

HSE Inspirational Leadership

PSM as a profit center



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Rev 3 : 10 Nov 24

PSM as a profit center rev 2

Multi-academic background creates Multi-career opportunities



Electrical Engineering

- Electrical Engineer
- Purchasing Engineer
- Process Operation Engineer
- Process Control Engineering Section Head
- Instrument & Electrical Division Manager



Occupational Health and Safety

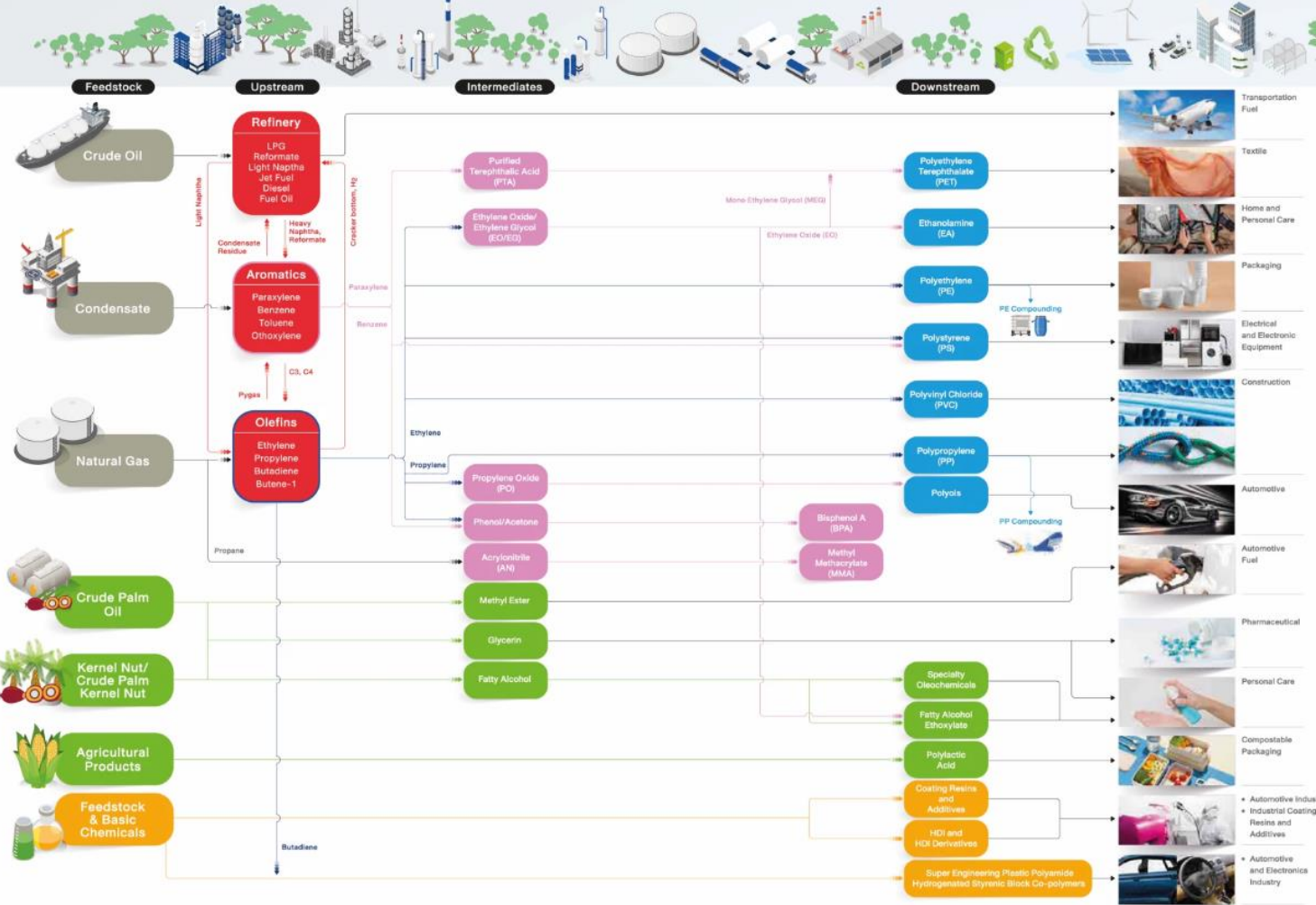
- Vice President SHE Management
- Vice President Technical Safety and PSM
- **Senior Vice President QSHE**



PSM Taskforce Leader Since 2014

- Drive PSM implementation
- API 754 RP
- Bow Tie Analysis
- Bow Tie Barrier Validation
- PTT group PSM recommended good practices (PTT PSM RP)

Business Value Chain



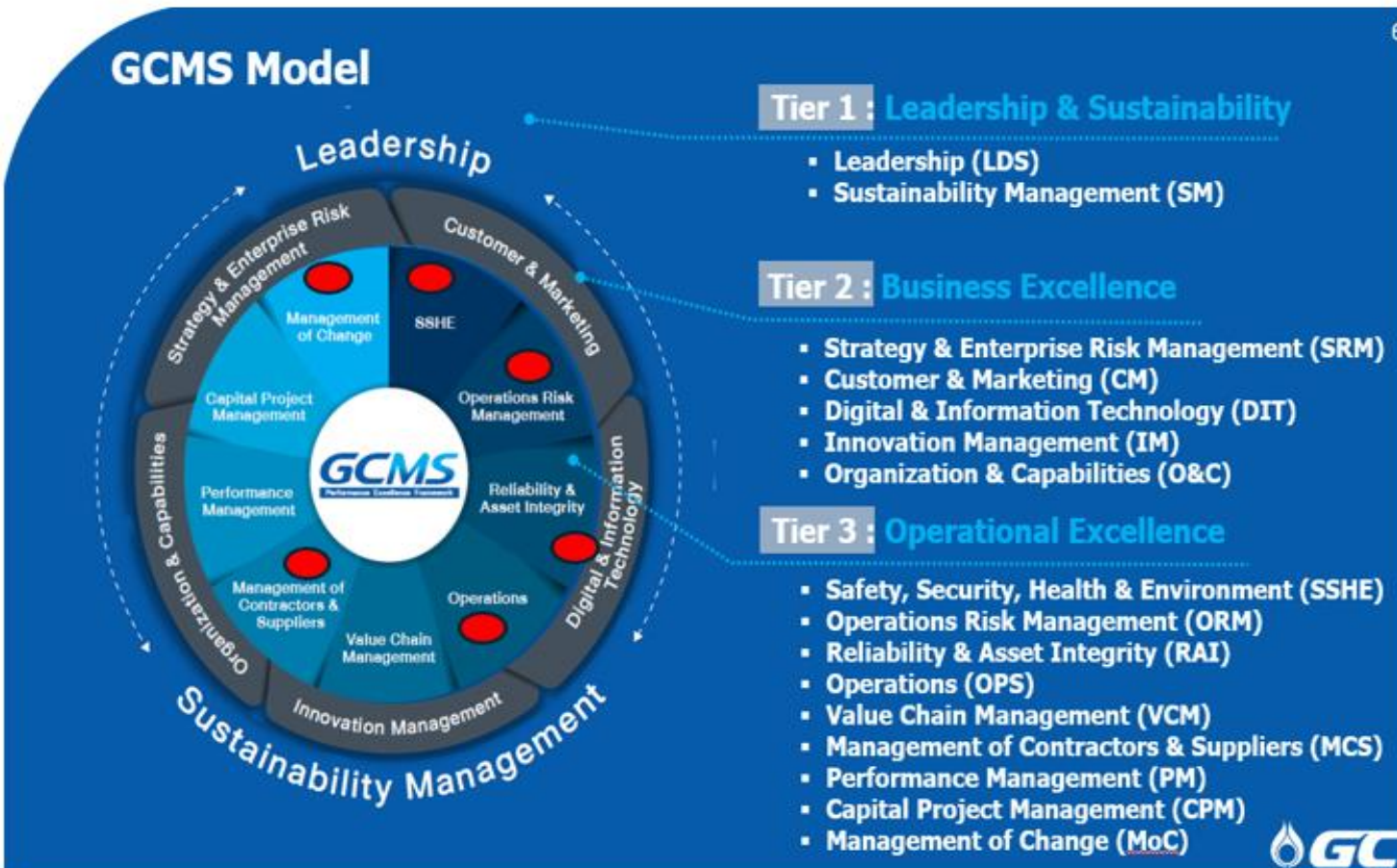
PTT Global Chemical Public Company Limited.

GC Chemistry for Better Living

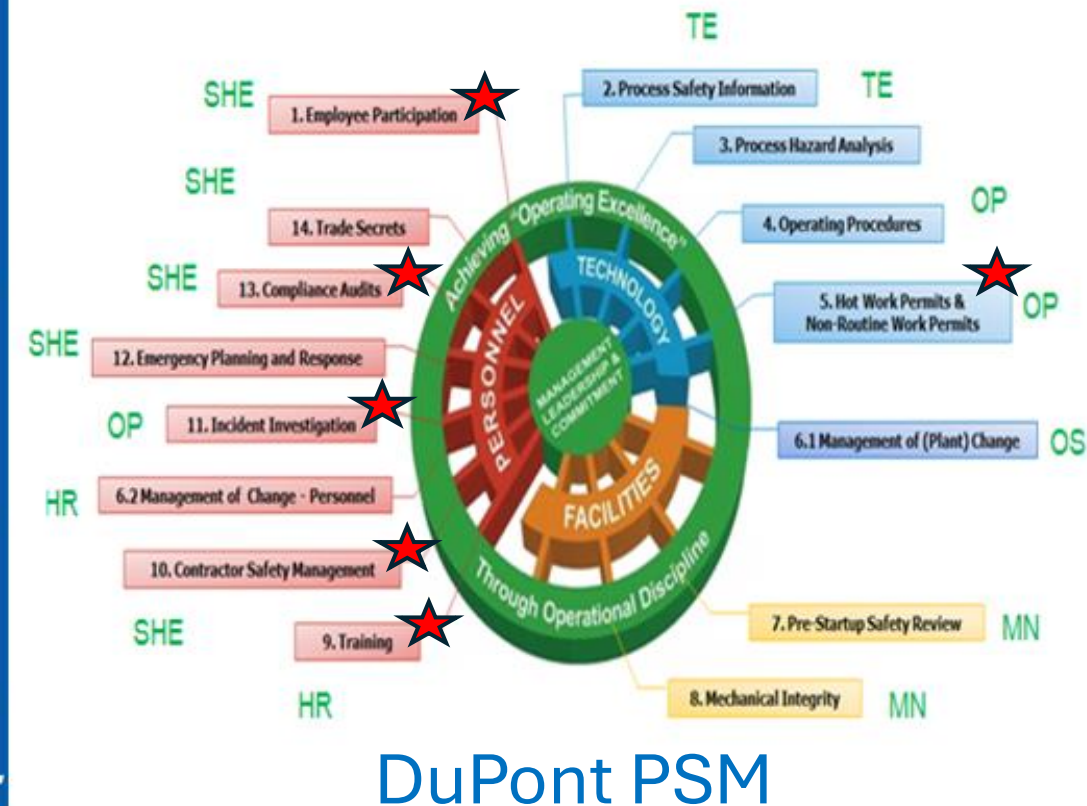
- 14 Million Ton per year of Petrochemical and Bio Chemicals products
- 200 KBarrel per day of Petroleum Refinery products
- The *biggest* Petrochemical plus Refining capacity in ASEAN

Process Safety Management (PSM) integrated in GC Management System

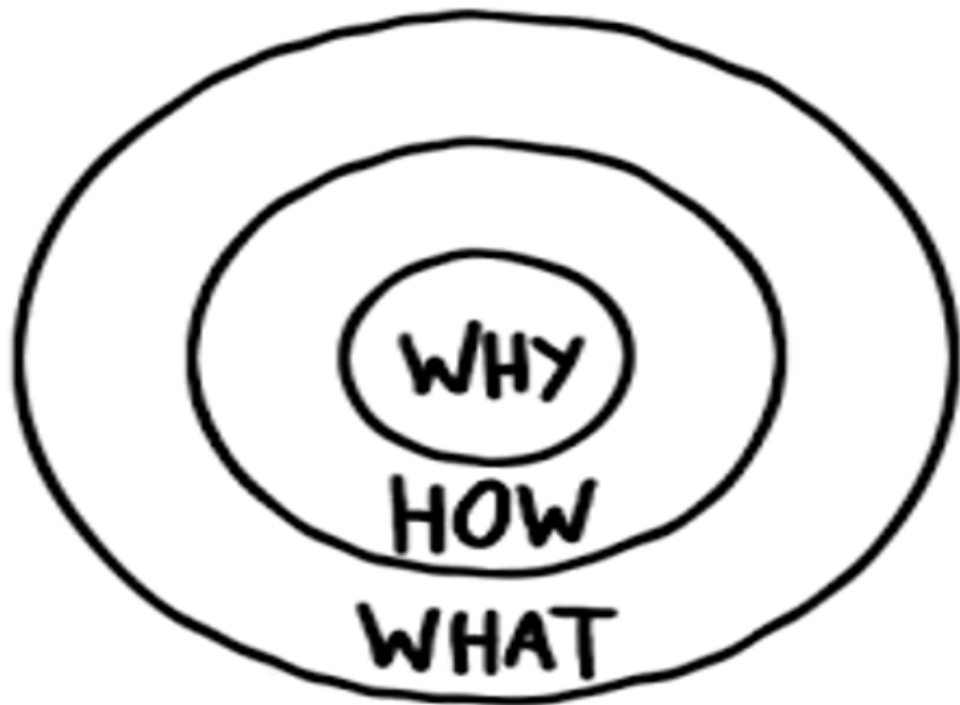
Personal Safety is integrated into PSM



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DuPont PSM



Golden Circle

What they do

How they do what they do

Why they do what they do

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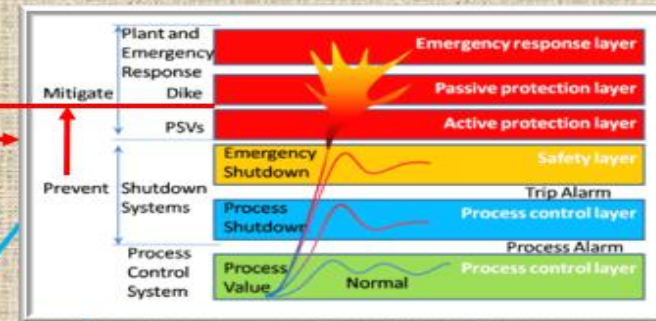
Some of WORLD'S... MAJOR Incidents

Challenge to change People' mindset.....

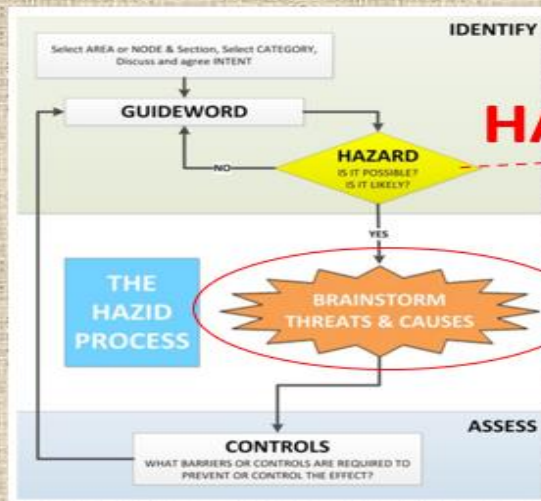


People believe that good HAZOP study can protect their plants... Right or Wrong?

Section: Valve (Air in)									
Item	Study node	Process parameters	Deviation (guide words)	Possible causes	Possible consequences	Action required	Assigned to:	Reply date:	No action Completed:
	Valve (Air in)	Flow	No	1. Control valve fails closed 2. Air pressure fails, closing valve 3. Controller fails and closes valve 4. Valve blocks	1. Pressure drop in the reactor 2. Conversion value is zero	1. Select valve to fail open 2. Install flow meter and low flow alarm to alert operator 3. Check and monitor the steam service 4. Replace or clean valve 5. Place controller on critical instrumentation list	Engineer		
			High	1. Control valve fails open 2. Air pressure fails, opening valve 3. Controller fails and opens valve	1. Over-pressurizes reactor 2. Dangerous if	1. Update procedures 2. Select valve to fail close 3. Install flow meter and high flow alarm to alert operator	Operator		

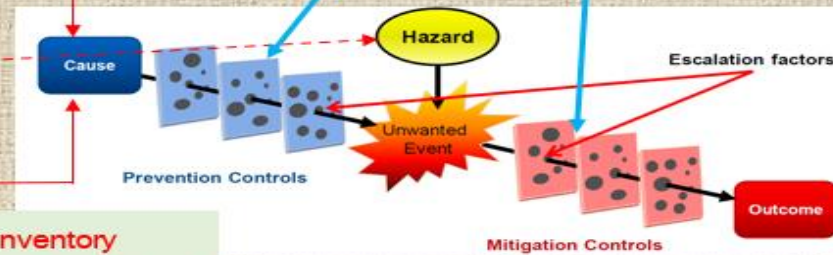


HAZOP



HAZID

- High HC Inventory
- High Press (> 10 barg)
- High Temp, Low temp
- C3 / C4 facilities
- High Toxicity

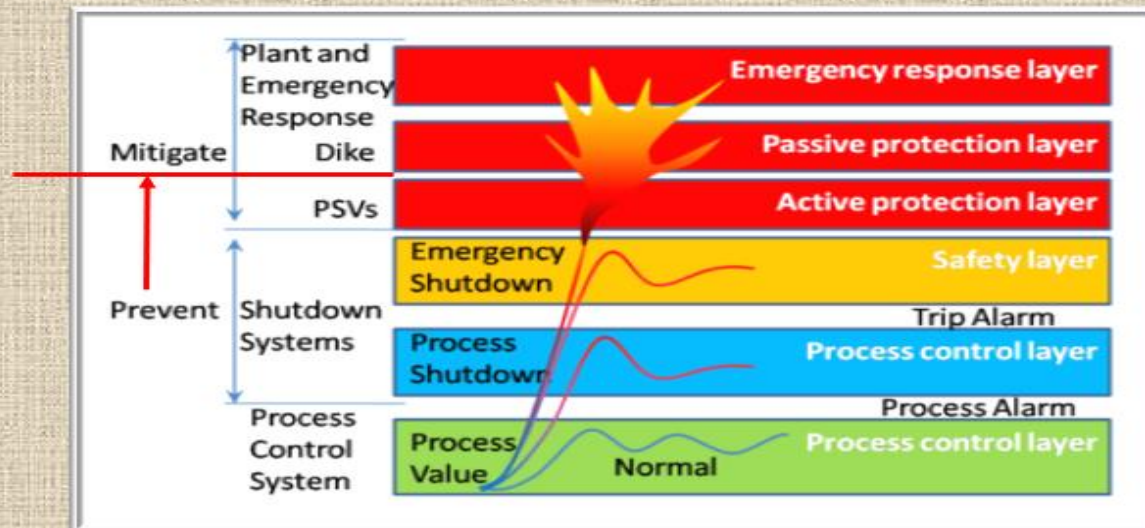
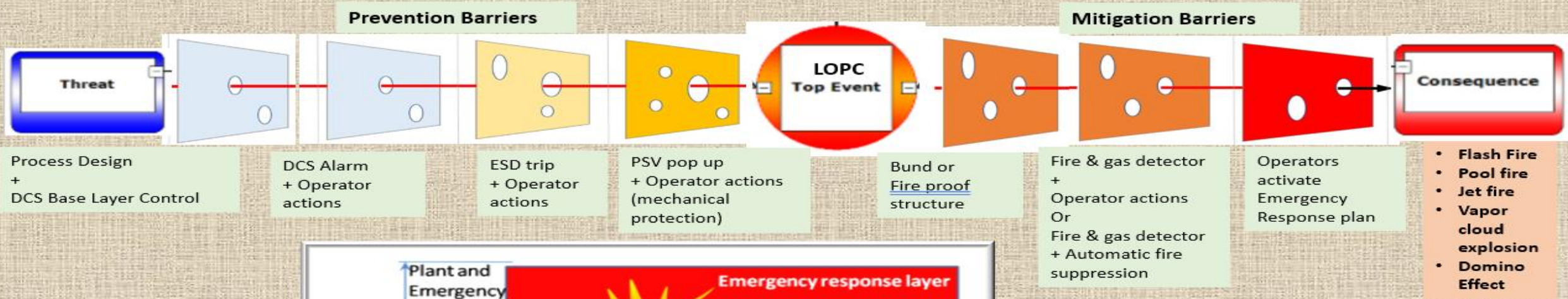


Bow Tie



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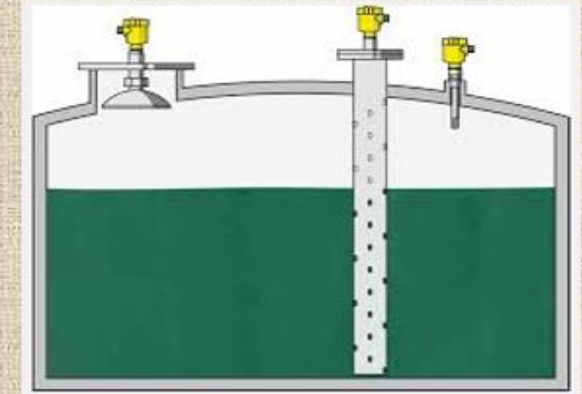
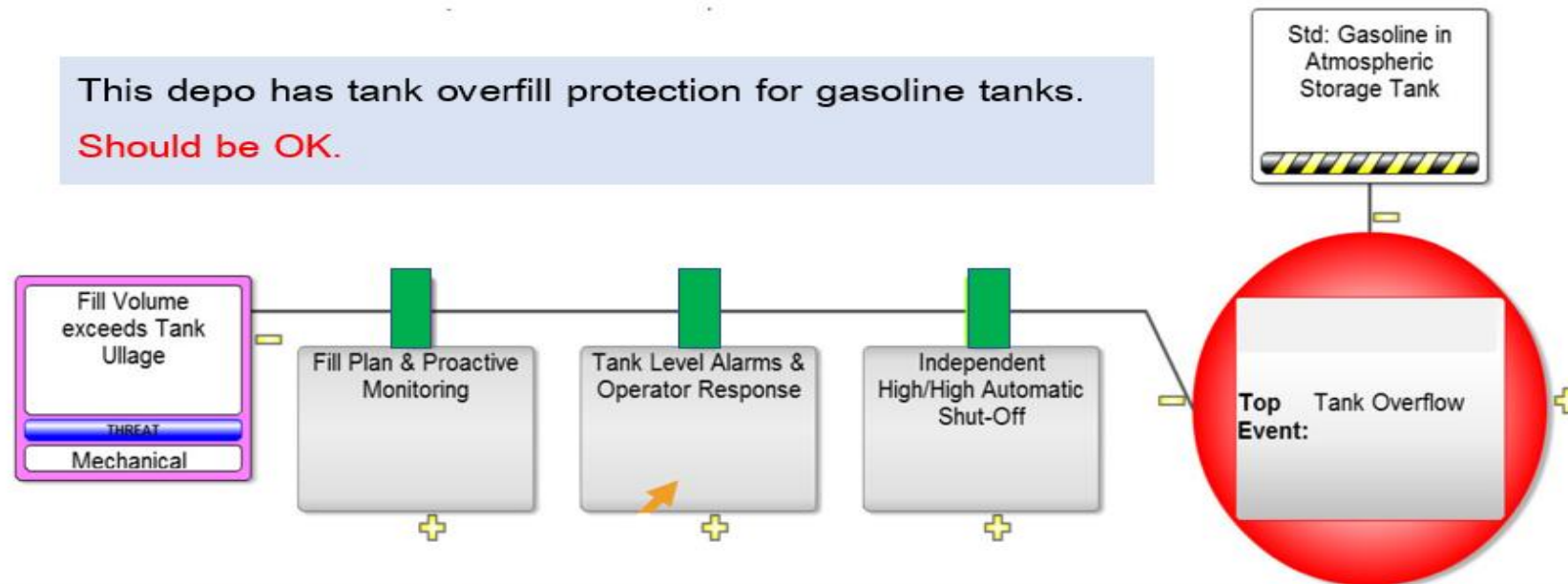
Install a lot of layers of protection..... Is it sufficient? How do we know?



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This depo has tank overflow protection for gasoline tanks.

Should be OK.



- The operator reads the gasoline level in the tank, then **calculates the remaining capacity** and makes a note of **when the tank will be full** before opening the inlet valve.
- Tank **High-Level Alarm** alerts DCS Panel operator to close the inlet valve.
- There is an **Overfill protection** by a high-high Level switch that sends a signal to the **ESD** to close the inlet valve before the tank overflows.

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EXAMPLE: Buncefield-type bow tie



Complete with safeguards
But why was there a **huge fire**?



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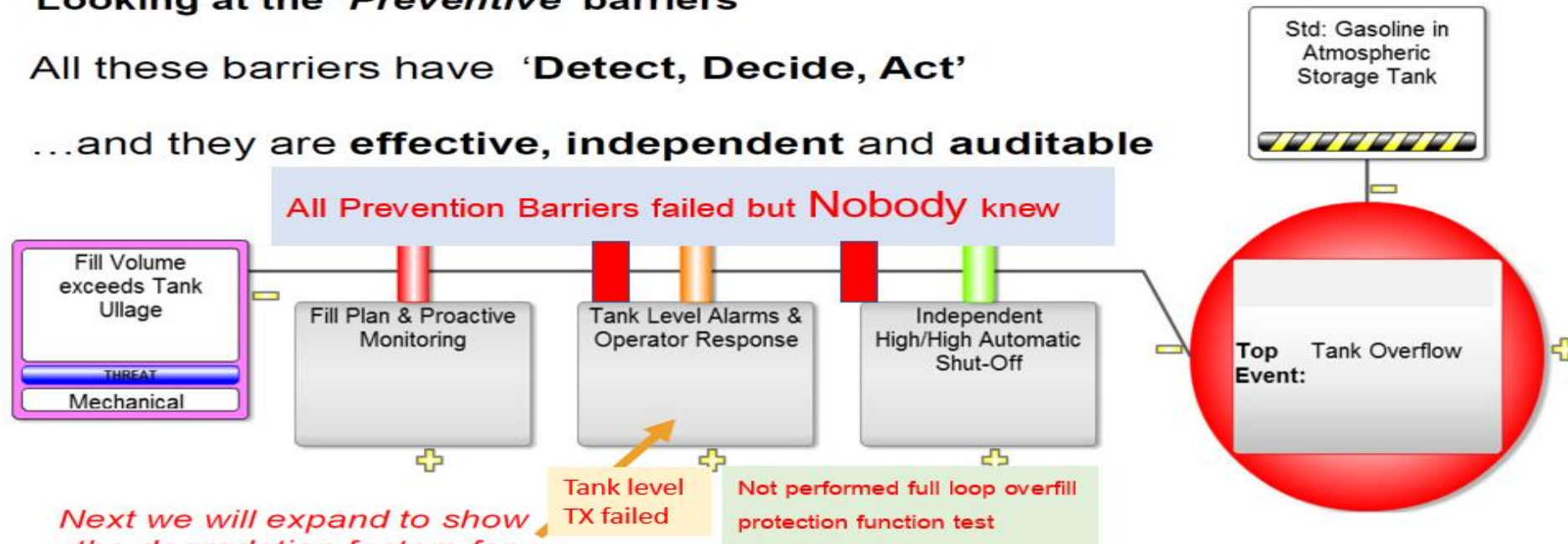
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EXAMPLE: Buncefield-type bow tie

Looking at the '**Preventive**' barriers

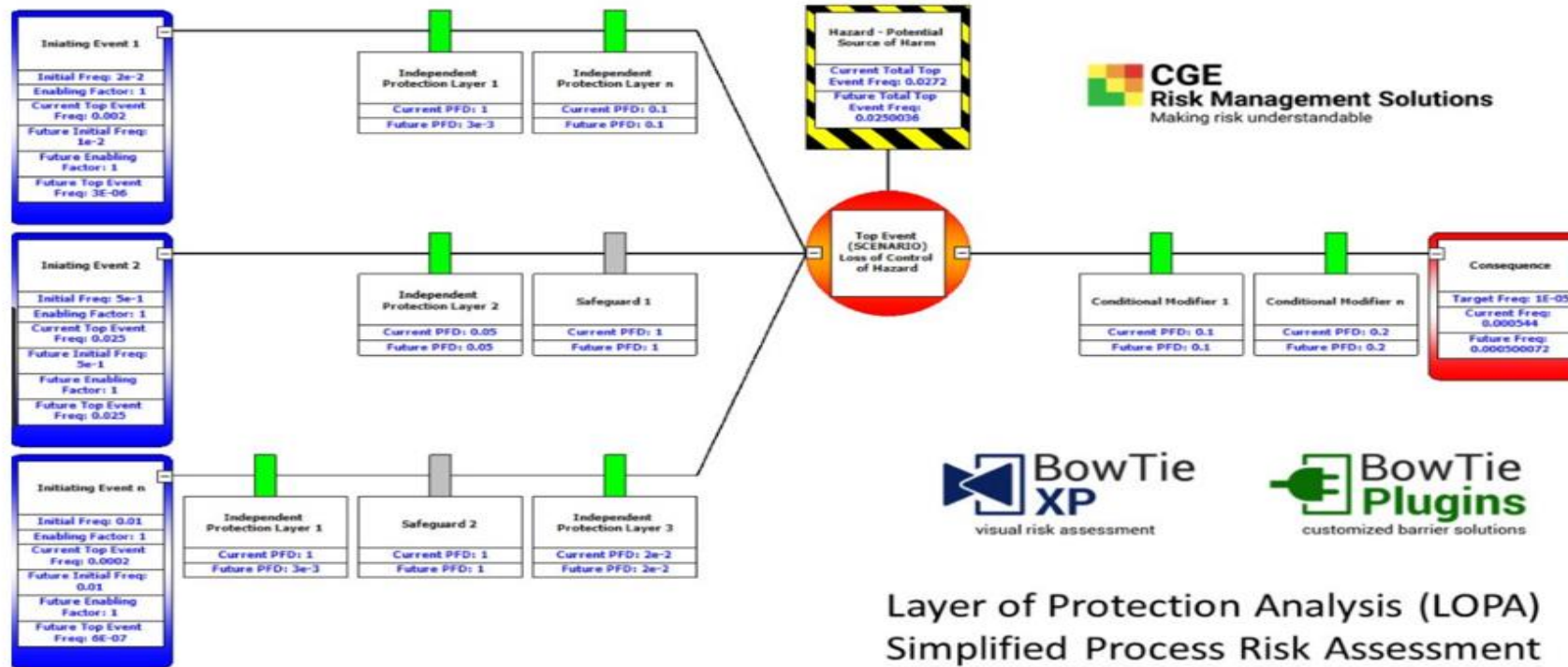
All these barriers have '**Detect, Decide, Act**'

...and they are **effective, independent and auditable**



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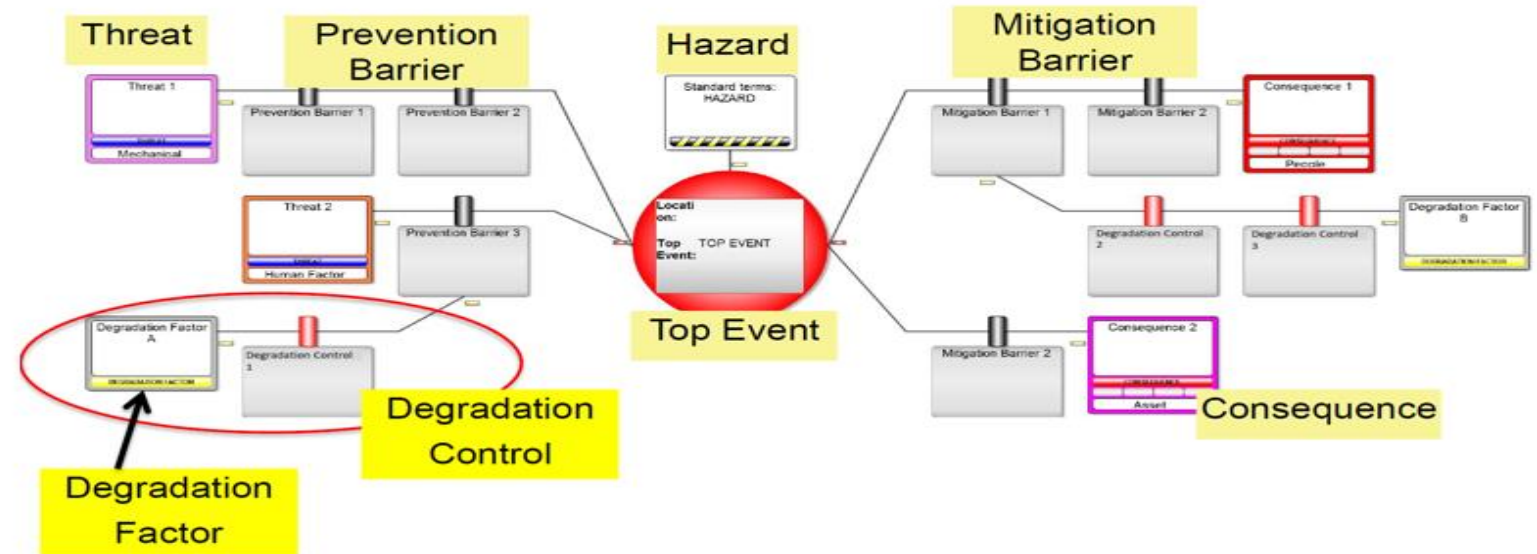


Every barrier has the **potential of failure on demand**

How do we know the health of each Barriers or Safeguards?



Bow Tie terminology





What counts as a barrier?



Effective

- *Prevention* barrier: capable on its own of preventing a threat developing into the top event
- *Mitigation* barrier: capable of reducing consequences

Independent

- no common failure modes with other barriers

Auditable

- There is a means to check that it works
- There are performance standards for functionality

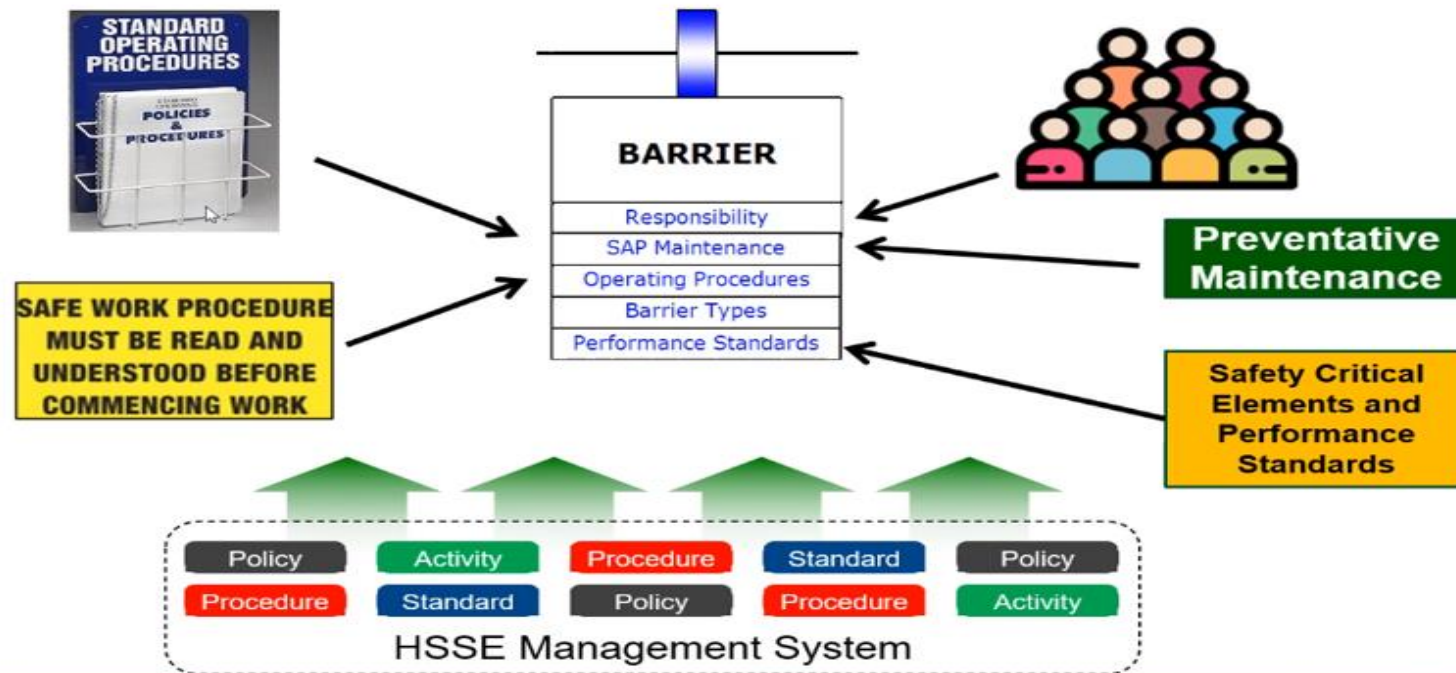
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Bow Tie Barrier Validation

- Big
- Strong
- Fast

BARRIER CONCEPTS

sherpa
asia



Audit

- Equipment
- Performance standards
- PM/CM/inspection programs
- Design sheet
- Operators
- Maintenance crews

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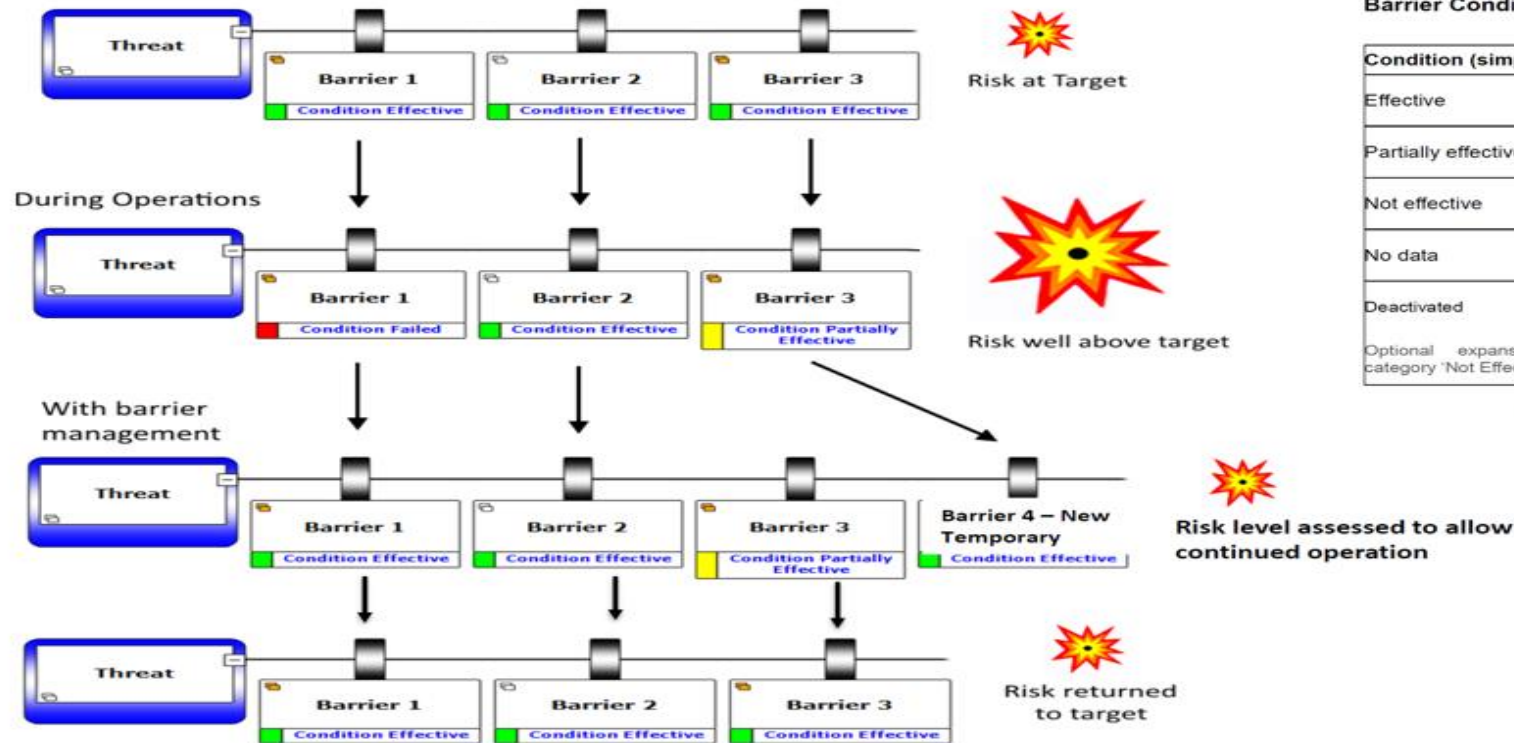
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Barrier Condition and Scoring (EXAMPLE)

Condition (simple)	Condition (detailed)	Color code
Effective	In place, available and effective	Green
Partially effective	In place and available, but operating below its intended functionality	Yellow
Not effective	Not in place, not available	Red
No data	No operational information is currently available	White
Deactivated	Not in place, turned-off, deactivated.	Black
Optional expansion of category ‘Not Effective’	Can also be used to differentiate a local system from corporate standards.	

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Reducing Cumulative Risk



Barrier Condition and Scoring (EXAMPLE)

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- **Operational Risk Management (ORM)** is the management system that manages the health of bow tie barriers to prevent major accidents.
- **ORM = Barrier Management**

PSM as a profit center (1/3)

Good news : **Bow Tie Analysis** can be applied for **Personal Safety accidents** from high-risk works

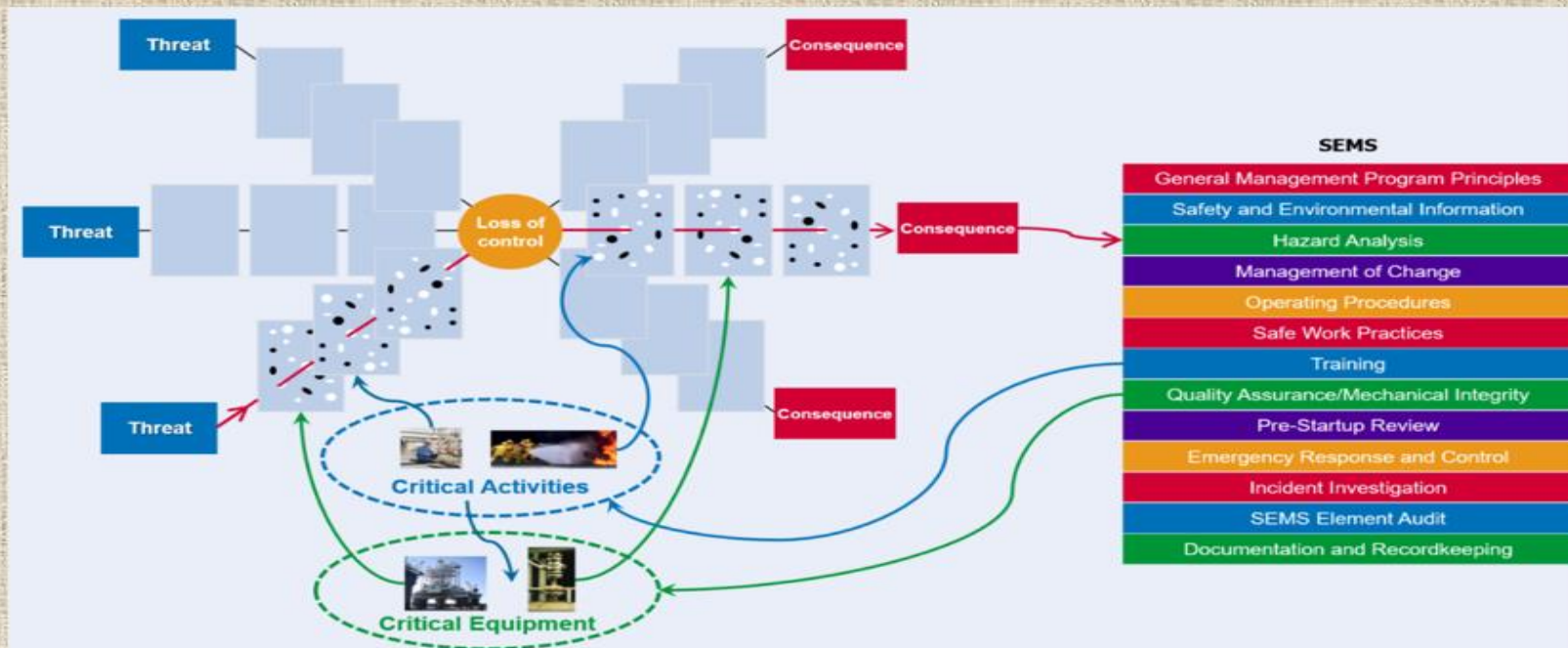


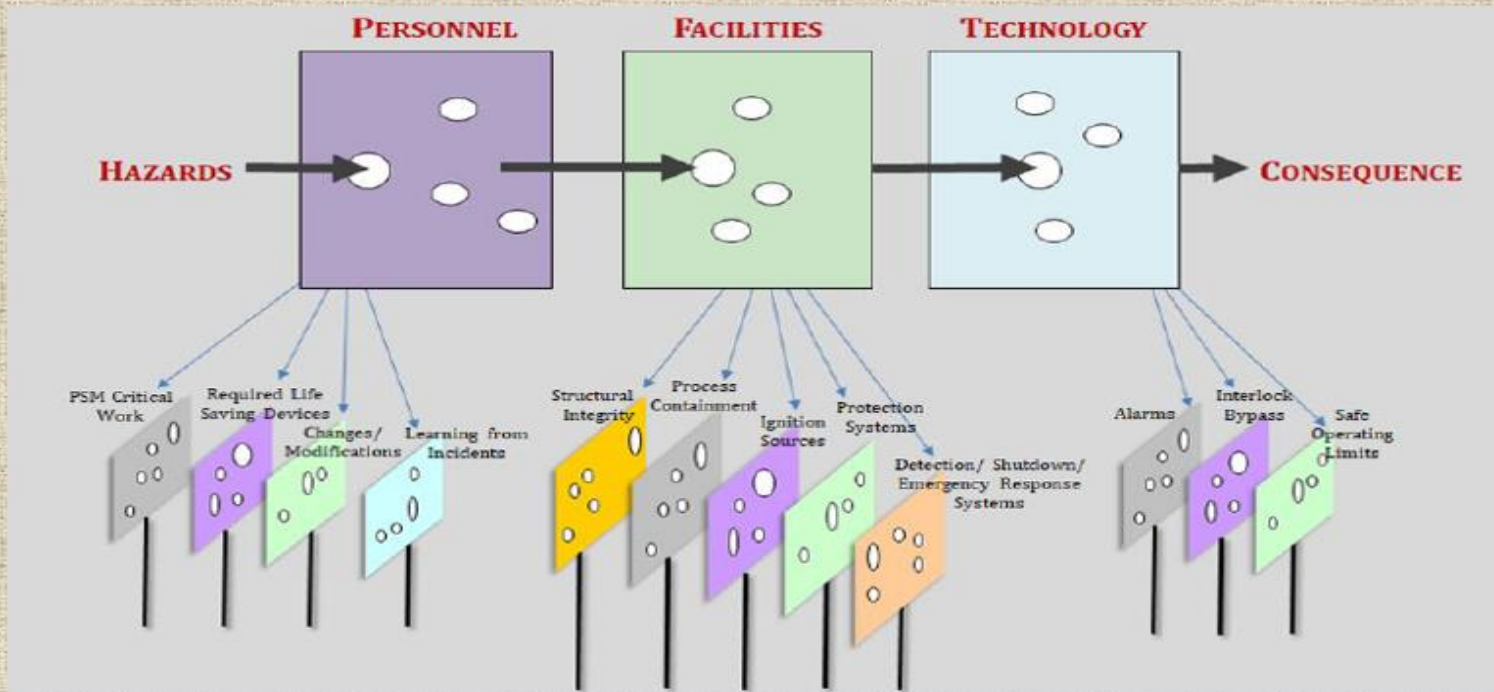
Figure 1 – Joined Up Thinking: follow the links from SEMS to critical activities & equipment to barriers

Integrate Bow Tie Barrier Validation with

1. PSM internal audit as Thai IEAT regulatory requirements
2. Reliability & Asset Integrity assurance program

Credit : Risktec.tuv.com

PSM as a profit center (2/3)



Credit: Field Risk Assessment by Dupont Sustainable Solutions (DSS)

Embed in Daily activities

- Educate field operators and maintenance technicians by process equipment specialists of how to find weak signals
- Daily petrol includes visual field risk assessment tool for **daily** Bow Tie Barriers health check by field operator & maintenance technicians
- Educate field operators to be able to use simple predictive maintenance tools

PSM as a profit center (3/3)

Involve all levels of management & staff



Good process safety creates good reliability

Credit:
Dupont Sustainable Solutions (DSS)

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Influencing Model for HSE Inspirational Leader



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Act as a Safety Role Model

- Walk the talk



What to do everyday



Coach & Develop others

- Their safety competencies

"... I see superiors, peers and subordinates behaving in the new way"

Role Modeling

I will change my mindset & behaviour if...

Developing talent and skills

"... I have the skills and competencies to behave in the new way"

Fostering understanding and conviction

Reinforcing with formal mechanisms

"... the structures, processes and systems reinforce the change in behaviour I am being asked to make"

Explain **Why**

- Why Safety important
- Accidents can happen but **can be prevented** if treat safety **as high priority as** productivity

Drive (How)

- Management Systems & KPIs
- Recognition programs

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