

February 24, 2016

## Entering into the Unexpected: Managing Resilience in Extreme Situations

**Prof. Franck Guarnieri** 



International Conference on Human and Organizational Aspects of Assuring Nuclear Safety – Exploring 30 Years of Safety Culture Vienna, Austria 22–26 February 2016

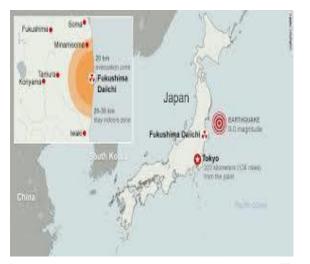
## The beginning of our history

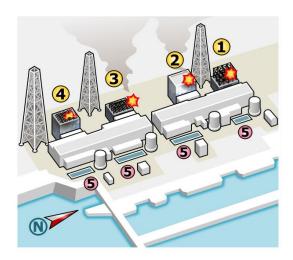




## The beginning of our history









# 5 days in hell!







## What are going to talk about?





## What are going to talk about?



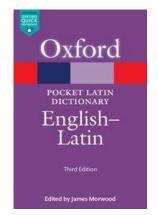




#### O A plethora of definitions

- The English word "resilience".
- The Latin verb "resilire" which means to "bounce back".
- The word does not exist in Japanese.
- BUT, it is possible to approximate the concept:
  - "kaifuku-ryoku", which would be something like buoyancy or power to recover,
  - or "fukugen-ryoku", which would be something like power of restitution,
  - or "dan ryoky sei", which could be inversely translated to elasticity
  - or even "teiku-ryoku" in the context of disease

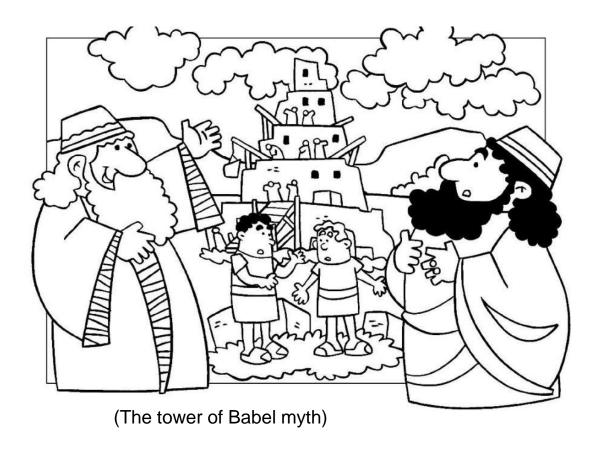








#### O A plethora of definitions





(The Babel fish)





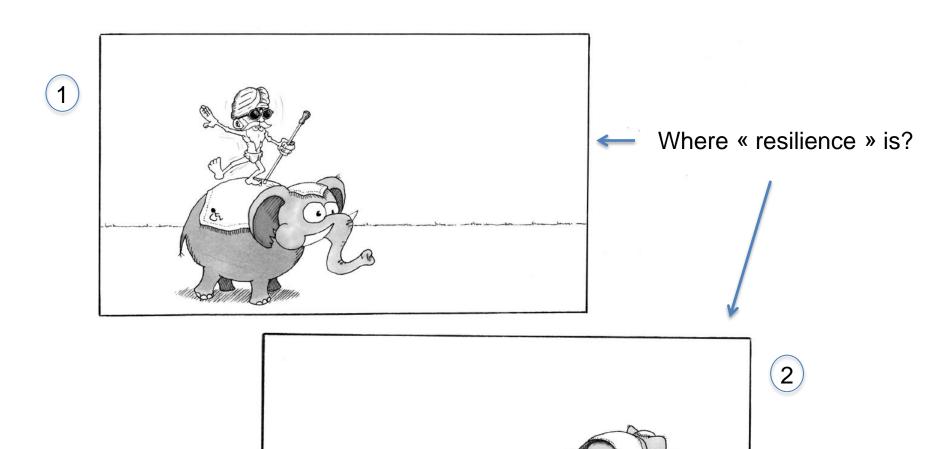


#### O A plethora of definitions

Table 1. Resilience definitions in different domains

Resilience	Definition	Emphasis	Key references
Engineering resilience	System's speed of return to equilibrium following a shock	Return time to recover, efficiency, equilibrium	Pimm (1984)
Ecological resilience	Ability of a system to withstand shock and maintain critical relationships and functions	Buffer capacity, withstand shock, persistence, robustness	Holling (1996)
Social ecological resilience	<ul> <li>(i) Amount of disturbance a system can absorb and remain within a domain of attraction; (ii) capacity for learning and adaptation (iii) degree to which the system is capable of self organizing</li> </ul>	Adaptive capacity, learning, innovation	Carpenter et al. (2001)
Social resilience	Ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change	Social dimensions, heuristic device	Adger (2000)
Development resilience	Capacity of a person, household or other aggregate unit to avoid poverty in the face of various stressors and in the wake of myriad shocks over time	Vulnerability, robustness	Pasteur (2011) and Barrett & Constas (2014)
Socioeconomic resilience	Socioeconomic resilience refers to the policy induced ability of an economy to recover from or adjust to the negative impacts of adverse exogenous shocks and to benefit from positive shocks	Economic response capacity	Mancini et al. (2012)
Community resilience	A process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance	Adaptive capacity, disturbance, social	Norris et al. (2008)
Psychological resilience	An individual's ability to adapt to stress and adversity. Resilience is a process and can be learned by anyone using positive emotions	Coping, adaptation, process	Tugade, Fredrickson & Feldman Barrett (2004)





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2015 - LAROUZO' & GUARNIERY







Voluntary

Involuntary



#### O Four case studies



(Apollo 13, april 11, 1970)



(Fukushima Dai Ichi, march 11, 2011)



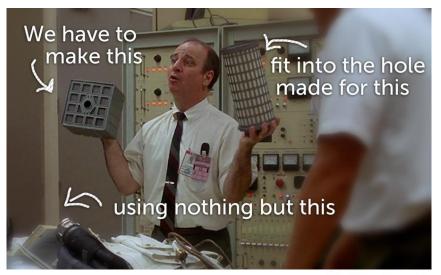
(Deepwater Horizon, april 10, 2010)



America's cup, september, 2013)



#### O Replacing a contaminated air filter...





#### Apollo CM CO2-Filter, auxilliary construction for use in the LM (replica)

Rotational view, part 1



Construction and pictures Hermann Duer, Switzerland











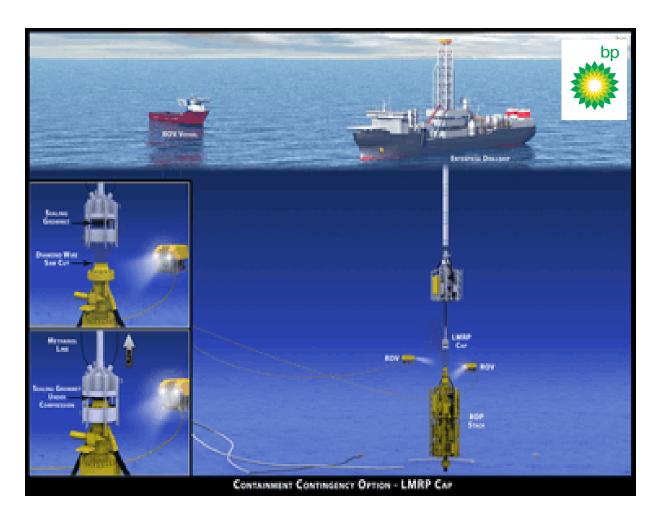


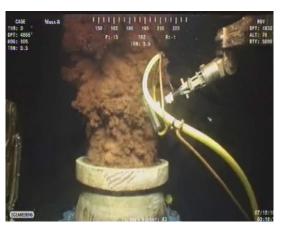






O Closing the head of an oil well...





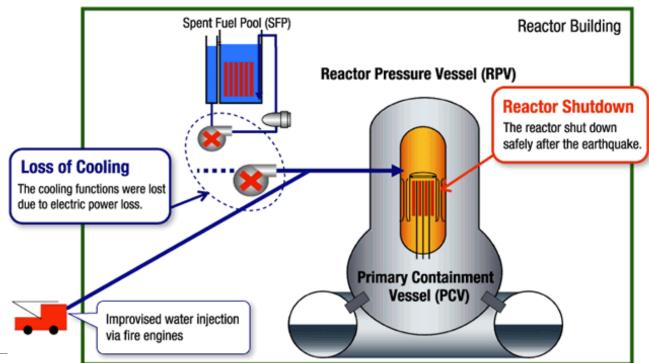




#### O Cooling the reactors of the Fukushima Dai ichi...



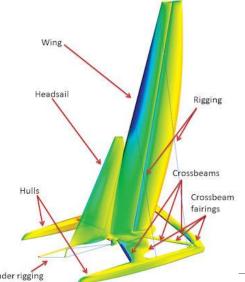


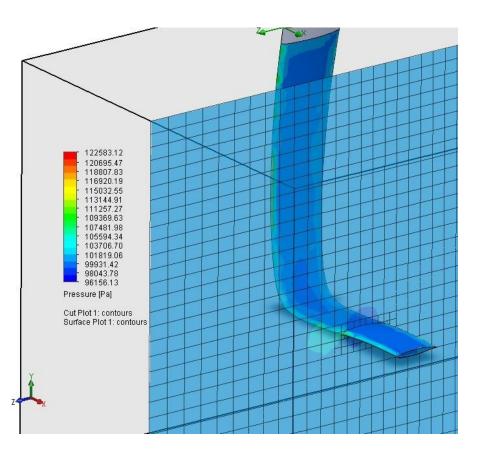




#### O Back to our story...











#### O Four categories of factors...

Hostility	Uncertainty	Limited ressources	Social pressure
<ul><li>Level of carbon dioxide</li><li>Temperature falls</li><li></li></ul>	<ul><li>Heat shield damaged?</li><li>Correct angle?</li><li>Parachutes open?</li><li></li></ul>	<ul><li>Water rationned</li><li>A sock</li><li>A duct tape</li><li></li></ul>	<ul><li>Television</li><li>The country</li><li></li></ul>

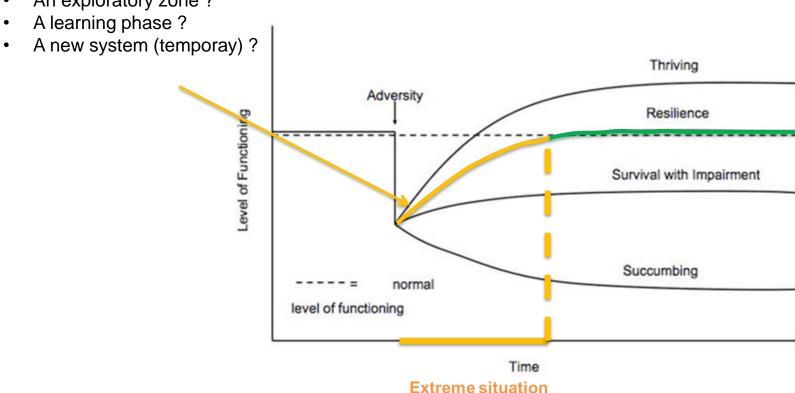








- O The concept of «entry into resilience» (or «resilience activitation»)
  - A movement ?
  - A transition?
  - A time dimension?
  - An exploratory zone?

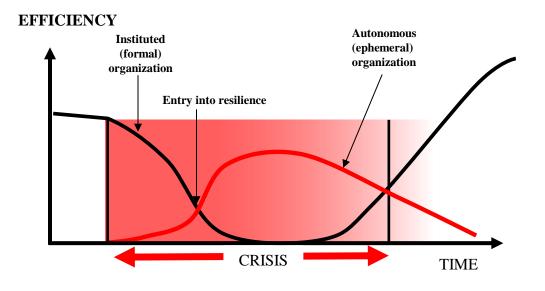


Resilience is the capability to bounce back rapidly through survival, adaptability, evolution, and growth in the face of turbulent changes and/ or brutal and dramatic events



O The concept of "entry into resilience" (or "resilience activitation")

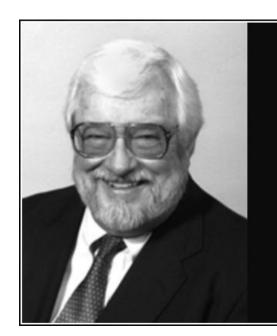
Time		Space	
Individual	Gro	oup	Organization



How to explain what "entry into resilience" is...



#### What is Sensemaking about?



Your beliefs are cause maps that you impose on the world, after which you 'see' what you have already imposed.

— Karl E. Weick -

AZ QUOTES

# HOW CAN I KNOW WHAT I THINK, UNTIL I SEE WHAT I SAY.

QUOTEHD.COM

Karl Weick



#### What is Sense in the making about?



The intensity of emotions within the group is illustrated by the tone of Yoshida's narrative following the explosion of reactor building 3:

**Everyone was in shock, frozen, unable to think**. So I got them all together to talk to them. I told them how much I regretted having sent them back into the field when the danger had not passed [...] I asked them to forgive me. I also told them [...] if we do not react, we would have an even more catastrophic situation. [...]. First, we had to clear this highly radioactive rubble. [...]. I asked them to do it, humbly. It was at that

moment that I experienced One of the greatest emotions of my life. They all wanted to go back to the field, they even pushed each other out of

the way. I had to calm them down".

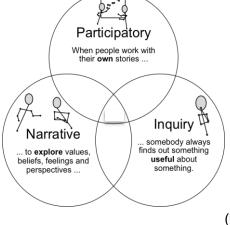


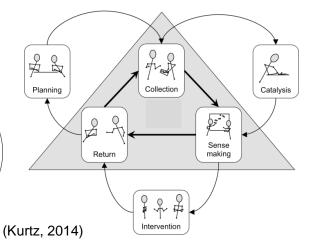
#### O Narrative research





















#### O Narrative research











#### O Narrative research

Institution	Туре	Date	Scope	#Pages
ICANPS *	Interim	26 Dec.	Initial facts & causes	604p.+ Appendix
	Report	2011		
IAEA**	Mission	16 Jun.	Factual findings	160p.
	Report	2011		
NAIIC***	Final Report	5 Jul.	Scenario &	483p. +Appendix
		2012	recommendations	
<b>ICANPS</b>	Final Report	23 Jul.	Scenario &	529p.+Appendix
		2012	recommendations	
NEA****	Activity	9 Oct.	Overview of corrective	69p.
	Report	2013	actions	
IAEA	Report by	31 Aug.	Scenario &	1254p. + Appendix
	the CEO	2015	recommendations	



Franck Guarnieri Sébastien Travadel Christophe Martin Aurélien Portelli Aissame Afrouss Eric Przyswa

#### L'accident de Fukushima Dai Ichi

Le récit du directeur de la centrale

**Volume II - Seuls** 





(M. Naoto Kan, former Prime Minister)

## Thank you! どうも有難う Merci