

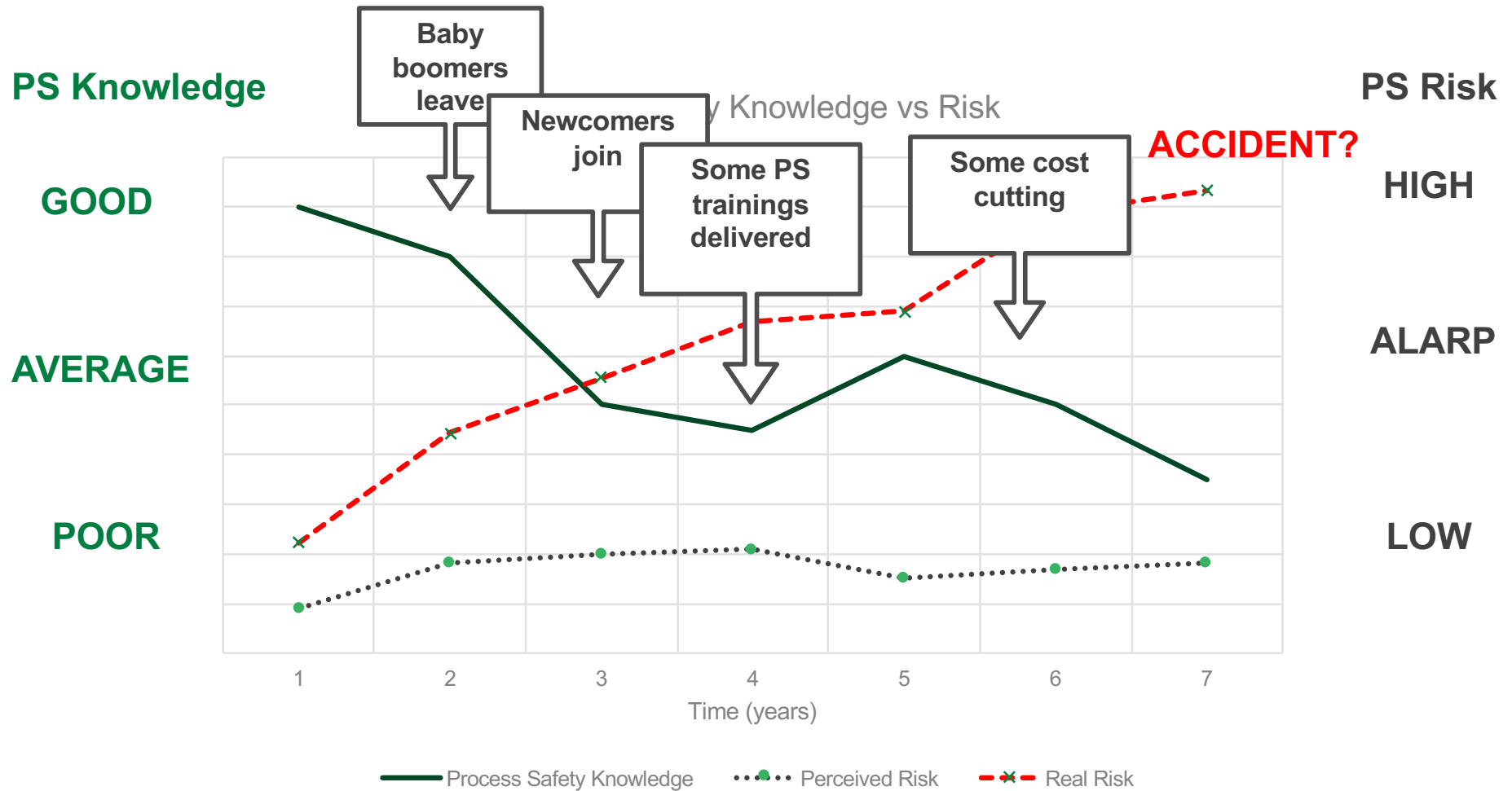
 **DEKRA** Insight

Process Safety Competency: Trends and Challenges

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Stake of Process Safety Competency

Graphically

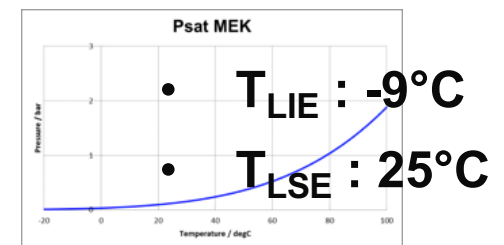


**STAKE OF PROCESS SAFETY
COMPETENCY BY CASE STUDIES
ILLUSTRATING FAILURES OF EMBEDDING
ORGANIZATIONAL PROCESS SAFETY COMPETENCE**

Case#1 : Flashpoint unknown or misused

Sector: Chemicals

- **Normal Process:**
 - Load 2000 liters of MEK in 6m³ mixer
 - Heat to 60°C
 - Load polyester resins sheets via manhole
 - But flammable vapors, nuisances, ...
- **Process change:**
 - Following success pilot test at ambient T, HSE decided to load sheets without heating
- **Explosion at 1st batch !**
- **Cause: Local incompetence**



Case#2 : Thermal stability unknown

Sector: Cosmetics/Healthcare

- **The incident :**
 - 1 ton of product decomposed rapidly in a mixer filling the room with heavy & toxic fumes. Emergency plan & fortunately no injuries
- **Likely cause :**
 - Ignition of the powder by spurious activation of explosion-suppressors (Hot spot in activation mechanism)
 - Data: MIE 1J, Kst 50 bar.m/s but Tonset ~50°C
 - Instrumentation installed in such a way that mixer was regulating 40°C
- **On this particular incident :**
 - Lack & bad understanding of process safety data
 - Wrong focus on dust-explosion rather than thermal stability
 - Over-instrumented
- **Cause: Organizational incompetence**



Case#3 : Dust explosion properties missing

Sector: Pharmaceuticals (secondary)

- **Process:**
 - Load pharma powder in hopper
 - 15 years of experience!
- **Incident**
 - Dust explosion
 - Data : MIE < 1 mJ
- **Need to measure and understand dust flammability properties**
- **Cause: Competence**



Process Safety Competence Failures

A few extra stories – At different levels

- **Senior level (*Verbatim*):**
 - [Boss to Supervisor]: “Why are we flaring today?”
 - [Supervisor to Boss]: “This is the flare of our neighbor”
- **Engineer level:**
 - **Dust explosion happened in a food dryer**
 - **Not even 1 such scenario in the HAZOP review!**
- **Operator level:**
 - **See: <http://www.youtube.com/watch?v=j5d0W2rP1ec>**

Trends in Process Safety Competence

Why PSC is getting attention?

- **PSC is getting attention globally for ≠ reasons:**
 - Brain drain, New businesses, acquisitions, ...
- **Regulator is helping (eg SEVESO or ATEX)**
- **Industry associations recommendations**
 - PSC is a chapter of CCPS PSM framework & Vision 2020 (Intentional Competency Development)
- **Companies realize how critical it is**
 - PS competence correlates with PS performance
 - PSC seen as an Asset for a manufacturing company
- **PSC Assurance is growing**
- **Several PS events are clearly related to PSC failures**

Challenges and Barriers in PS Competence

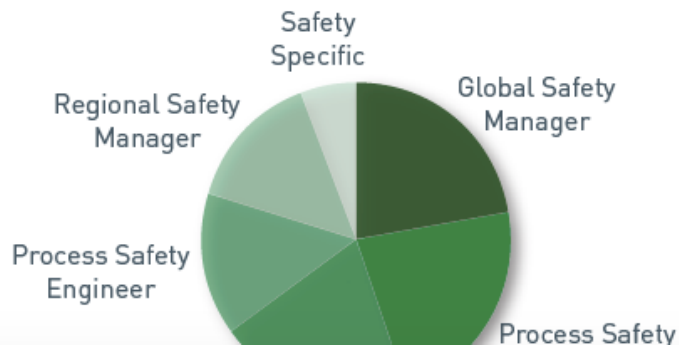
Our global survey results

TRAINING AND COMPETENCY 2017 SURVEY

COMMON CHALLENGES ACROSS THE INDUSTRY

- #1 Time restraints
- #2 Finding the right content
- #3 Getting global consistency
- #4 Budget
- #5 Engaging workers
- #6 Leadership support

WHO RESPONDED



■ Safety managers and directors with more than 10 years of experience in safety

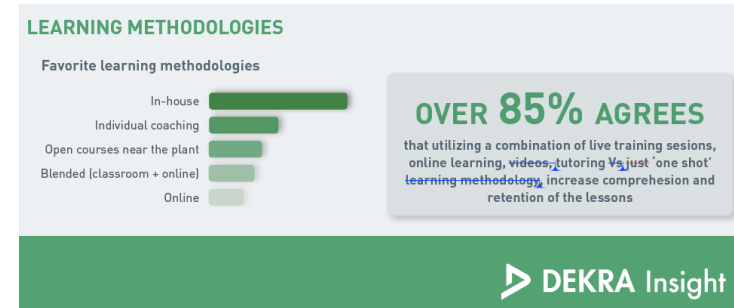
■ From some of the largest industrial companies in the world (50% >5,000 employees)

■ Mainly from the industrial sectors: Chemical, Oil and

Shift from Training to Competence building

Our global survey results

- Plethora of providers
 - Massive Internet information
 - New learning delivery (vs death by PPT)
 - Workshops & case studies
 - Online courses / MOOC
 - Serious games
- ➔ Not training anymore but **competence building** with engagement of staff



PS Competence Building

What is it?

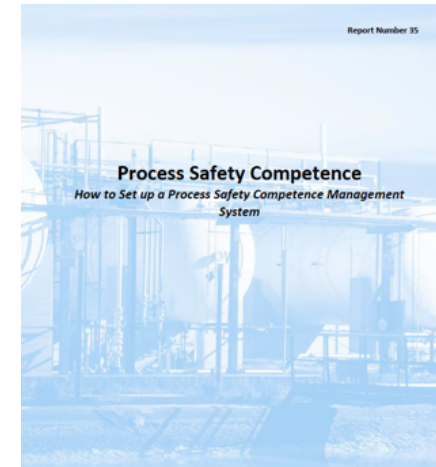
- The right process safety skills
 - For your needs / sector
- Embedded in the organization
 - Different levels
 - Different profiles/roles
- Sustainable
 - ie Managed

Category	Discipline	Sector of the process industry				
		Chemical	Petroleum and gas	Food processing	Cosmetics	Pharmaceutical
Process engineering						
	<i>Knowledge of processes</i>	✓	✓	✓	✓	✓
	<i>Diagrams (PID, ...) and engineering standards</i>	✓	✓	✓	✓	✓
	<i>Thermodynamics</i>	✓	✓	-	-	✓
	<i>Fluid dynamics</i>	✓	✓	-	✓	✓
Hazards / fundamentals						
	<i>Fire</i>	✓	✓	✓	✓	✓
	<i>Detonation</i>	-	✓			-
	<i>Gas explosion</i>	✓	✓	✓	✓	✓
	<i>Dust explosion</i>	✓		✓	✓	✓
	<i>Physical explosions and BLEVE</i>	✓	✓	✓	✓	✓
	<i>Thermal runaway</i>	✓			-	✓
	<i>Corrosion, Materials</i>	✓	✓		-	✓
	<i>Toxicity</i>	✓	✓	✓	✓	✓
Methods						
	<i>Risk analysis (PHA/HAZOP)</i>	✓	✓	✓	✓	✓
	<i>Evaluation of consequences and QRA</i>	✓	✓			-
	<i>Change management</i>	✓	✓	✓	✓	✓
	<i>Local regulation of major hazards</i>	-	✓			-
Feedback						
	<i>Knowledge of accidents</i>	✓	✓	✓	✓	✓
	<i>Expert assessment, accident analysis</i>	✓	✓	✓	✓	✓
Protective barriers and safeguards						
	<i>Fire protection</i>	✓	✓	✓	✓	✓
	<i>Functional safety, safety instrumented systems</i>	✓	✓	✓	✓	✓
	<i>Relief valves and rupture diaphragms</i>	✓	✓	✓	✓	✓
	<i>Emergency vents for reactive systems (DIERS)</i>	✓				✓
	<i>Emergency plans</i>	✓	✓	✓	✓	✓

PS Competence Solutions

What are the best-in-class companies doing?

- **Implement PSC-Management System**
 - See EPSC Report 35 and CCPS book from Jan. 2015
- **In-house PS Academy/University**
 - Some core, some outsourced
- **Measure PSC with metrics**
 - Leading for PS performance
- **Corporate-wide PS Education programs**
 - Eg SIL, Hazards of P&T, Ignition sources, ...
 - Fine-tuned with site specific examples/cases
- **Embed widely inside their organization**
 - Not anymore 1 central expert, but a network of PS champions



EPSC, Process Safety Competence, Report 35, 2013

Summary

- **PS Competence more & more seen as critical**
 - Root cause for many PS Events
 - **Critical to “glue” PSM programs**
 - Correlates with PS performance
- **All global companies face PS Competence challenges:**
 - How to embed, retain & sustain?
- **Need:**
 - Shift to PS competence building via new learning solutions
 - Sustained at different levels/profiles
 - Mindful system/plan/investment
 - Active corporate sponsor to make it happen



**High Process
Safety
Competence is
an Asset for a
Chemical
Company**

Dr. H. Schwarz –
Corporate PS Head –
BASF - 2012

Want to know more about our Process Safety competence programs?

Come to our booth or visit

www.dekra-insight.com

www.chilworth.nl

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