



Fondation pour une culture  
de sécurité industrielle

*The Foundation for Industrial Safety Culture  
Toulouse, France*

## APPROACHES TO SAFETY: ONE SIZE DOES NOT FIT ALL

*René AMALBERTI, Prof, MD, PhD  
Director FONCSI*

# RISK IN HUMAN ACTIVITIES

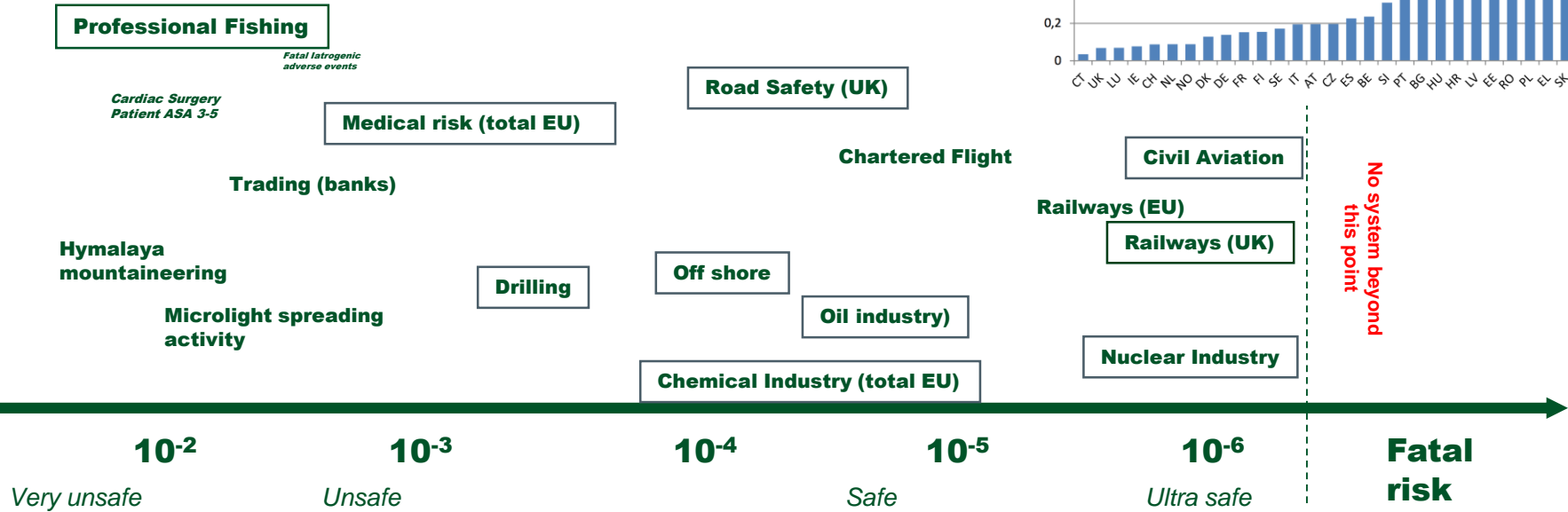
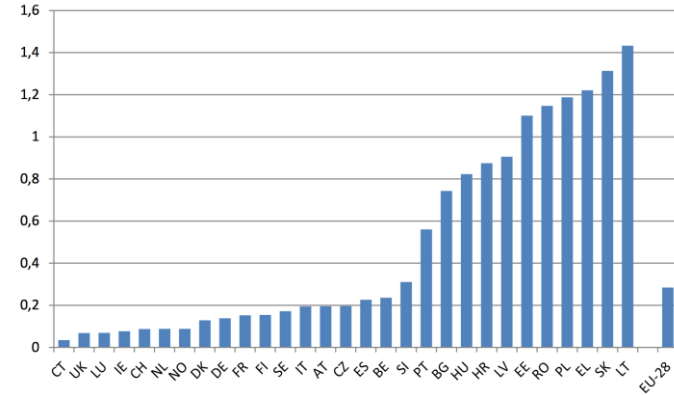


Figure 2 — : Railway fatalities per million train-km (2010-2014)



# THE PROBLEM

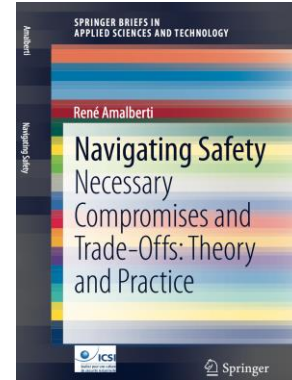
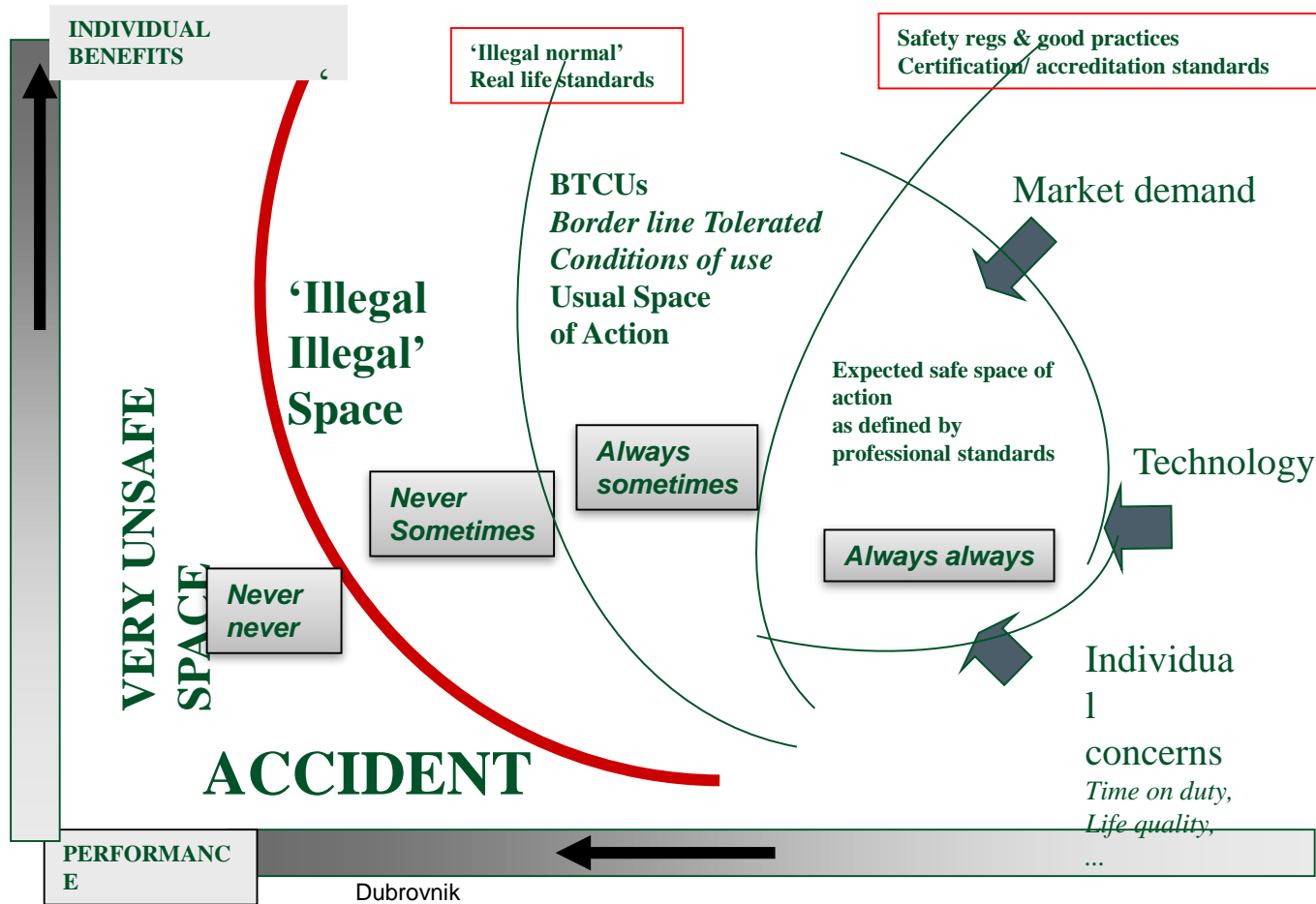
# DOES THAT RING A BELL?

- ⊙ Huge pressures, frequent planning changes, missing or failing material, repetitive interruptions, poor sync between services, inadequate/malfunctioning IT systems, understaffing, junior staff with lack of supervision.

# WORK AS DONE IS INCREASINGLY DEVIATING FROM WORK AS IMAGINE

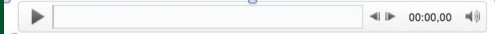
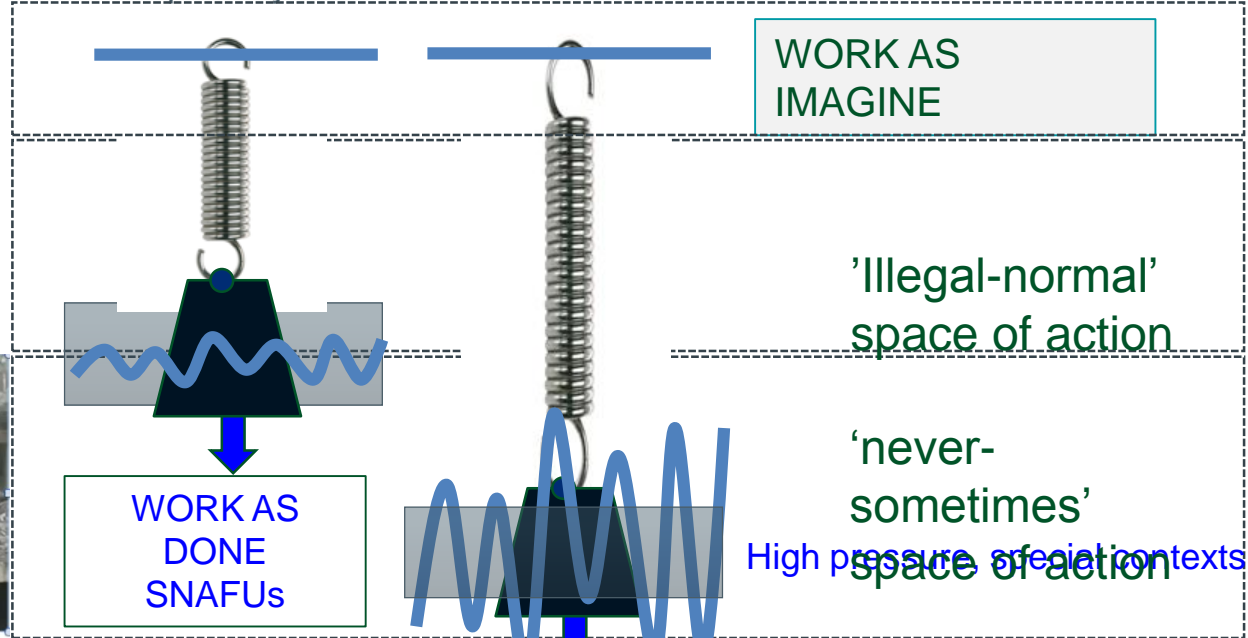
- ⊙ Quality and Safety protocol and standards inflations
- ⊙ When there are so many rules that it is impossible to obey all of them, rule-breaking becomes "normal" behaviour
- ⊙ Especially if the management breaks rules to increase productivity
- ⊙ To sum up...regular experience responding to handle anomalies or SNAFUs (Woods, 2017)

# System Migration to Boundaries



# ADAPTATION

Adaptive system



# THE SOLUTION SPACE



## **ARE WE EXPLICITLY TRAINING OUR (BOARD GOVERN, MIDDLE AND FRONT LINE) MANAGERS TO COPE WITH SUCH USUAL WORKING CONDITIONS?**

- ⊙ **Not really, still taboo subject**
- ⊙ **Expected to be the result of self-learning, assimilated to experience**
- ⊙ **But wrong assumption**
  - Great variance of competence among managers, whether they are executive or middle/frontline managers
  - Need for formal education, learning how to conduct “safe arbitrations in normal and abnormal degraded conditions”
  - Pedagogic material available

# BRITTLINESS AND ADAPTIVE CAPACITY

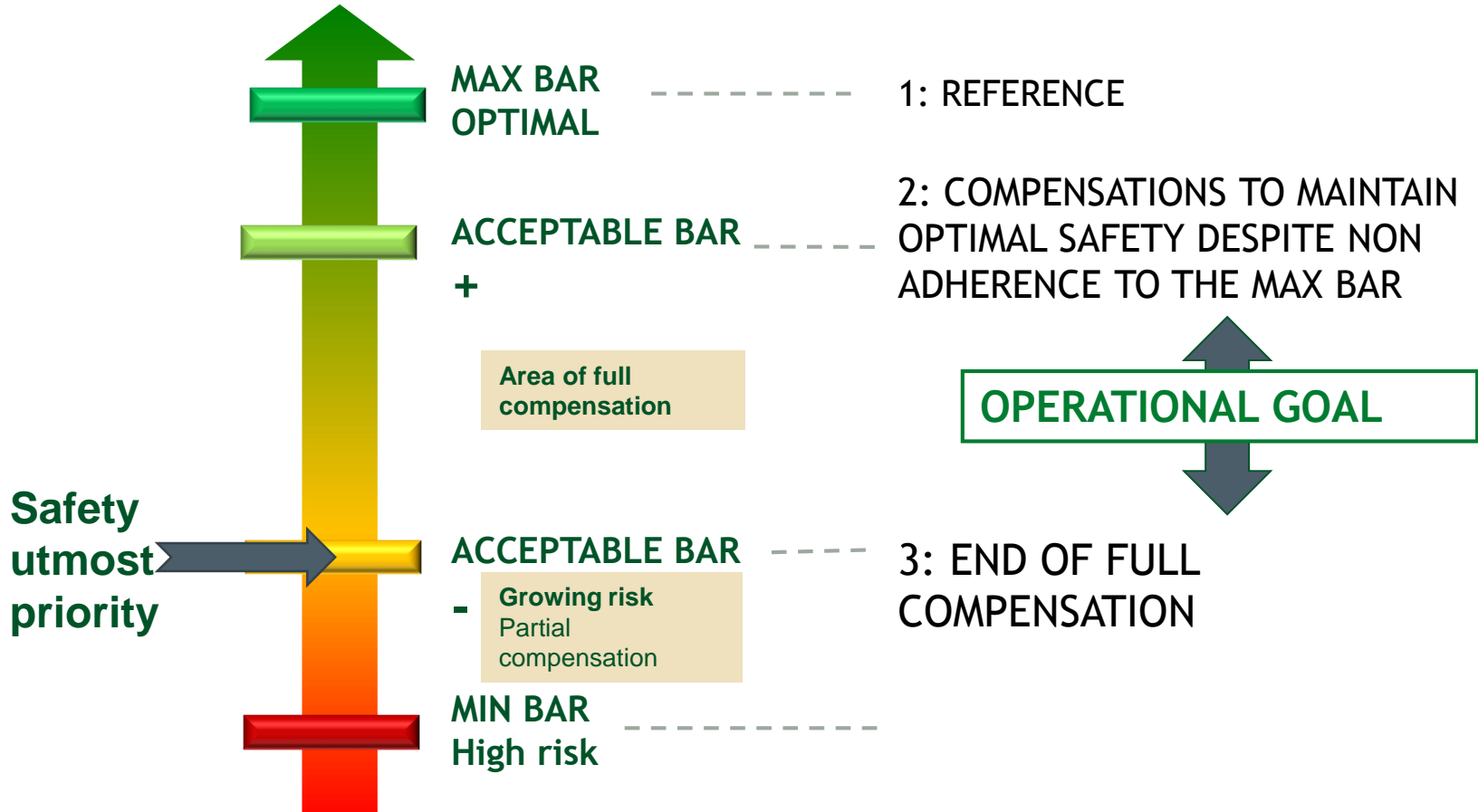
## ⊙ Brittleness

- All systems have an envelope of performance, or a *range of adaptive behaviour*, due to finite resources and the inherent variability of its environment in a continuously changing world.
- Descriptively, brittleness is how rapidly a system's performance declines when it nears and reaches its boundary.
- Brittle systems experience rapid performance collapses, or failures, when events challenge boundaries. **Of course, one difficulty is that the location of the boundary is normally uncertain and moves as capabilities and conditions change.**

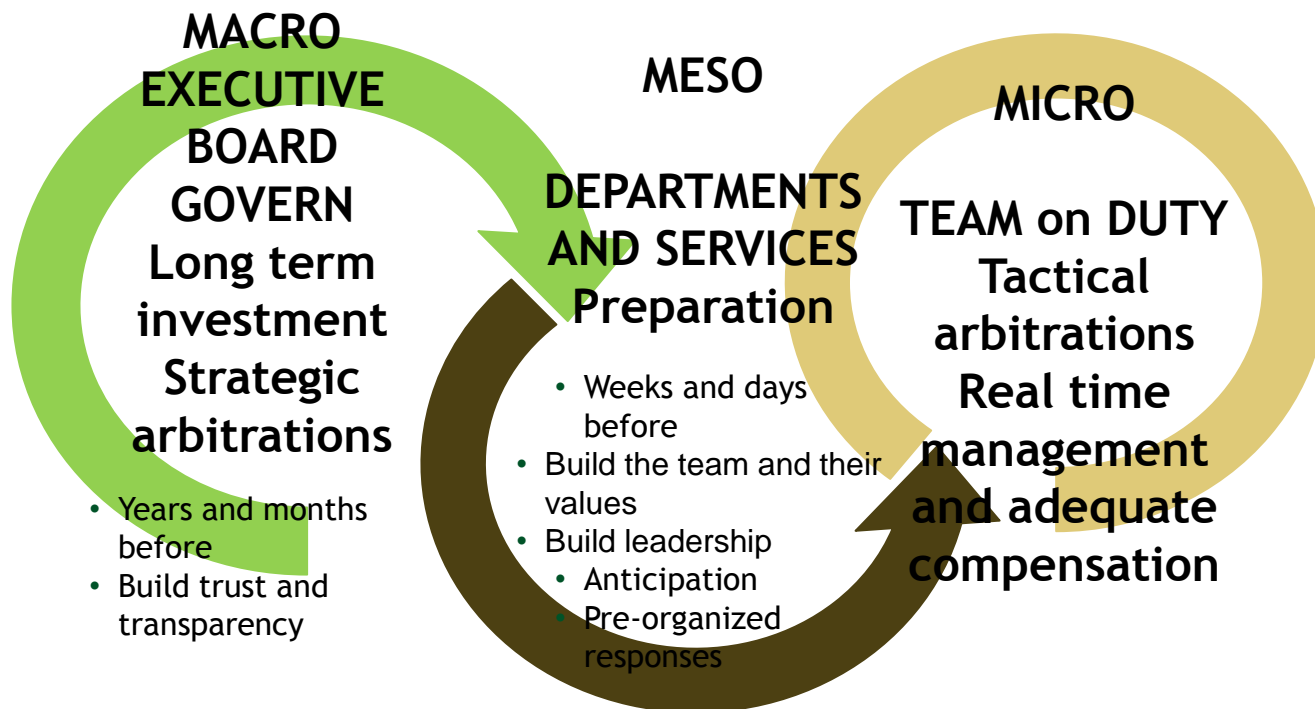
⊙ **Adaptive capacity** means a system is *poised to adapt*, it has some readiness or potential to change how it currently works— its models, plans, processes, behaviours

⊙ Regular experience responding to handle anomalies or **SNAFUs**,  
*Dave Woods, 2018, Essentials of Resilience, Revisited*

## PERFORMANCE LEVELS

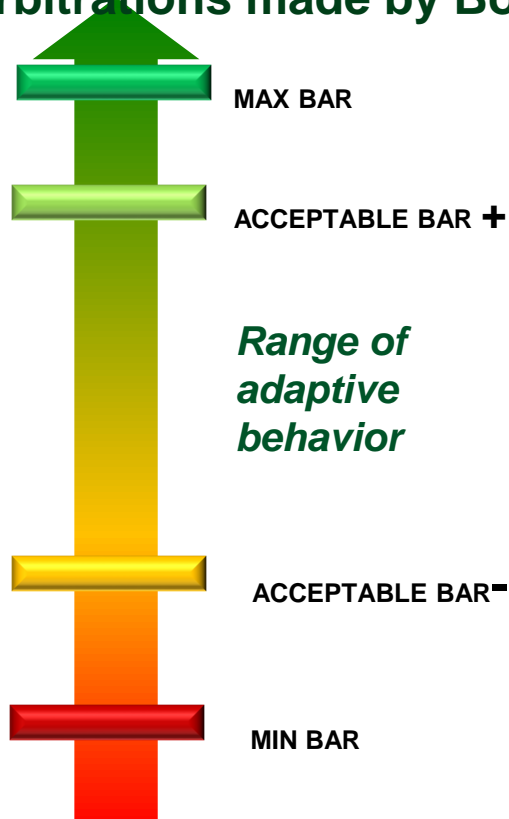


## THREE COMBINED LEVELS OF ACTION TO IMPROVE SAFE ARBITRATIONS



The effectiveness of short term compensation strategies depend on long term investments and arbitrations

**Good arbitrations made by Board govern**



*Range of adaptive behavior*

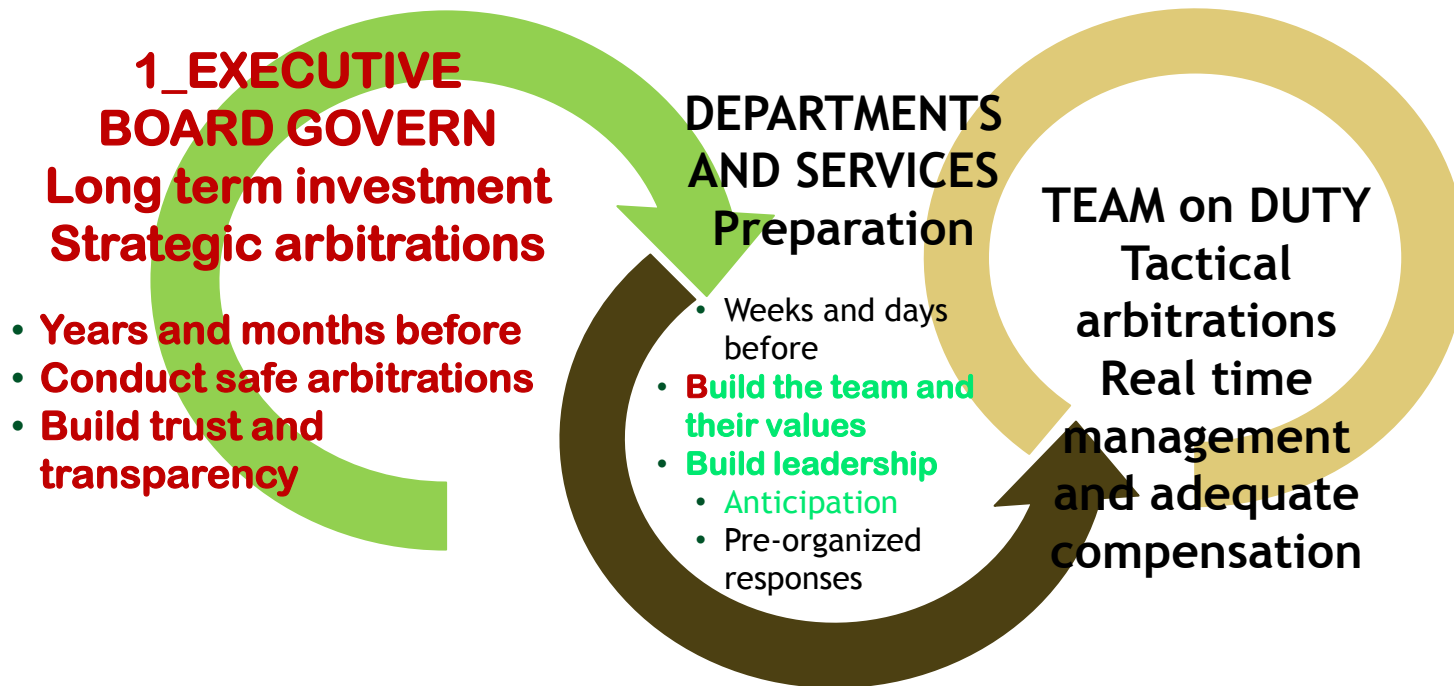
**Poor arbitrations made by Board govern**



*Reduced range of adaptive behavior*

*Min bar*

## THREE LEVELS OF ACTION TO IMPROVE SAFE ARBITRATIONS



# MANAGING RISKS NAVIGATING BETWEEN REEFS

## ⊙ Companies and Production Units may collapse for many reasons

- **Loosing markets, unable to expand**
  - inability to cover market demands, offer falling behind innovations
  - Fierce market competition, poor image, economic recession
- **Unable to generate high quality product in a timely manner, at affordable cost (including maintenance)**
  - Endemic defect on the production chain / care chain
  - Excessive junior staff
  - Poor maintenance
  - Social peace at risk, strike actions
- **Finance crisis, unable to fund development**
  - Business model
  - Cash flow, financial debts, loans
  - Partnership, alliances, ... economic and political dependencies
- **Unsafe macro, meso and micro systems**
  - Adverse events, Dramas, accidents, public scandals
  - Blame from authorities, possibly loss of authorization



***Risks are not  
only Adverse  
events!***

⊙ **Every CODIR/COMEX/BOARD GOVERN reshuffles the cards according to the most imminent threat, which takes the token**

① **Accept the idea that making concessions is the norm**





## COMPETITIVE ALLOCATION OF PRIORITIES AMONG DIMENSIONS

### ① “The optimal wishful plans”

- Each manager in charge of a dimension (Finance, Production, Marketing, Human resources, Safety) attends executive meetings with a wishful optimal plan in mind
- This wishful plan reflects a risk matrix associated with recommended interventions

### ② “The Dictatorship of short-term”

- Each executive meeting, at several levels of the management chain, prioritizes the topics of the day perceived as the most harmful short-term effects.
- Hence, one or two dimensions among Finance, Production, Marketing, Safety, human resources and social climate, overwhelm all other dimensions.

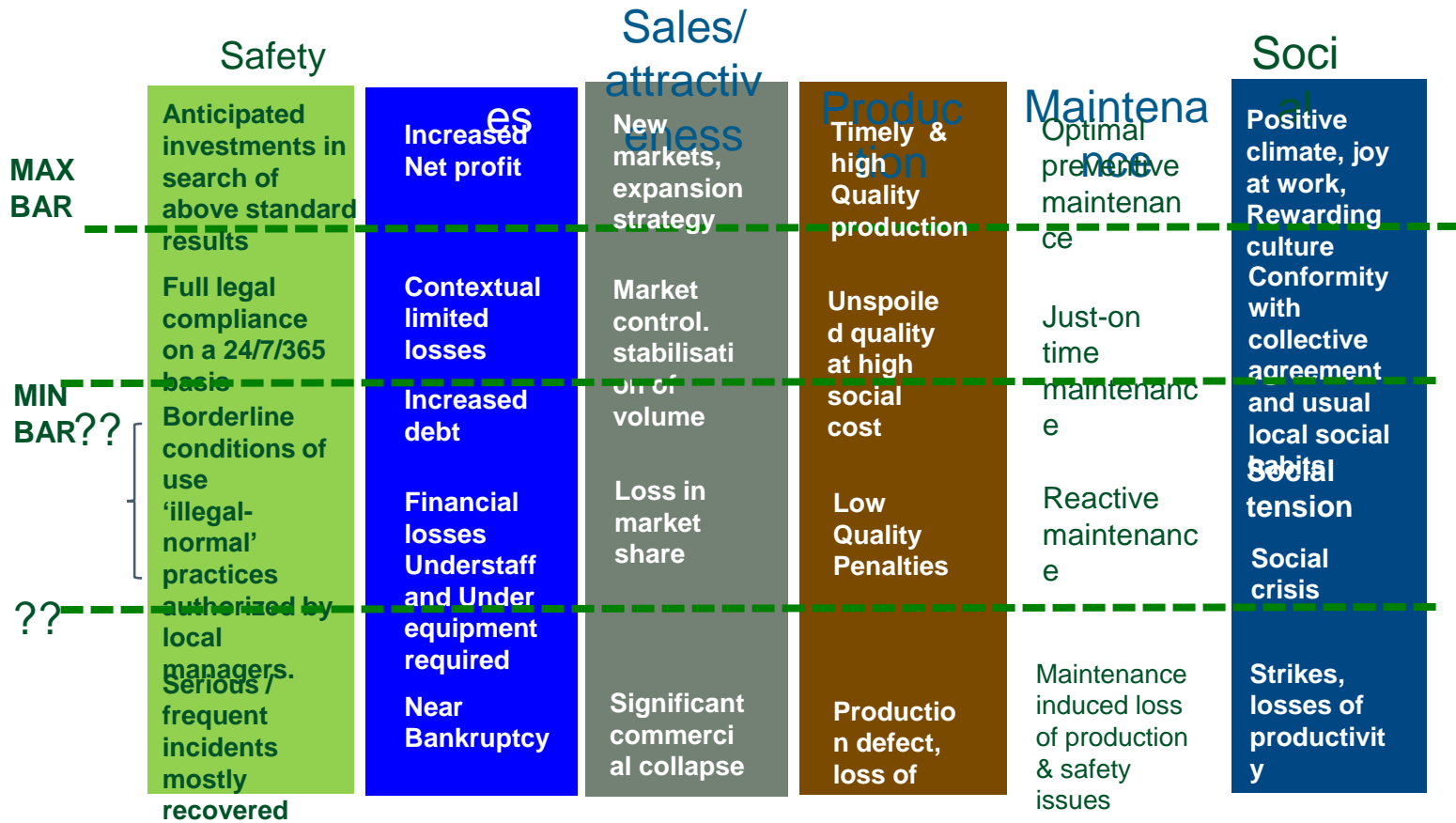
### ③ Optimal wishful plan of dimensions are competitive with one another.

- Giving the token of the day to one dimension inevitably asks the other dimensions stepping back in their optimal wishful plan

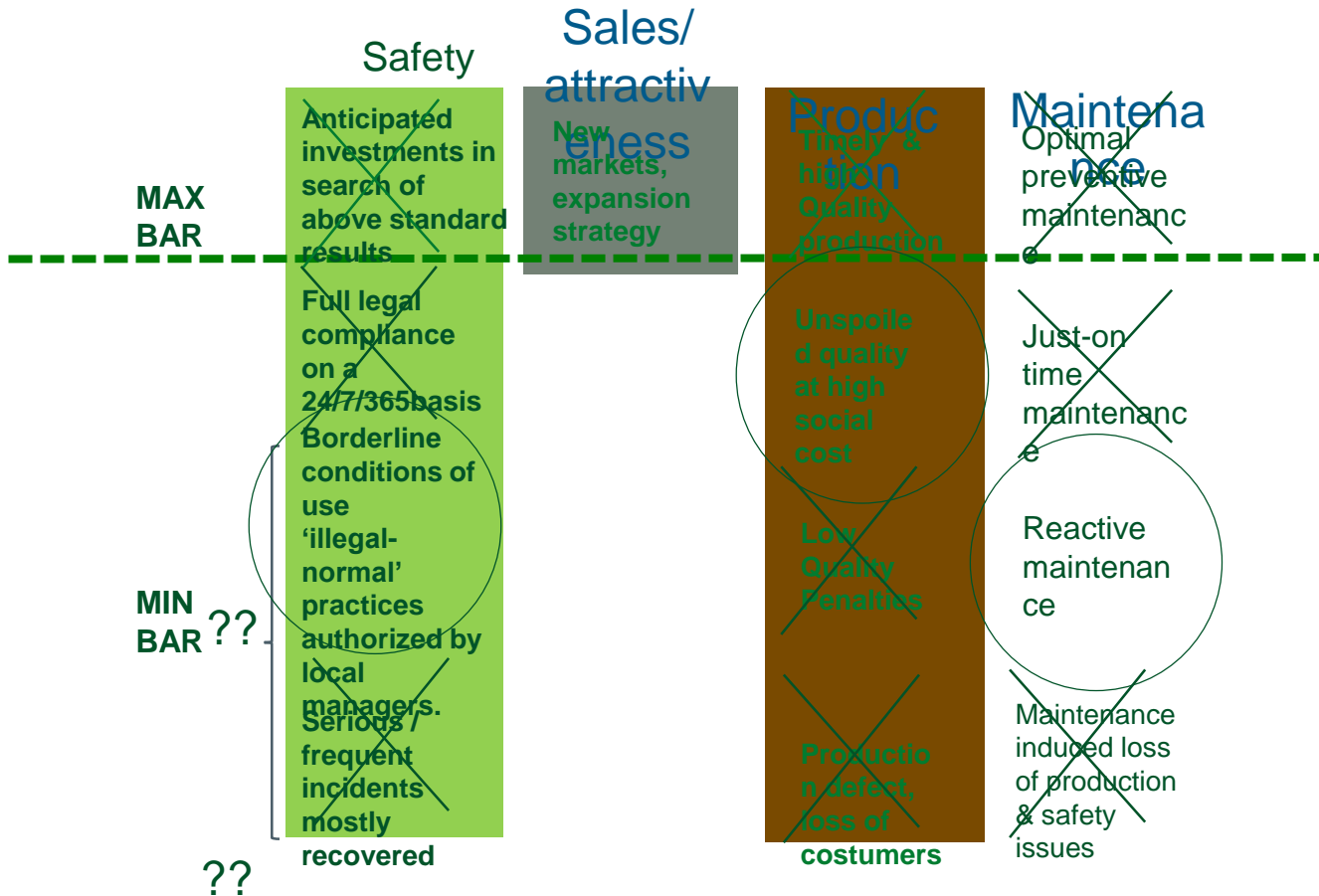


**② Prepare each direction to make concessions and ‘step back’ from its ideal plan, while maintaining acceptable results.**

## HOW FAR WILL YOU ACCEPT TO GO FROM IDEAL?



## HOW FAR WILL YOU ACCEPT TO GO FROM IDEAL?



## An example of the limit of making concession

*EDF Executive Board,  
JULY 2016*

*The token and priority of  
the day was given to  
commercial and political  
issues*

*As usual, all other  
dimension had to step  
back, including Finances.  
The chief financial  
considered that the  
decision was too much  
consequential for  
Finance asking to step  
back so far on his  
dimension that he was  
unable to provide a  
compromise.  
He resigned from the  
board.*

## The Telegraph

### EDF board member resigns, attacking Hinkley Point nuclear project as financially 'risky'

Hinkley Point C has proved highly controversial CREDIT: EDF  
**Emily Gosden, energy editor**

28 JULY 2016 • 2:54PM

**A**board member of EDF has quit ahead of its meeting to approve the Hinkley Point Nuclear plant, calling the project “very risky” and suggesting it could drag the French utility giant into an “abyss”

The resignation of Gerard Magnin, who was proposed to EDF's 18-man board by the French Government, is not expected to prevent the £18bn project gaining approval in a vote later on Thursday. But his comments will stoke further doubts over the financial viability of project, following the resignation of chief financial officer Thomas Piquemal in March and the opposition of unions who fear EDF cannot afford to build the reactors.

## When safety does not win 100 %...

- ① Accept the idea that making concessions is the norm
- ② Prepare each direction to make concessions and ‘step back’ from its ideal plan, while maintaining acceptable results.
- ③ **Stepping back requires counterparties**

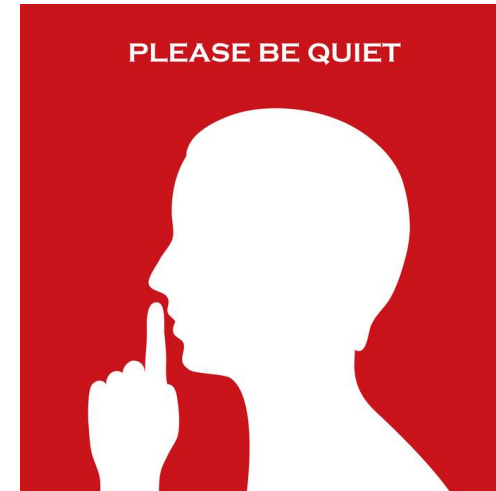
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## RISK OF ORGANIZATIONAL SILENCE ORGANIZATIONAL

### SILENCE

- Illusion of control: the procedures cover every possible case
- Corporate illusion of being informed
- Continuous improvement deficit: Unresolved problems are a source of errors and risks.
- Difficulties and errors are never reported.
  - Alerts have little effect or no information
  - Ideology: “a real pro doesn't have problems”; “the unions are never satisfied”
- This confirms the management's illusion that the present situation is compliant with the rules and that they have the right managerial model.
- The workers are convinced that reporting problems makes no difference.



## When safety does not win 100 %...

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- ⑤ **Train front line et middle managers to compensation strategies**



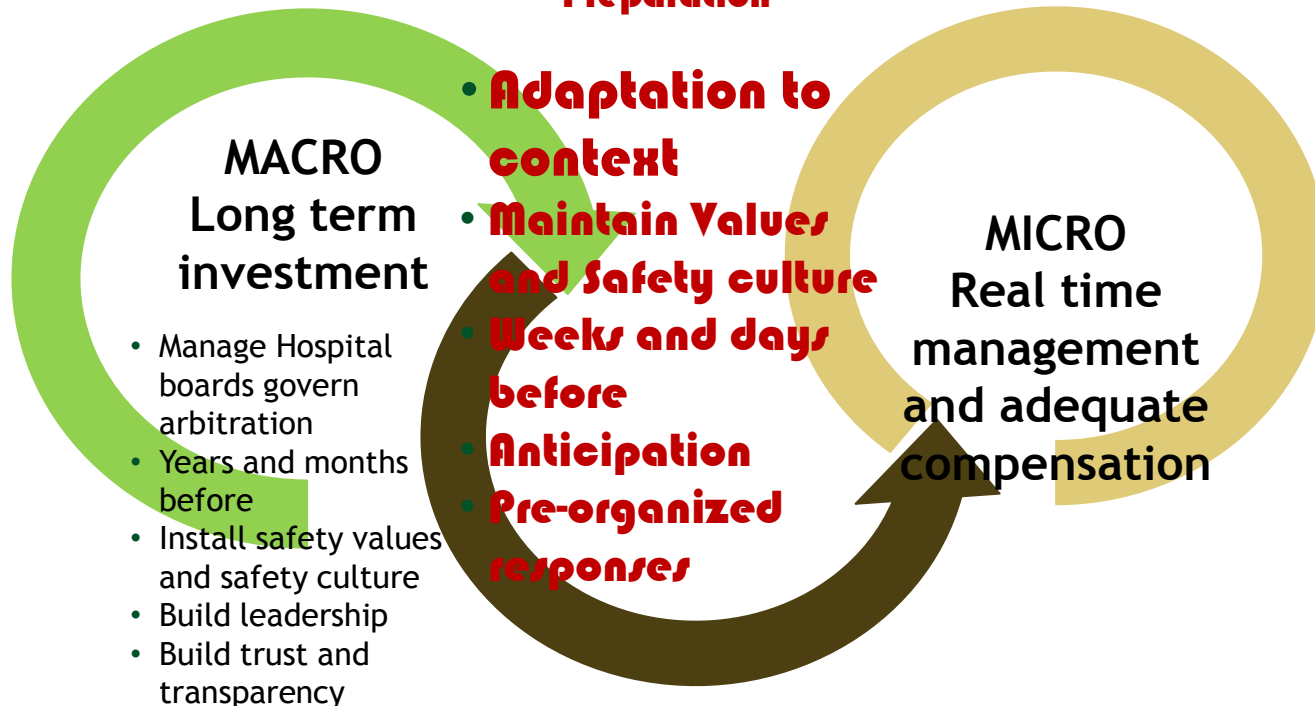
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- ④ Whatever the amplitude of concessions, concessions need to be communicated in full transparency to the middle and front line managers who will have to manage
- ⑤ Train front line et middle managers to compensation strategies
- ⑥ **Set a memory of concessions. Never cumulate arbitrations on a long period of time on the same direction, especially on the safety dimension.**

## THREE COMPONENTS OF RISK MANAGEMENT

### 2. MESO

#### Preparation



# Three Contrasted Safety models

## ULTRA RESILIENT Embracing risk

**Context :** Taking risks is the essence of the profession.

**Cultural trait:** Fighter spirit, cult of champions and heroes

### Safety model : Power to experts

'Give me best chances and safest tools to survive in these adverse conditions and make exploits'

Success analysis more important than accident analysis

### Safety training: Priority to expertise

Experts talk to juniors, acquisition of expertise, understanding own limitations

## HRO model Managing risk

**Context :** Risk is not sought out, but it is inherent in the profession.

**Cult** of group intelligence and adaptation to changing situations.

**Safety model : Power to the group,** Organization, roles, and procedures  
Mutual protection team members. Suspicion of simple explanations

### Priority to recovery and mitigation

Safety training: **Training** in teamwork  
Training and safety focused on adaptability and flexibility of procedures

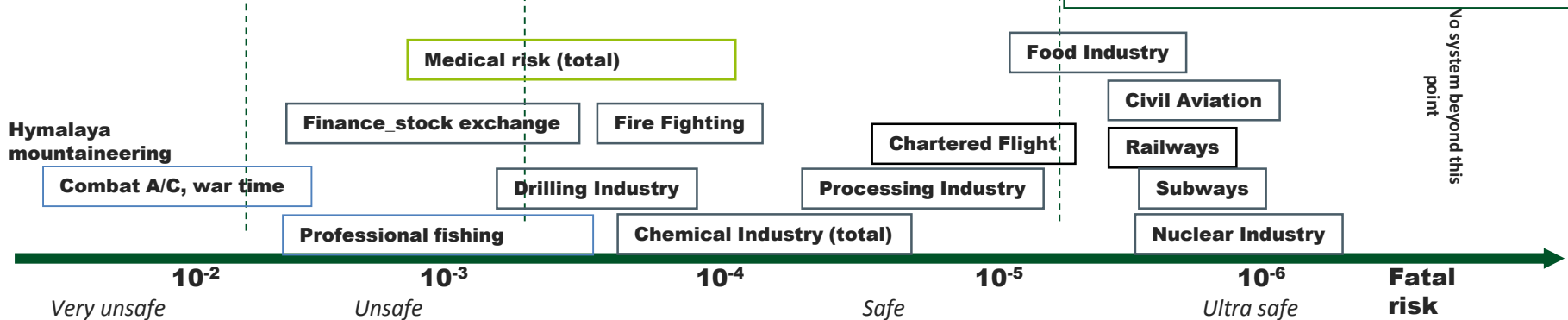
## ULTRA SAFE Excluding risk

**Context :** Risk is excluded as far as possible.  
**Cult** of applying procedures and safety organized by an effective supervisory organization.

**Safety model : Power to the regulators** of the system to avoid exposing front-line actors to unnecessary risks.

### Priority to prevention

**Training** in teamwork to apply procedures and apportion the work even if abnormal events occur.  
'Training only inside the tube': training limited to what the organization considers the need for expected operations.  
No improvisation permitted.



# THE PORT FOLIO OF INTERVENTION STRATEGIES TO MAINTAIN SAFETY AT ACCEPTABLE LEVEL

## Optimisation strategies

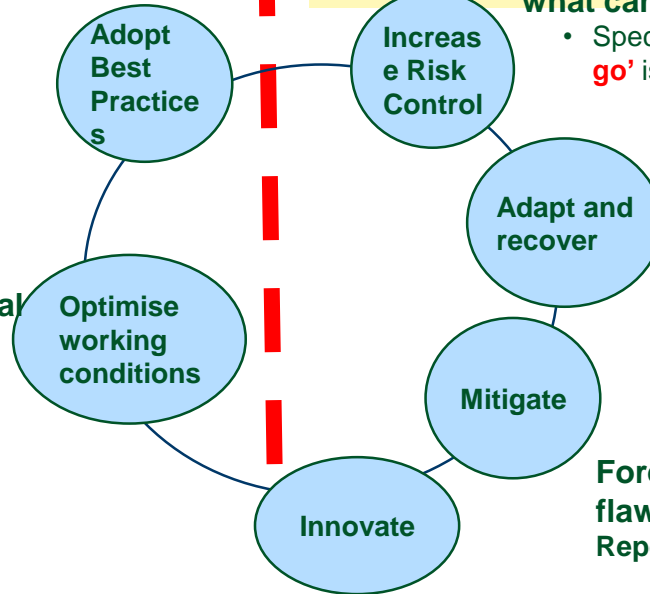
## Risk management strategies

**Ensure that best practices in prevention are in place and being implemented**

- Encourage compliance
- Build and update best standards
- Build capacities and resources

**Optimize Human and Organizational factors**

- Improved style of Leadership
- Improved working hours
- Improved utilization of skills
- Share values among the team
- Improved working conditions



- Adopt new solutions redefining boundaries of playability, quality and safety
- Analyse risk associated with innovative solutions

**Restrain range of activity to what can be properly performed**

- Specify, share and **respect 'no go'** issues

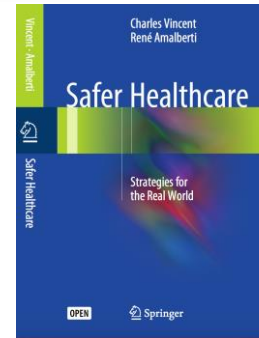
**Accept intelligent adaptation to context**

- Share situation awareness and risks in the team
- Detect and recover errors
- Improve failure to rescue and team decision making
- **Adopt a context adapted safety culture (Ultra safe, HRO, Adaptive)**

**Foresee and mitigate consequences of flaws**

**Report incidents and accidents**

- Celebrate team effort and recovery
- Say sorry to clients
- Invest on a blameless just culture



# UNDERSTANDING ADAPTATION

## ADAPTATION $S_T = S_R + S_M$

$$S_t \text{ (Safety total)} = S_R \text{ (Rule-Based safety)} + S_g \text{ (Safety managed)}$$

**Observed  
Safety**

**NORMS / QUALITY + HUMAN ADAPTATION**

**Error avoidance  
BBS/CBS/HRA**

**Based on  
Technology  
Regulations  
Constraints**

**Surprises  
management**

**Based on  
Human expertise  
Adaptive learning  
systems**

Articulating the Differences Between Safety and Resilience:  
The Decision-Making Process of Professional Sea-Fishing  
Skippers

Gaël Morel, University of South Brittany, Lorient, France, René Amalberti, Air Force  
Aerospace Medical Research Institute, Brétigny-sur-Orge, France, and Christine  
Chauvin, University of South Brittany, Lorient, France

*Human factors*, 2008, 1, 1-16

## PARADOXES OF ADAPTATION

Significant safety improvements always detrimental to  $S_m$

Craftman industry  $S_{total} = S_{rule-based} + S_{managed}$

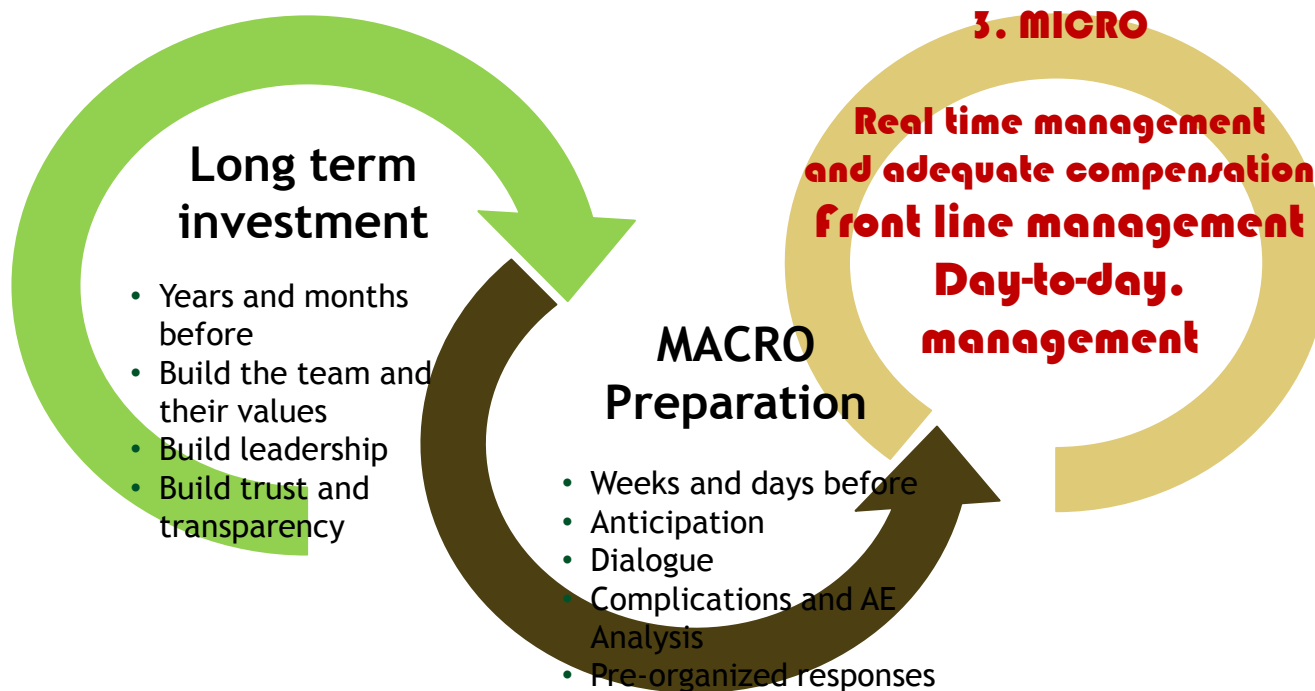
**Safety improvement**

↓  
 Ultrasafe systems  $S_{total} = S_{rule-based} + S_{managed}$

The almost impossible challenge : Preverving  $S_r$  while Improving  $S_i$

$$S_t = S_r + S_m$$

## THREE COMPONENTS OF RISK MANAGEMENT





## TRAINING FRONT LINE MANAGERS TO MANAGING DEGRADED SITUATIONS

- ① I practice **Daily operational Brief** at job start and anytime the situation is changing
  - Take stock of the situation, share with the team
  - Reorganize resources to do the job by limiting the potential risks
- ② I set the **absolute no go issues** of today and voice it to the team
- ③ I **manage** available colleagues' **competencies** according to today risk (task and program allocation)
- ④ All team members are required to **publicly voice alerts**
  - Professionals voice and share alerts and bad feeling about changing contexts
  - The manager publicly acknowledges alerts and voice how to adapt
- ⑤ I increase **error detection, recovery and mitigation**
- ⑥ I **thank the team for efforts** made to control the situation within acceptable boundaries, I give apologies to clients as required
- ⑦ I **report incidents** and intervention strategies to the hierarchy (within the group and to the hierarchy)



**CONCLUSION**

**DESIGN AND TEACH REFERENCES**

Adaptive system

