

An aerial photograph of an industrial plant, likely a refinery or chemical processing facility. The image shows several large, circular storage tanks or clarifiers, a network of pipes and walkways, and a white tanker truck parked on a paved area. The scene is overlaid with a semi-transparent blue and green gradient. Two large, overlapping circles are drawn over the image: a light blue one on the left and a light green one on the right.

# Process Safety after a Merger

How to come together in a joint culture

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Manager Process Safety  
Perfumery & Beauty

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**dsm-firmenich** 

# Introduction

## Wassila Benaïssa

- Chemical Engineer & Doctor – INPToulouse – France
- 8 years Chemical Hazards Specialist & Lab Manager – INERIS, Paris
- 4 years Process Safety Engineer and Lab Manager – Solvay, Lyon
- 5 years Process Safety Expert – dsm-firmenich, Geneva



## Pier-Jan Hettema

- Chemical Engineering –TU Eindhoven
- 14 years operations – Dupont, Shin-Etsu
- 5+ years consultant in Reliability Engineering and Process Safety
- 11 years Global Process Safety Expert – ADM, dsm-firmenich
- EPSC Board member since 2021







DSM

**1902**

DSM (Dutch State Mines) is founded in the Netherlands

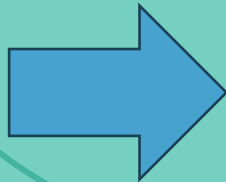
## Two iconic Companies Merging



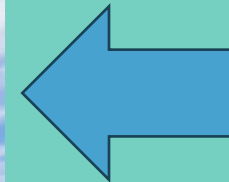
Firmenich

**1895**

Philippe Chuit, a visionary scientist, and businessman Martin Naef create a perfumery start-up in the garage of Charles Firmenich in Geneva, Switzerland.



May 9, 2023



# Innovators in nutrition, health and beauty



Perfumery  
& Beauty



Taste, Texture  
& Health



Health, Nutrition  
& Care



Animal Nutrition  
& Health



# Three dynamic markets, two iconic names, one foundational purpose

## dsm-firmenich: we bring progress to life

We're a trusted partner to global companies operating in high-growth and resilient markets. We're innovators in nutrition, health, and beauty

**~30,000**

passionate, talented, and diverse people in our global team

**150+ years**

of combined scientific discovery and innovation heritage

**€12+ bn**

combined revenue

# Different process safety cultures

## DSM

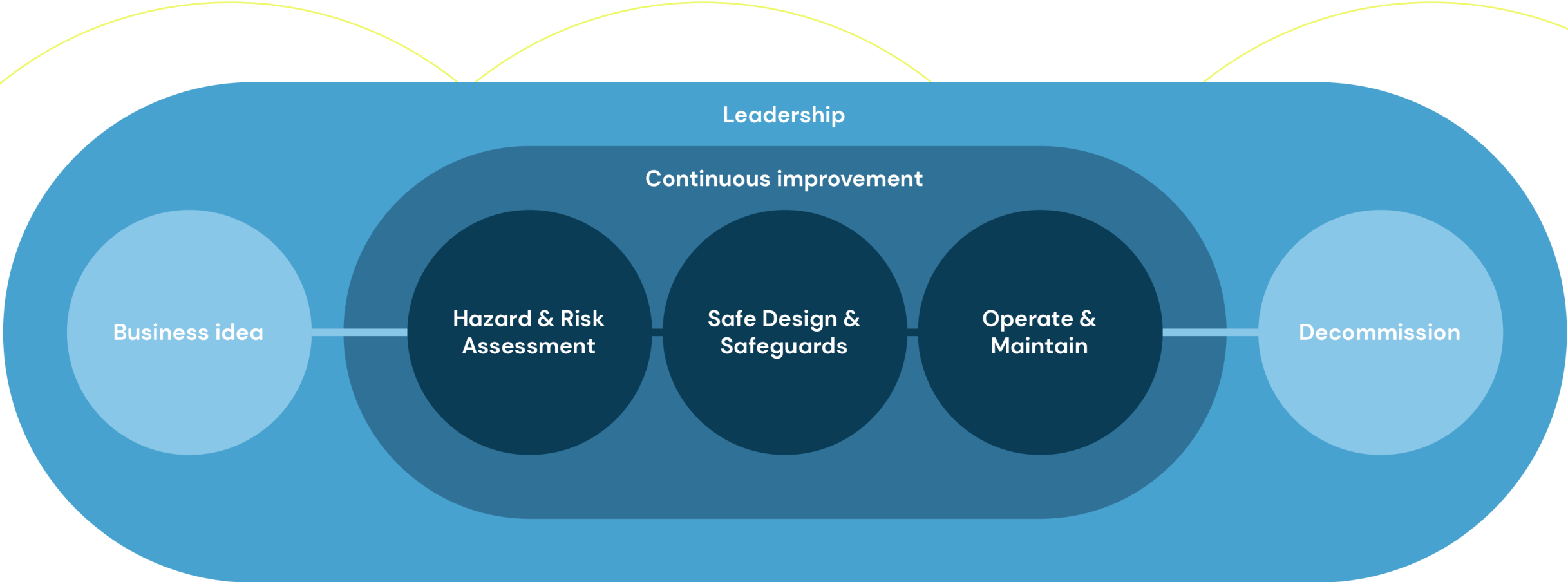
- State → Stock owned
- Historic fatal incidents
- Industrial best practise
- Corporate PS standards
- Global competences
- Strong safety network
- Mandatory risk reduction
- Strict verification & validation of safeguards

## Firmenich

- Privately owned
- No history of fatal incidents
- Compliance driven
- No corporate PS standards
- External consultants
- Small safety network
- ALARP
- No specific verification & validation process

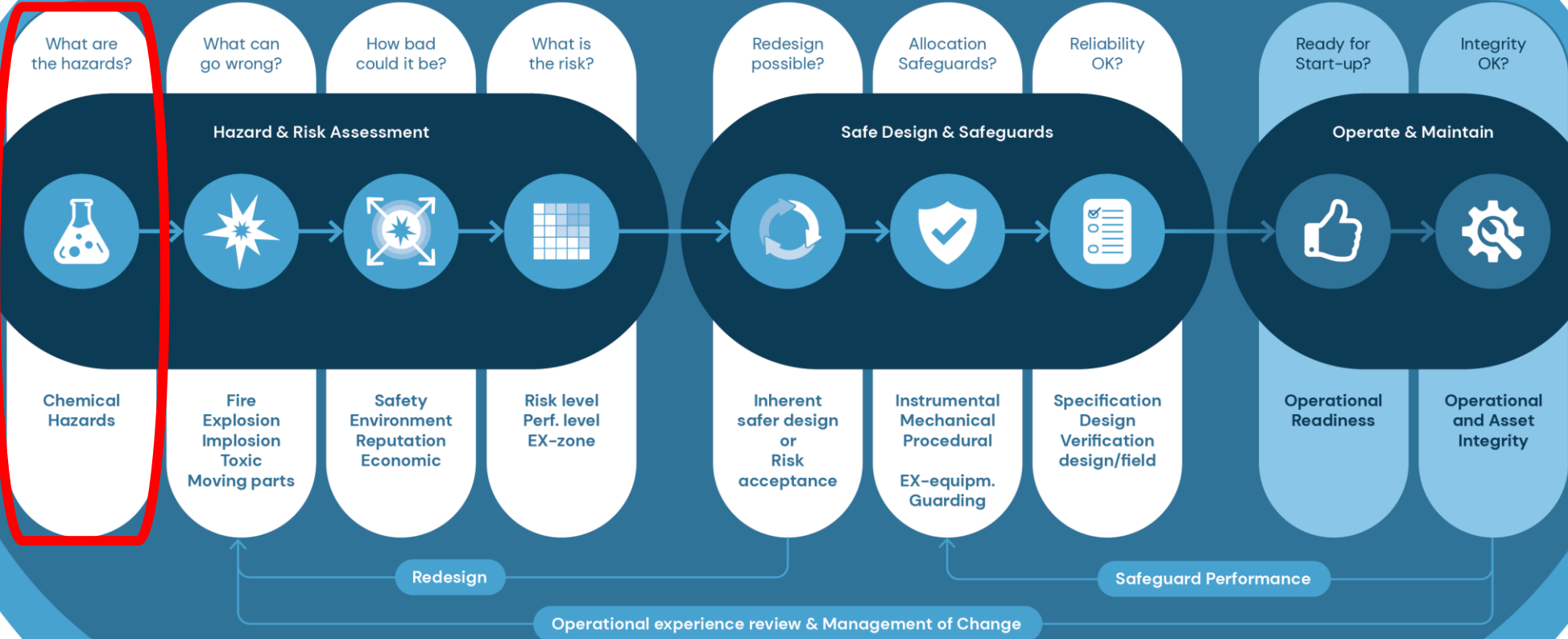
Safety is a priority

# Bringing everything together



# Leadership

## Continuous improvement



Safety requirements

Competence & Expertise

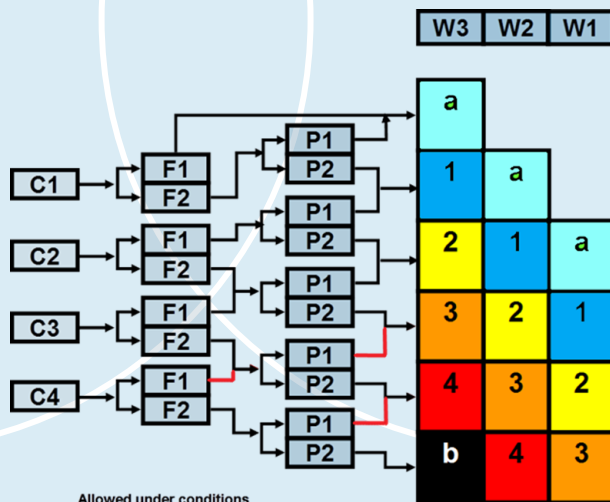
Performance measurement



# Focus on the combined Risk determination

## DSM

- Risk graph
- Based on IEC 61511
- Order of magnitude reductions
- Conditional modifiers
- Only 1 reversible injury consequence
- Focus on more severe fatal injury
- Determine Risk Level without safeguards

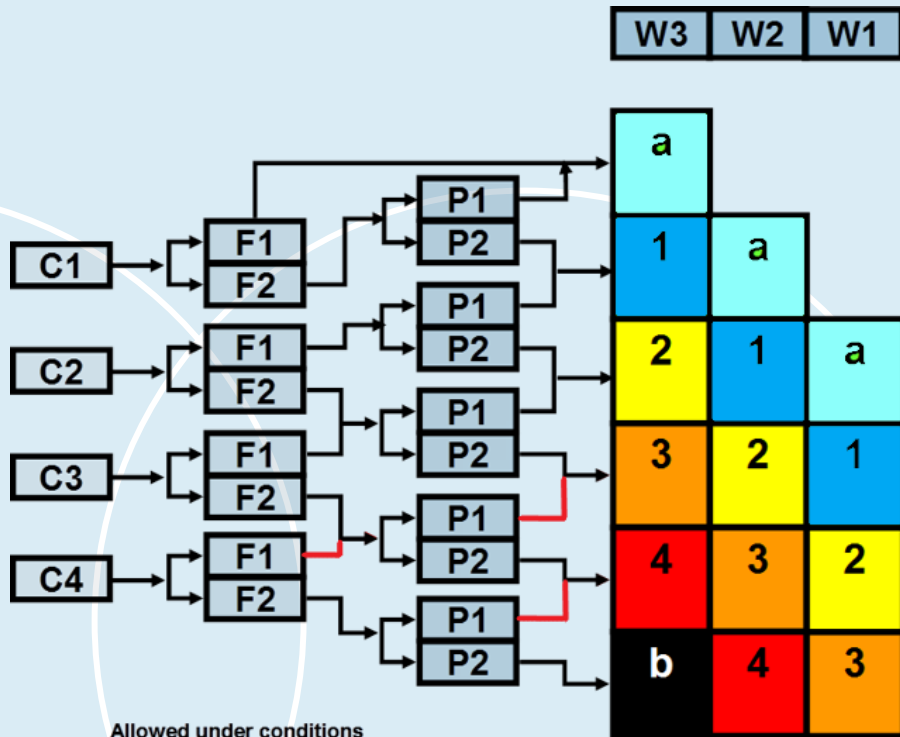


## Firmenich

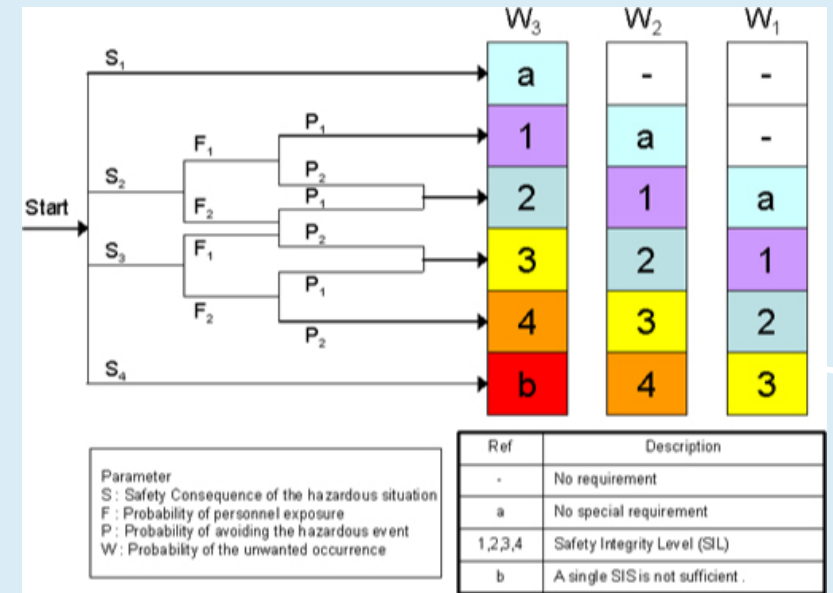
- Risk matrix
- 5x5
- Order of magnitude reductions
- Conditional modifiers
- 3 reversible injury consequences
- Focus on smaller injury categories
- Residual risk including safeguards.

		Consequence Severity				
		5 - Negligible (< 10K CHF)	4 - Low (10K- 100K CHF)	3 - Moderate (100K - 1M CHF)	2 - Significant (1M - 10M CHF)	1- Catastrophic (> 10M CHF)
Likelihood	A – Frequent (1 per yr.)	II	II	I	I	I
	B – Occasional (once in 10 yrs.)	III	II	II	I	I
	C – Infrequent (once in 100 yrs.)	III	III	II	II	I
	D – Improbable (once in 1000 yrs.) (10 <sup>3</sup> )	III	III	III	II	II
	E – Highly Improbable (once in 10,000 yrs.) (10 <sup>4</sup> )	III	III	III	III	II

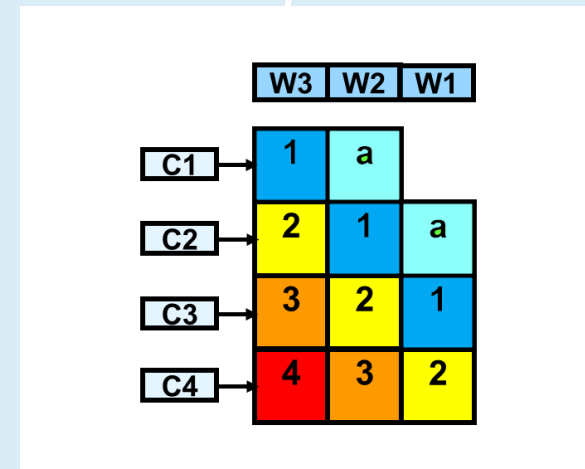
# Legacy DSM Risk Graph



C = consequence  
 F = Presence  
 P = Avoidance/Flee  
 W = Probability  
 a, 1, 2, 3, 4, b = Risk without safeguards



IEC 61511



Environmental risk graph

# Legacy Firmenich risk matrix

		Consequence Severity				
		5 - Negligible (< 10K CHF)	4 - Low (10K- 100K CHF)	3 - Moderate (100K - 1M CHF)	2 - Significant (1M - 10M CHF)	1- Catastrophic (> 10M CHF)
Likelihood	A – Frequent (1 per yr.)	II	II	I	I	I
	B – Occasional (once in 10 yrs.)	III	II	II	I	I
	C – Infrequent (once in 100 yrs.)	III	III	II	II	I
	D – Improbable (once in 1000 yrs.) (10 <sup>3</sup> )	III	III	III	II	II
	E – Highly Improbable (once in 10,000 yrs.) (10 <sup>4</sup> )	III	III	III	III	II

## Approach

- Consequence severity should be assessed on the basis of maximum credible worst case (i.e., maximum nominal inventory or energy that could be released), without benefit of active safeguards\*. Passive safeguards\*\* may be assumed to work.
- Likelihood should be assessed on the basis of the entire scenario occurring, not just the cause, and should take credit for active and passive safeguards. Likelihood should be based on operating history, within and outside company, and available failure rate data.
- The Likelihood level of E should be assigned sparingly – e.g., if all safeguards (procedures, training, hardware, mechanical integrity, administrative) including good engineering practice are in place and of high quality.

\* Active Safeguards: Control measures that require energy or human action at some point to function properly. Examples: Procedures, interlocks, emergency shut-off valves, pressure relief devices, sprinklers, mechanical ventilation.

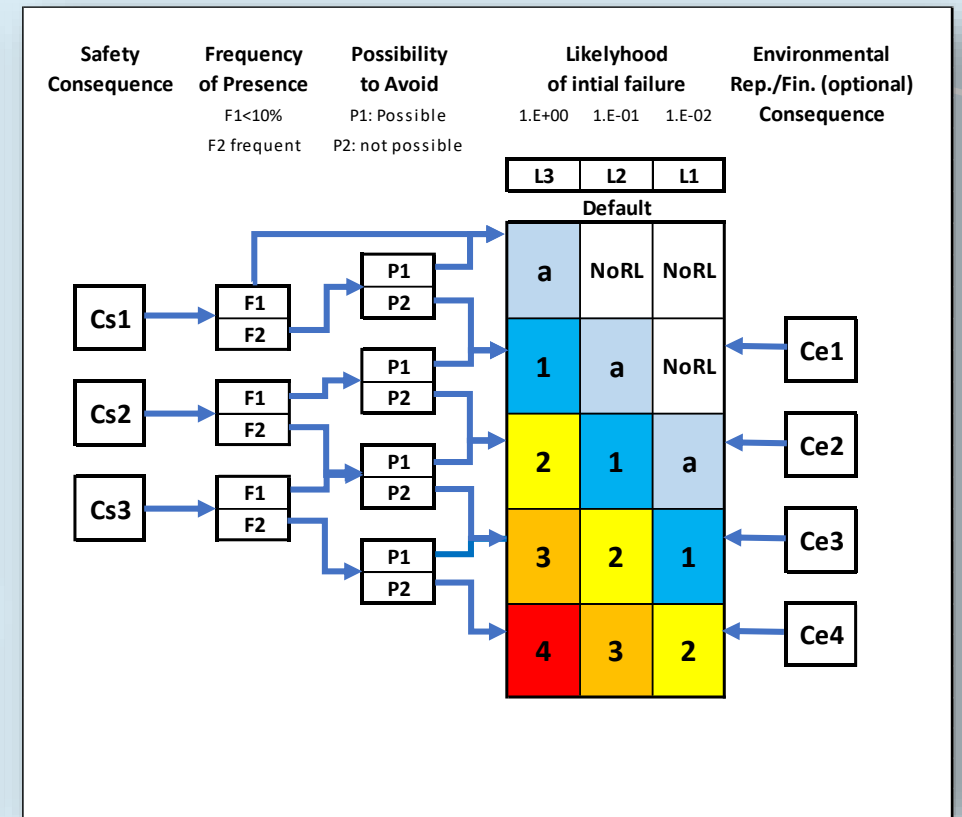
\*\* Passive Safeguards: Control measures that do not require energy or human action to function. Examples: such as secondary containment, fire walls, vessel design pressure, natural ventilation.

Level	Descriptor	Potential Financial Impact (CHF)	Examples of Losses – On-Site	Examples of Losses – Off-Site
1	Catastrophic	> 10M	- One or more Fatalities - Large spills and releases - Property damage - Business interruption	- Fatality or multiple severe injuries - Large scale evacuation - Major property damage - Major environmental impact
2	Significant	1M - 10M	- One or more severe permanent injuries - Significant spills and releases - Property damage - Business interruption	- 1 or 2 LTC injuries - Evacuation; shelter-in-place - Significant property damage - Environmental impact
3	Moderate	100K - 1M	- 1 or 2 serious injuries (Lost Time Case) - Multiple Medical Treatment cases - Medium spills and releases - Property damage & business interruption	- 1 or 2 First Aid injuries - Property damage - Minor environmental impact
4	Low	10K - 100K	- 1 or 2 Medical Treatment cases - Multiple (~10) First Aid cases - Small spill or release - Property damage & business interruption	- Nuisance impact (odors, noise, traffic, etc.)
5	Negligible	< 10K	- 1 or 2 First Aid cases - Fully contained spill - Release remains onsite - Property damage & business interruption	- No discernible impact



# Proposed future Risk Matrix – Risk Graph

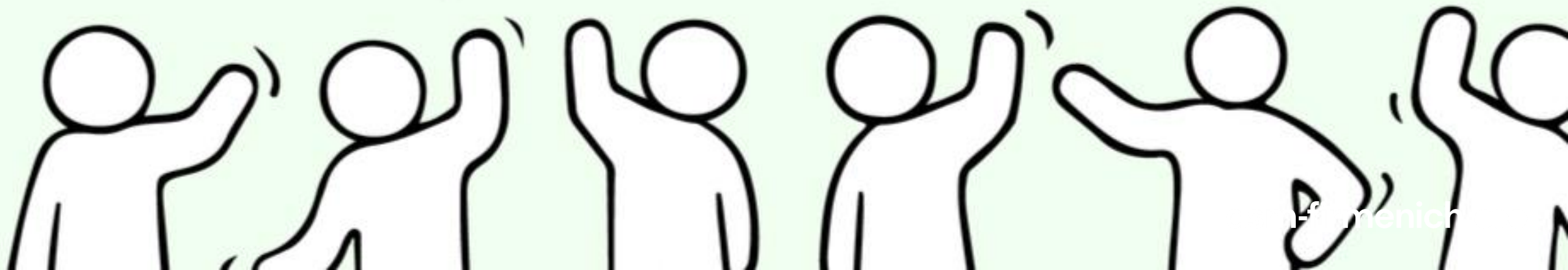
				Safety consequence					
				Reversible injury			Irreversible injury		
				Minor	Medium	Medium	Serious	Catastrophic	
					Cs1		Cs2	Cs3	
				5	4	3	2	1	
Likelihood of the initial failure	L3	A	High initial failure	a	1	2	3	4	
	L2	B	Default	Tolerable	a	1	2	3	
	L1	C	Low initial failure	Tolerable	Tolerable	a	1	2	
		D		Tolerable	Tolerable	Tolerable	a	1	
		E		Tolerable	Tolerable	Tolerable	Tolerable	a	
				Ce1	Ce2	Ce3	Ce4		
				Environmental/reputation*/financial*					
<b>How to apply the risk matrix?</b>				<b>Terminology</b>		<b>Presence (F)</b>		<b>Escape (P)</b>	
1. Determine the initial risk by consequence and initial failure likelihood 2. Then apply F and/or P reduction to determine the Risk Level				Conditional modifiers	F, P (max 2 reductions)	F1 < 10%	P1 - Possible		
				Likelihood	L, L2 = default	F2 - Frequent	P2 - Not Possible		
				Consequence	Cs, Ce				



## Conclusions

- Get to know each other takes time (people, work habits, processes)
- Aligning the ambition level
- Pull vs. Push strategy
- Different demand and hazard profile in 4 BU's
- Cultural changes takes years...







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