Effective Implementation of Bowties: An Organizational Perspective

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- Big Picture
- Barrier Thinking
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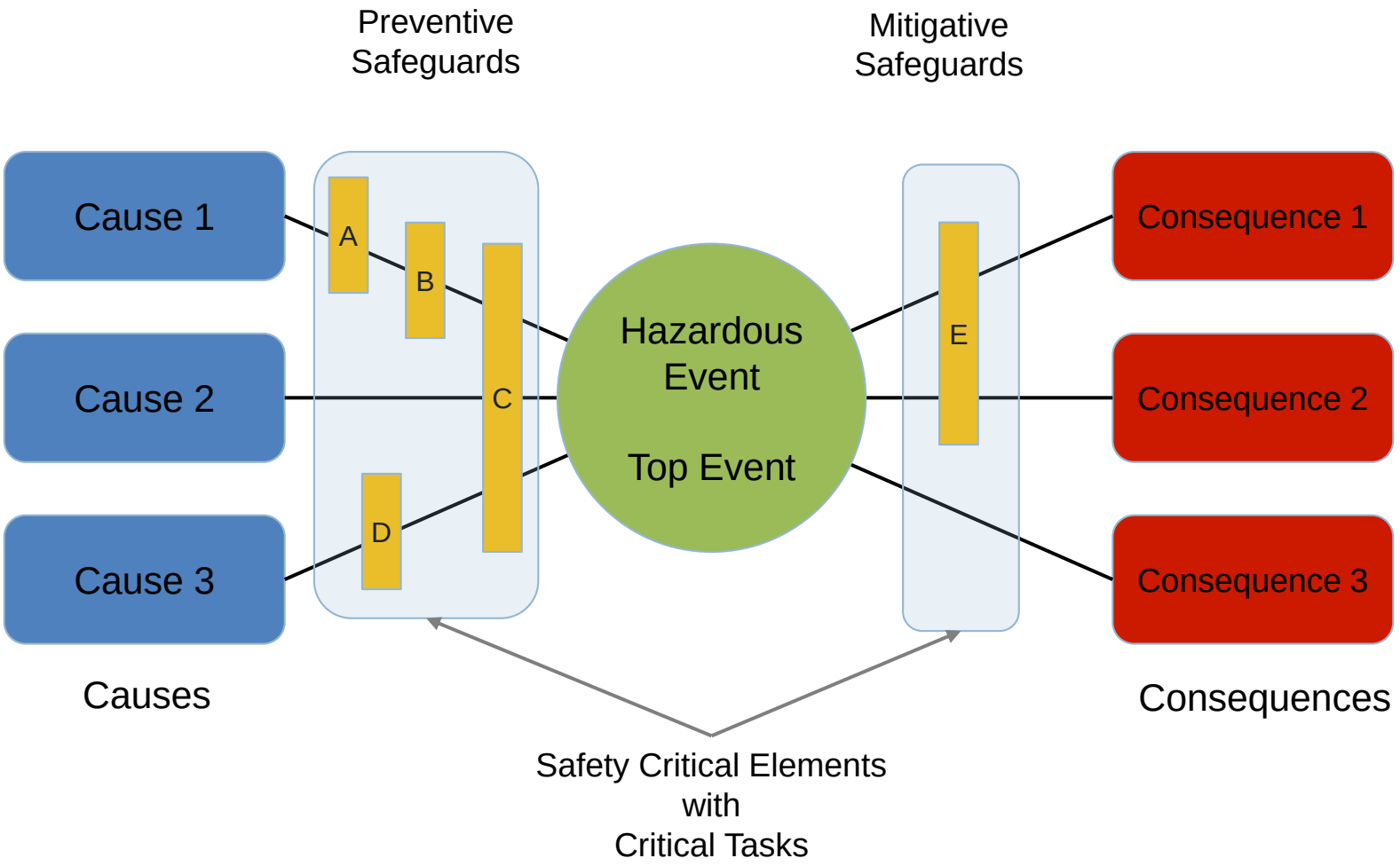
  - People
  - Organisation Alignment
  - Framework
  - Technology

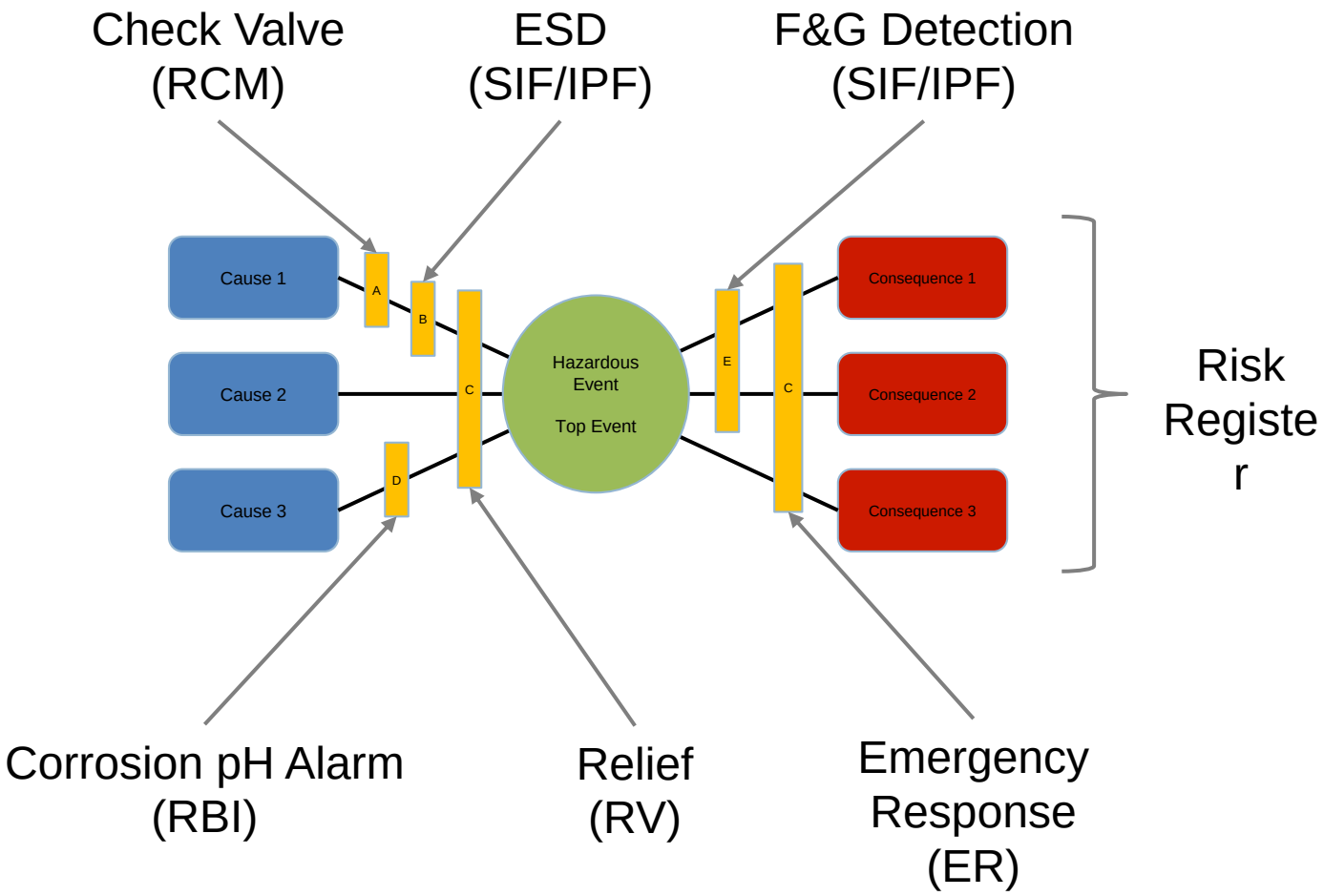
Bowtie


Preventive Safeguards
Mitigative Safeguards
Cause 1
Cause 2
Cause 3
A
B
C
D
Hazardous Event
Top Event
E
Consequence 1
Consequence 2
Consequence 3
Causes
Consequences
Safety Critical Elements with Critical Tasks

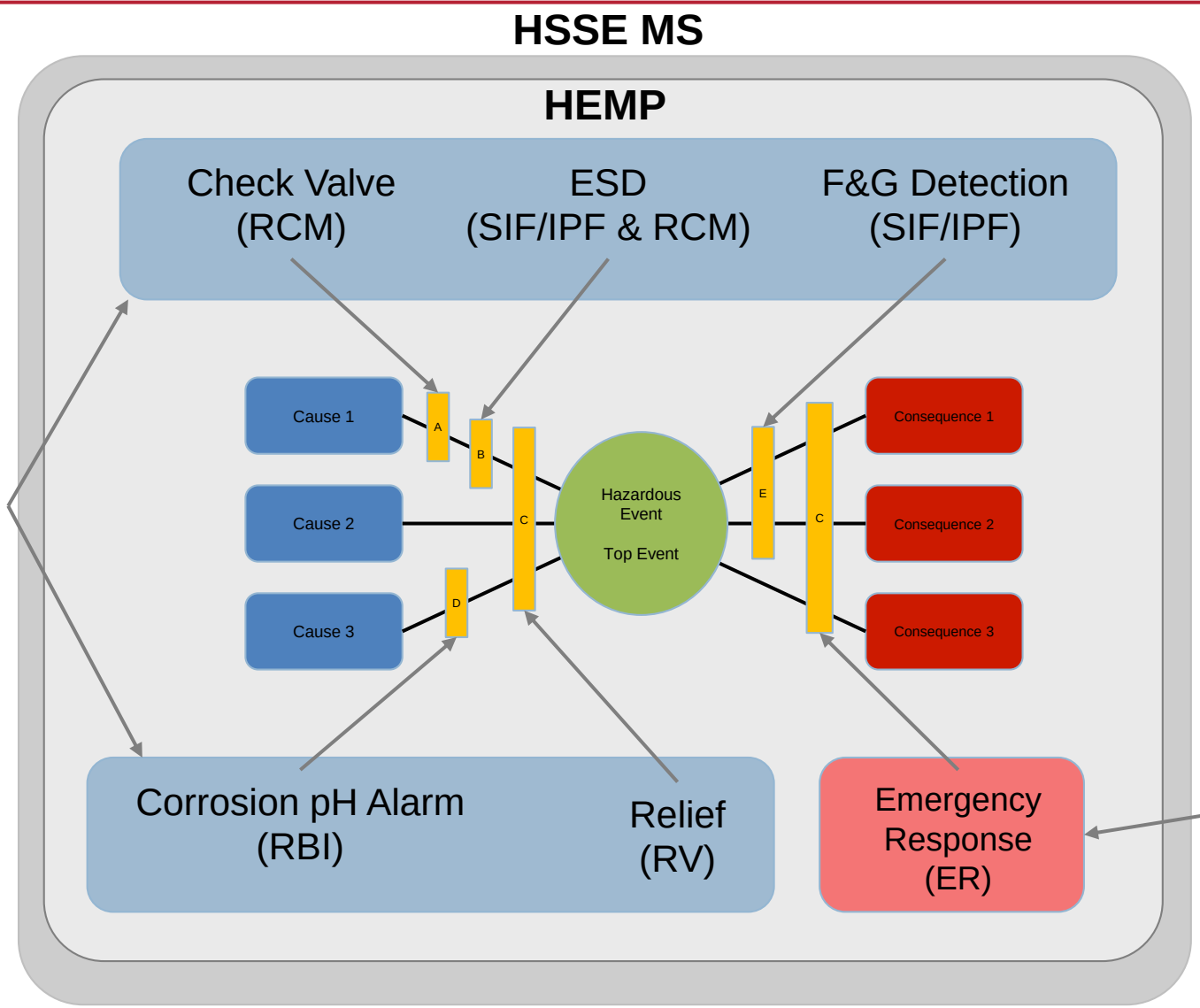
Bowtie

- LOPA can be visually presented using bowtie
- Multiple causes and consequences
- Preventive and Mitigative Barriers
- Safety Critical Elements (SCE)
- Critical Tasks
- Its visual nature make it helpful in doing risk assessments
- It is often used as only a risk assessment tool
- But, bow tie can be a tool to educate an organization on Barrier Thinking

The Big Picture



The Big Picture



The Big Picture

Common Issues:

1. Lack of awareness of the various processes and how they interlink.
2. Lack of appreciation of risk management.
3. Process safety is only for specific groups.
4. Too much focus on bowtie (i.e. risk analysis).
5. Unable to effectively operationalize HEMP.

Barrier Thinking

What if…

Everyone can do **Barrier Thinking**?

Barrier Thinking

- PTW, JHA, etc. are forms of barrier thinking.
- These types of analysis focuses on work execution.
- Bow tie gives an overview of all causes, barriers and consequences.
- A bowtie's strength is in visualizing what and where the risks are and how the barriers or safeguards are keeping things safe.
- Other examples are MOC, Incident investigation, audits, safety drills, etc.

Success Factors

Success factors in implementing bowtie within an organization:

1. Leadership
2. People
3. Organization alignment
4. Framework
5. Technology

1. Leadership

Leadership defines the

‘Safety Vision’

1. Leadership

Leadership sets the organization's Vision and Direction.

Leadership sets the expectation in the use and consistent implementation of bowties.

Leadership ensures organizational alignment, people competency, ensures a working governing framework, removes blockers and provides guidance in moving forward

1. Leadership

Genuine interest has to be shown through presence:

- Site walkabouts
- Safety reviews
- Toolboxes
- Training
- Town Hall sessions
- Staff Engagements

Implementation fail because of a lack of sustained commitment from leadership.

1. Leadership

KPIs

- No. of bowties reviewed in toolbox
- Management participation in toolbox
- % Bowtie training completed
- No. of SCEs bypassed/out of service
- % of Overdue SCE Preventive Maintenance
- No. of SCEs in backlog

Don’t let it become a ‘*numbers’* exercise.

2. People

- People is a **key factor** in implementing the use of bowtie.
- All levels of the organization have to be prepared.
- People have to understand, and appreciate, that the thing that they do, is what keeps others safe.
- People are part of the bowtie '**safety chain**'.

2. People

- Clear roles and responsibilities
- It begins with competency - Competency matrix .
- Training is the *easy part…*!
- **Coaching** and **mentoring** is the key in driving the use of barrier thinking using bowties.
- A key factor in the take up of bowtie in everyday use is **practicality**.
- Example, can start with simple routine maintenance tasks.
- Facilitate the sessions.

2. People

- People need to see and feel that bowties bring value to them.
- Supervisors and team leads are not only **coaches** but also become **change agents**.
- Supervisors and team leads need to be mentored and coached too!

3. Organizational Alignment

- An organization has to be aligned in its use of bowties.
- For example, criterias where bowtie analysis shall be used e.g. high-risk non-routine tasks.
- Alignment between stakeholders. Examples of mis-alignment:
  - Instrument and Process Safety Group
  - Use of conditional modifier

3. Organizational Alignment

- Stakeholders:
  - Health and Safety – *HSSE Management Systems*
  - Process Safety – *Hazards and Effects Management Process*
  - Instrumentation and control – *Safety Instrumented Systems*
  - Maintenance
  - Operations.

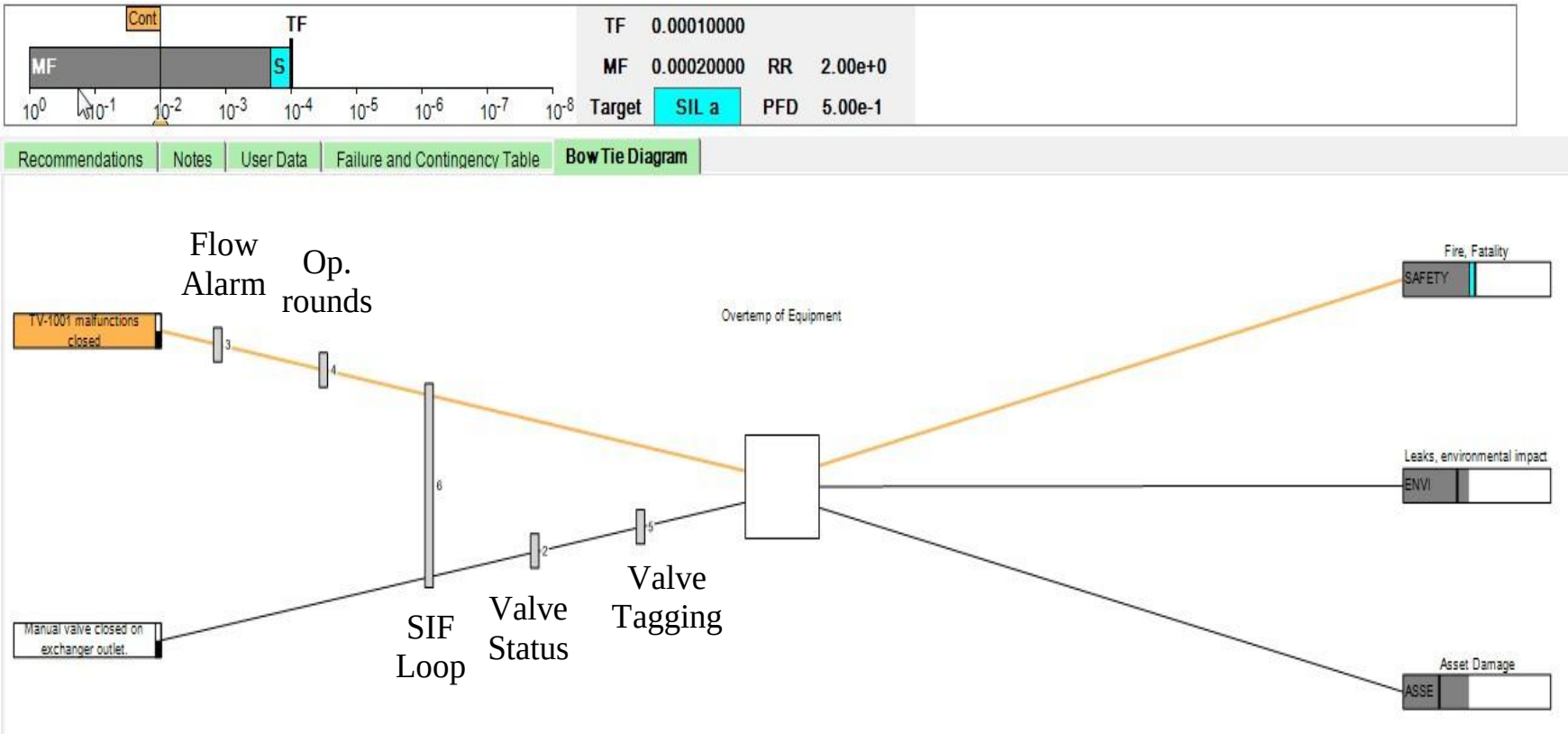
4. Framework

- To ensure sustainable management of process safety, all the above have to be tied together through a process framework.
- This framework defines how all the elements are put in place within a specific organization.
- Includes internal and external assessments which look at, among others, effectiveness and process maturity.
- This framework would be defined in a framework document, has an owner, and would serve as reference for implementation at all sites within a group.

5. Technology

- Technology has distinct advantages in the implementation of bowties.
- These advantages range from supporting engineering risk studies during design, through to real-time monitoring of operational risk.
- Over-reliance on technology without a solid foundation on its principles can be detrimental.

5. Technology



ACM SafeGuard Profiler

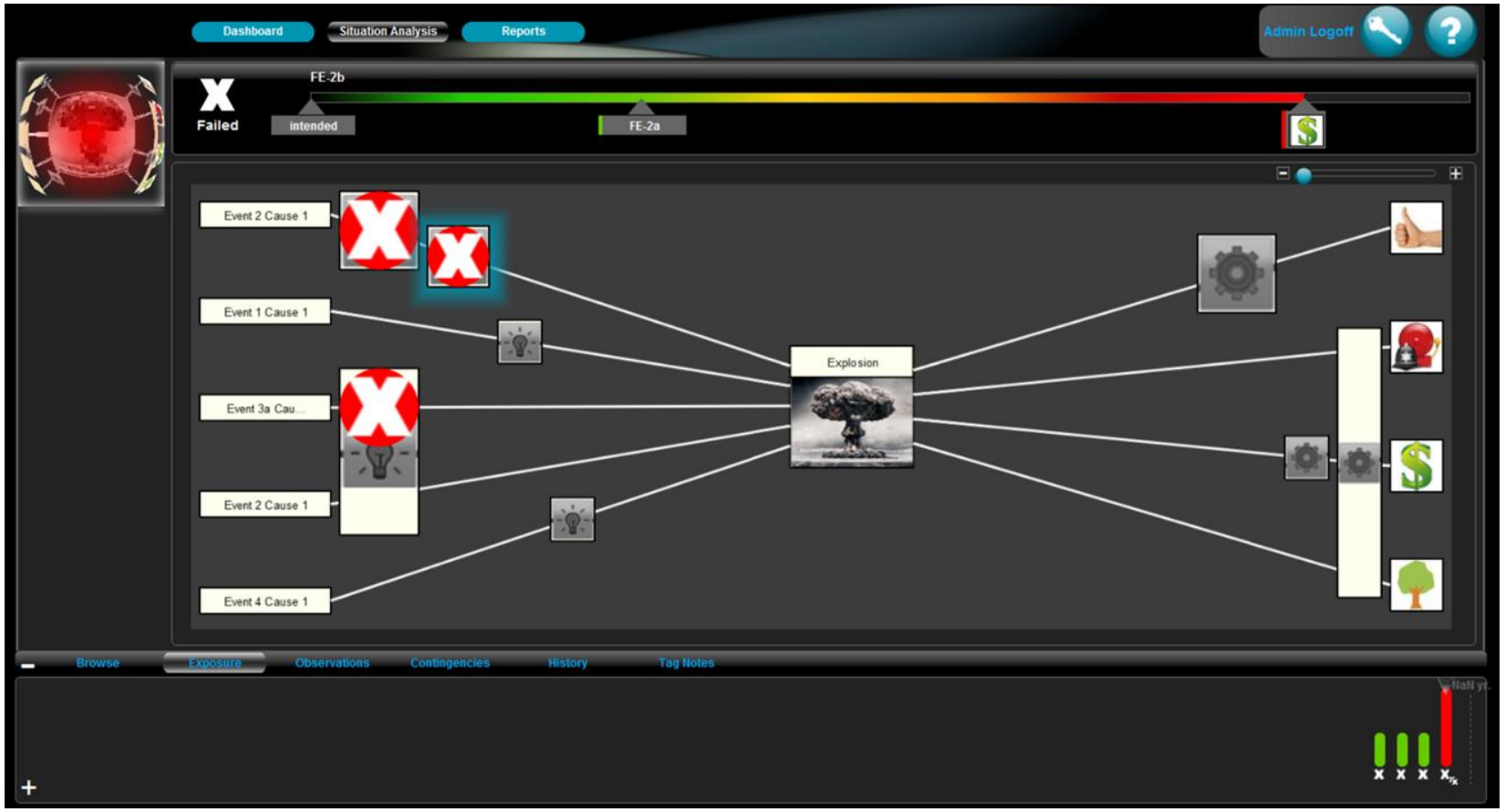
5. Technology

- By using a bowtie, multiple pages of spreadsheet data are compressed down to a simple visual representation.
- Multiple causes, independent protection layers, top events, consequences, target mitigation event frequency, and other aspects of the risk assessment are all contained in a single diagram.
- This allows for increased participation.

5. Technology

- Documents can be **referenced** and **embedded**.
- Future references to past safety reviews would be simplified.
- This would also simplify tracking of changes via Management of Change (MOC).
- Bowties that are developed during the LOPA session can be used as a tool for **auditing** and **training** during the operational life of the facility.

5. Technology



ACM SafeGuard Sentinel

5. Technology

- Software can be used to provide **situational awareness** of the health of safety critical elements (SCEs).
- Real-time visual representation.
- When a barrier goes out of service, operators are able to see the impact.
- If linked to LOPA/bowtie, assessments can determine the **possible consequences** in detail.
- Created in advance, **contingency plans** capture experienced operator knowledge to give all operators a pre-approved action which can be taken to reduce risk to an acceptable level.

Thank You
Terima Kasih