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ASSET INTEGRITY MANAGEMENT SYSTEM

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Gas transmission... a complex activity

barriers illustration

critical metal defects

In Line Inspection

gas transmission network availability

patrolling

third party damage



cathodic protection

replacement

ageing

threats illustration

corrosion

training

wrong maneuver



Gas transmission financial / technical context

1. Gas Transmission operator : high **capitalistic** activity
2. Gas Transmission safety / reliability : high **operational** activity



need for an efficient **Asset Management System**

“make sure you spend the right €, on the right activity, at the right time”

Some definitions

ISO 55000 :

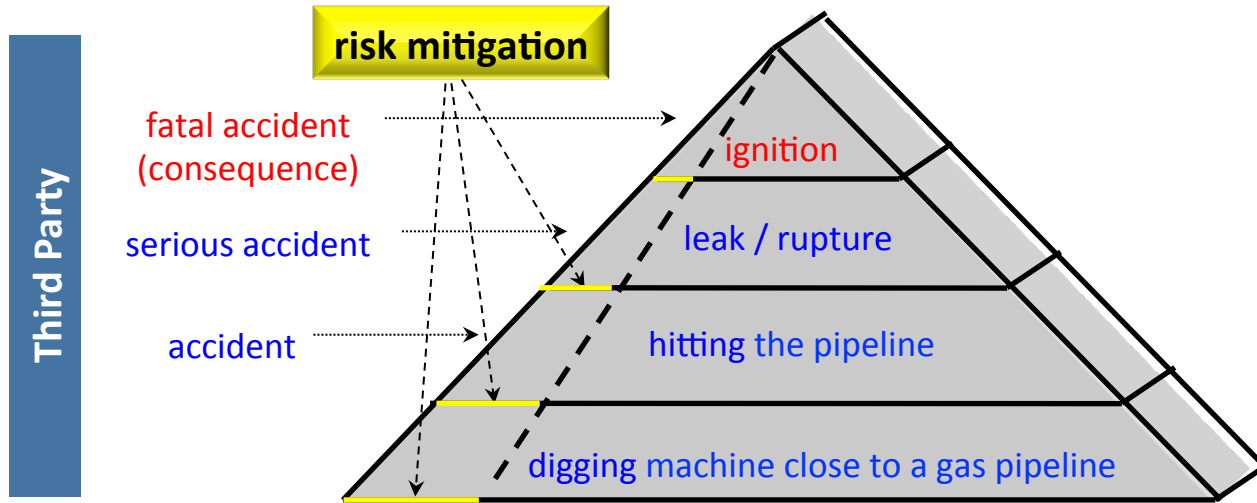
Asset Management = “set of *coordinated* activities that an organization uses to realize value from assets in the delivery of its outcomes or objectives”

Oxford English dictionary :

coordinate = “bring the different elements of a complex activity into an *efficient relationship*”

where : “*efficient relationship* should be a *cost effective* one *minimizing* the operator’s *overall risk*”

Risk notion & assumption



$$\text{risk} = \text{frequency} \times \text{consequence}$$

$$\text{frequency} = \prod_{i=1}^n \text{frequency}_i$$

impact on persons and properties

Coordinated approach

Goal : the global annual budget “e” to be split according to a new annual cost distribution e'_j per activity “j”, $j = 1, \dots, p$ with respect to :

financial requirement

no additional cost →

$$e = \sum_{j=1}^p e'_j$$

coordinating requirement

minimize →

$$\text{Residual overall risk} = \sum_{j=1}^p \text{Residual Risk}_j$$



in-house software AIMS : Asset Integrity Management System

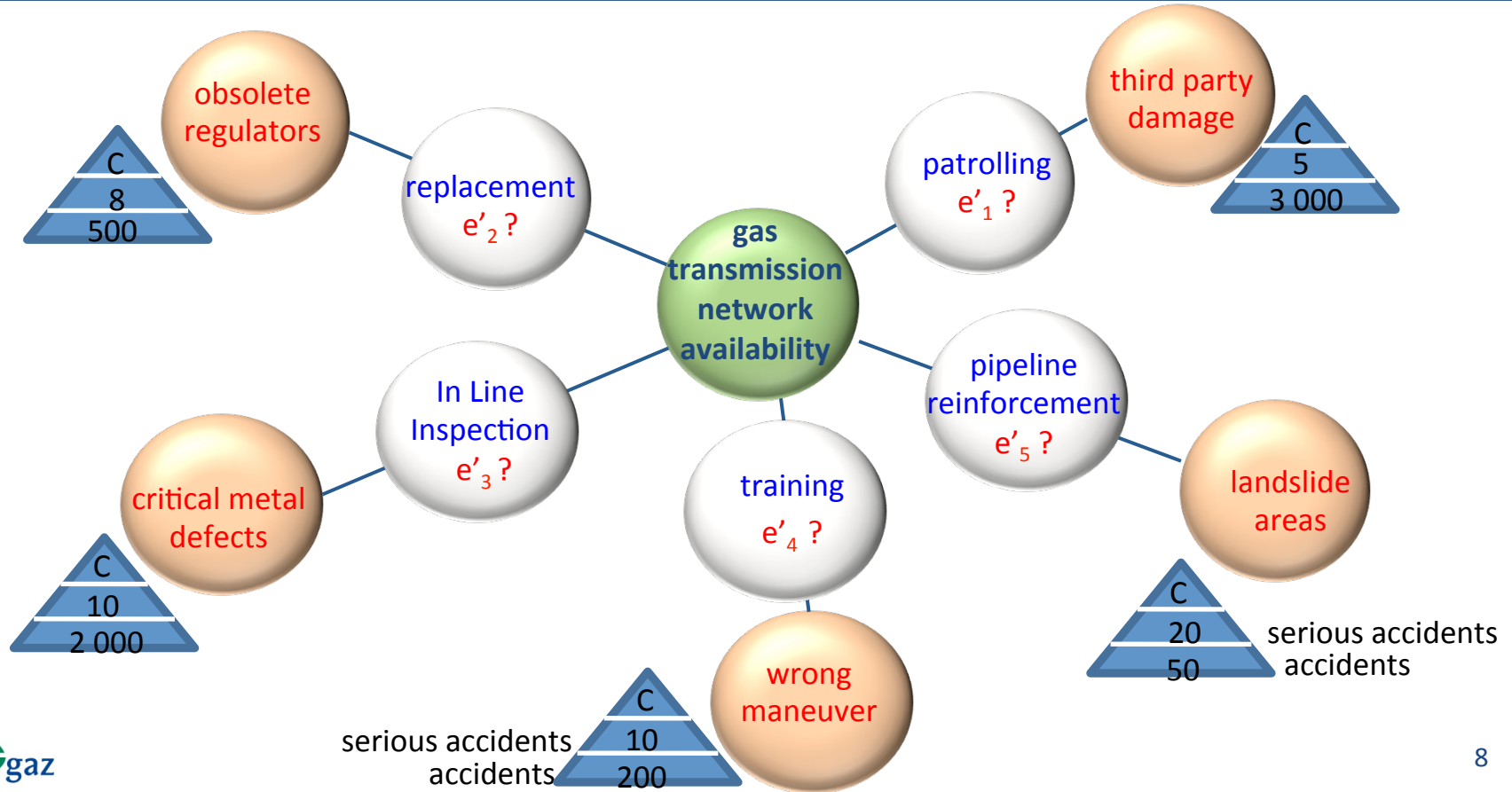
Full fictitious case study

- threat 1 : third party interference
- threat 2 : obsolete regulators
- threat 3 : metal corrosion
- threat 4 : wrong maneuver
- threat 5 : landslide areas

p = 5

threat	activity	current annual cost
1	slabs & survey	8 M€
2	regulators replacement	3.5 M€
3	inspection/rehabilitation	10 M€
4	training campaign	1.2 M€
5	technical reinforcement	0.8 M€
	total	23,5 M€

Risk fictitious data



Cost distribution – illustration 1

M€ / year	uncoordinated cost distribution	coordinated cost distribution	coordinated conditioned* cost distribution
slabs & survey	8.0	9.3	8.5
regulators replacement	3.5	0.0	1.7
inspection/rehabilitation	10.0	13.0	12.0
training campaign	1.2	1.1	0.9
technical reinforcement	0.8	0.1	0.4
total	23.5	23.5	23.5

** condition → at least 50% of the initial uncoordinated corresponding cost distribution*

Cost distribution – illustration 2

Global cost reduction -10 % → 21.2 M€/year instead of 23.5 M€/year

M€ / year	uncoordinated cost distribution	coordinated cost distribution	coordinated conditioned cost distribution
slabs & survey	7.2 (-10%)	8.4 (+5%)	7.7 (-4%)
regulators replacement	3.2 (-10%)	0.0 (-100%)	1.5 (-57%)
inspection/rehabilitation	9.0 (-10%)	11.7 (+17%)	10.8 (+8%)
training campaign	1.1 (-10%)	1.0 (-20%)	0.8 (-30%)
technical reinforcement	0.7 (-10%)	0.1 (-87%)	0.3 (-63%)
total	21.2 (-10%)	21.2 (-10%)	21.2 (-10%)

Final conclusion

- Based on **risk assessment**, the present approach contributes to **asset management**. Only **technical** risks were considered which, in the gas industry, are the most serious ones.
- As shown in the “virtual” illustration, the approach may offer a **smooth transition** in order to optimize resources.
- It offers two options :
 1. do **better** with **no** additional cost (prevailing option)
 2. make your best with **less** cost (shortage situation)



make sure you spend the right €, on the right activity, at the right time