put executives into the driving seat when it comes to the generation and assimilation of information on process safety risks rather than being the passive recipients of information generated by others. This approach relies on executives and senior managers having access to high quality training on process safety management. Many such training courses exist to supply this need. This model will help leaders to put into practice the competencies and knowledge gained from such training.

References:

1. Corporate governance for process safety: Guidance for senior leaders in high hazard industries. <http://www.oecd.org/chemicalsafety/corporategovernanceforprocesssafety.htm>
2. Process Safety Leadership Group, PSLG, Principles of Process Safety Leadership, <http://www.hse.gov.uk/comah/buncefield/pslgprinciples.pdf>
3. The COMAH Competent Authority Inspection Delivery Guide and Major Hazard Leadership Tool. To be published early in 2019.
4. COMAH Strategic Forum: Managing Risk: The hazards that can destroy your business. https://webcommunities.hse.gov.uk/gf2.ti/f/22306/656517.1/PDF/-/Managing_Risk_The_hazards_that_can_destroy_your_business_v1.0_20th_June_2017.pdf
5. Process Safety Management Framework. www.iantravers.co.uk
6. Bow Ties in Risk Management: A Concept Book for Process Safety. Centre for Chemical Process Safety and Energy Institute. Wiley Publications, 2018 ISBN 978-1-119-49039-5