RISK IN HUMAN ACTIVITIES

- Professional Fishing
- Medical risk (total EU)
- Trading (banks)
- Hymalaya mountaineering
- Microlight spreading activity
- Drilling
- Off shore
- Oil industry
- Chemical Industry (total EU)
- Chartered Flight
- Civil Aviation
- Railways (EU)
- Railways (UK)
- Nuclear Industry

10^{-2} Very unsafe
10^{-3} Unsafe
10^{-4} Safe
10^{-5} Ultra safe
10^{-6} Fatal risk

Road Safety (UK)

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

- **PERFORMANC**
- **INDIVIDUAL BENEFITS**
- **VERY UNSAFE SPACE**
- **ACCIDENT**

**BTCUs**
- Border line Tolerated Conditions of use
- Usual Space of Action

**‘Illegal normal’**
- Real life standards

**‘Illegal Illegal’**
- Space

- Never
- Sometimes
- Always
- Always always
- Market demand

**Expected safe space of action**
- as defined by professional standards

**Technology**

**Individua l concerns**
- Time on duty,
- Life quality,
- ...
Adaptive system

WORK AS IMAGINE

WORK AS DONE
SNAFUs

'Illegal-normal'
space of action

High pressure, special contexts

‘never-sometimes’
space of action

END OF ADAPTATION
NO GO

ACCIDENT
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
Brittleness 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

MAX BAR
OPTIMAL

1: REFERENCE

ACCEPTABLE BAR

2: COMPENSATIONS TO MAINTAIN
OPTIMAL SAFETY DESPITE NON
ADHERENCE TO THE MAX BAR

Area of full compensation

Growing risk
Partial compensation

MIN BAR
High risk

3: END OF FULL
COMPENSATION

Safety utmost priority

OPERATIONAL GOAL

Dubrovnik
THREE COMBINED LEVELS OF ACTION TO IMPROVE SAFE ARBITRATIONS

MACRO
EXECUTIVE
BOARD
GOVERN
Long term investment
Strategic arbitrations
• Years and months before
• Build trust and transparency

MESO
DEPARTMENTS AND SERVICES
Preparation
• Weeks and days before
• Build the team and their values
• Build leadership
• Anticipation
• Pre-organized responses

MICRO
TEAM on DUTY
Tactical arbitrations
Real time management
and adequate compensation
The effectiveness of short term compensation strategies depend on long term investments and arbitrations.

Good arbitrations made by Board govern

- MAX BAR
- ACCEPTABLE BAR +
- ACCEPTABLE BAR
- MIN BAR

Range of adaptive behavior

Poor arbitrations made by Board govern

- ACCEPTABLE BAR +
- Reduced range of adaptive behavior
- ACCEPTABLE BAR
- Min bar
THREE LEVELS OF ACTION TO IMPROVE SAFE ARBITRATIONS

1_EXECUTIVE BOARD GOVERN
Long term investment
Strategic arbitrations
- Years and months before
- Conduct safe arbitrations
- Build trust and transparency

DEPARTMENTS AND SERVICES
Preparation
- Weeks and days before
- Build the team and their values
- Build leadership
- Anticipation
- Pre-organized responses

TEAM on DUTY
Tactical arbitrations
Real time management and adequate compensation

Dubrovnik
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

“*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

“*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.

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?**

| MAX BAR | Safety | Sales/ attractiveness | Production | Maintenance | Social |
|---------|--------|----------------------|------------|-------------|--------|
| **Anticipated investments in search of above standard results** | Increased Net profit | New markets, expansion strategy | Timely & high Quality production | Optimal preventive maintenance | Positive climate, joy at work, Rewarding culture |
| **Full legal compliance on a 24/7/365 basis** | Contextual limited losses | Market control, stabilisation of volume | Unspoiled quality at high social cost | Just-on time maintenance | Conformity with collective agreement |
| **Borderline conditions of use 'illegal-normal' practices authorized by local managers.** | Increased debt | Low Quality Penalties | Reactive maintenance | and usual local social tension |
| **Serious / frequent incidents mostly recovered** | Financial losses Understaff and Under equipment required | Production defect, loss of | Maintenance induced loss of production & safety issues | Social crisis | |
| **MIN BAR??** | Near Bankruptcy | Significant commercial collapse | | | Strikes, losses of productivity |

**Dubrovnik**
**How far will you accept to go from Ideal?**

**MAX BAR**
- Anticipated investments in search of above standard results
- Full legal compliance on a 24/7/365 basis
- Borderline conditions of use ‘illegal-normal’ practices authorized by local managers.
- Serious / frequent incidents mostly recovered

**MIN BAR??**

**Sales/attractiveness**
- New markets, expansion strategy

**Production**
- Unspoiled quality at high social cost
- Low Quality Penalties
- Production defect, loss of customers

**Maintenance**
- Optimal preventive maintenance
- Just-on-time maintenance
- Reactive maintenance
- Maintenance induced loss of production & safety issues
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.

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.

Dubrovnik
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
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
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
Risk of 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 %...

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
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
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
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

MACRO
Long term investment
- Manage Hospital boards govern arbitration
- Years and months before
- Install safety values and safety culture
- Build leadership
- Build trust and transparency

MICRO
Real time management and adequate compensation

- Adaptation to context
- Maintain Values and Safety culture
- Weeks and days before
- Anticipation
- Pre-organized responses
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

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

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**HRO model**
*Managing risk*

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

**Cultural trait**: 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

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**ULTRA SAFE**
*Excluding risk*

**Context**: Risk is excluded as far as possible.

**Cultural trait**: 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 PORTFOLIO OF INTERVENTION STRATEGIES TO MAINTAIN SAFETY AT ACCEPTABLE LEVEL

Optimisation strategies

- Ensure that best practices in prevention are in place and being implemented
  - Encourage compliance
  - Build and update best standards
  - Build capacities and resources

Risk management strategies

- 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

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

Innovate

- Adopt Best Practices
- Increase Risk Control
- Adapt and recover
- Mitigate
- Innovate

Report incidents and accidents

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

Adaptation $S_T = S_R + S_M$

$S_t$ (Safety total) = $S_R$ (Rule-Based safety) + $S_g$ (Safety managed)

**Observed Safety**

- Error avoidance
- BBS/CBS/HRA
- Based on Technology
- Regulations
- Constraints

**NORMS / QUALITY** + **HUMAN ADAPTATION**

- Surprises management
- Based on Human expertise
- Adaptive learning systems

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

Gael Morel, University of South Brittany, Lorient, France; René Amalberti, Air Force Aerospace Medical Research Institute; Brittany-sur-Orge, France; and Christine Chauvel, 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: Preventing $S_r$ while Improving $S_i$

$S_t = S_r + S_m$
Three Components of Risk Management

Long term investment
- Years and months before
- Build the team and their values
- Build leadership
- Build trust and transparency

MACRO Preparation
- Weeks and days before
- Anticipation
- Dialogue
- Complications and AE Analysis
- Pre-organized responses

3. MICRO
Real time management and adequate compensation
Front line management
Day-to-day management

Dubrovnik 31
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

Adaptive system

WORK AS DONE SNAFUs

WORK AS IMAGINE

DESIGN AND TEACH REFERENCES

’Illusory ‘legal’

space of action

BET ON SAFETY CULTURE

‘Illegal-normal’

space of action

ACCEPT THE REALITY GAP AND CONTROL

High pressure, special contexts

‘never-

sometimes’

space of action

FIX CLEAR BOTTOM LINE

PREPARE TO UNSTABLE CONDITIONS

END OF ADAPTATION

NO GO

ACCIDENT