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SafetySynthesis
The Repository for Safety-II

4th International Workshop on "Safety-II in Practice":
towards a unified approach to all operations
September 21-23, 2021 - via Zoom

I - Common ground - Aerospace and O&G industries

II - Human Factors approach in Aerospace and O&G industries

III - Complexity and safety: from top management to field operations

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Common ground - Aerospace and O&G industries

1859

Onshore Drake well
21m deepth

2021

Offshore oil rig
8.000m deepth

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Common ground - Aerospace and O&G industries

1969

First walk in the moon,
20th July 1969.

2021

Perseverance rover in Mars, 18 February 2021,
at 20:55 UTC, Octavia E. Butler Landing site

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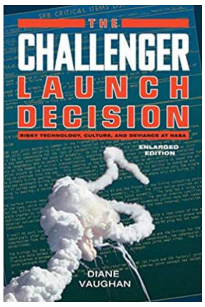
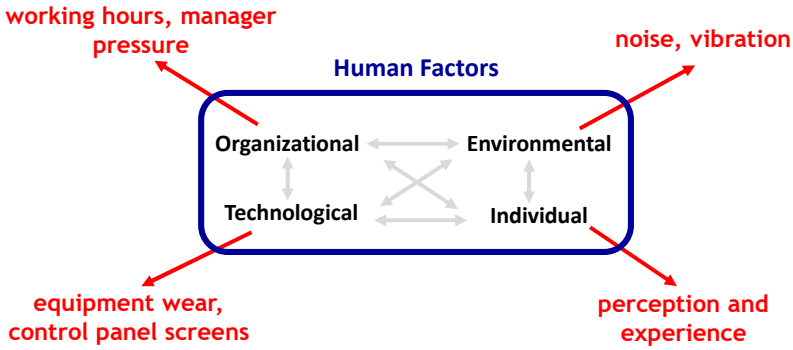
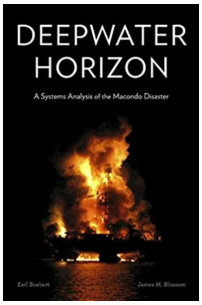
Human Factors approach in Aerospace and O&G industries







Human Factors are all factors that can influence human performance in their work activities.

These factors act together and may be technological, environmental, organizational and individual, among others.

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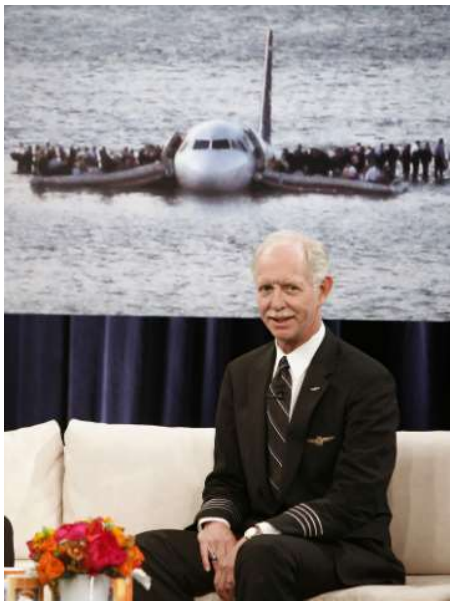
Human Factors approach in Aerospace and O&G industries



Evolution of work: from simple to complex

"Not every situation can be foreseen or anticipated. There isn't a checklist for everything." *Captain Sully*

"The natural human resilience is what brought us here as a Society, and it will continue to keep us prepared for the most diverse situations." *Prof. Josué Maia França*

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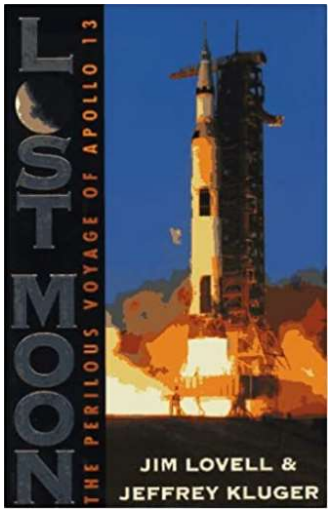
Human Factors approach in Aerospace and O&G industries

Human skills (technical and non-technical) in emergency situations:



things go right even when everything is going wrong (at 330.000 km)!

"We at the capsule, and them, in the Mission Control, we were just one team at that time." *Jim Lovell*

02 07 55 19	LMP	Okay, Houston - -
02 07 55 20	CDR	I believe we've had a problem here.
02 07 55 28	CC	This is Houston. Say again, please.
02 07 55 35	CDR	Houston, we've had a problem. We've had a MAIN B BUS UNDERVOLT.
02 07 55 42	CC	Roger. MAIN B UNDERVOLT.
02 07 55 58	CC	Okay, stand by, 13. We're looking at it.

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Human Factors approach in Aerospace and O&G industries

To help us, we can be clear about how we think about human factors:

- People interact with each other, plants and processes as part of a complex system. Human beings are essential in maintaining our barriers and safeguards. They can, and often do, "save the day".
- We understand and accept that people will make mistakes, but these are typically due to underlying conditions and systems. People's actions are rarely malicious and usually make sense to them at the time. Since human error will never be eliminated entirely, we try to make sure that our most critical tasks and barriers are resistant to error.
- Understanding how mistakes happen can help us prevent or cope with them. We use what we learn to design plants, tools and activities to reduce mistakes and better manage risk.
- Finally, we know that leaders help shape the conditions that influence what people do. It matters how leaders respond when things go wrong."

From IOGP Report 453 - *Safety Leadership in Practice: A Guide for managers*

What the experts say about "80% human error"

When the 80 percent human error is broken down further, it reveals that the majority of errors associated with events come from latent organisational weaknesses (mostly the result of human and organisation actions in the past) whereas about 30 percent are caused by the individual worker who last touched the equipment or process.

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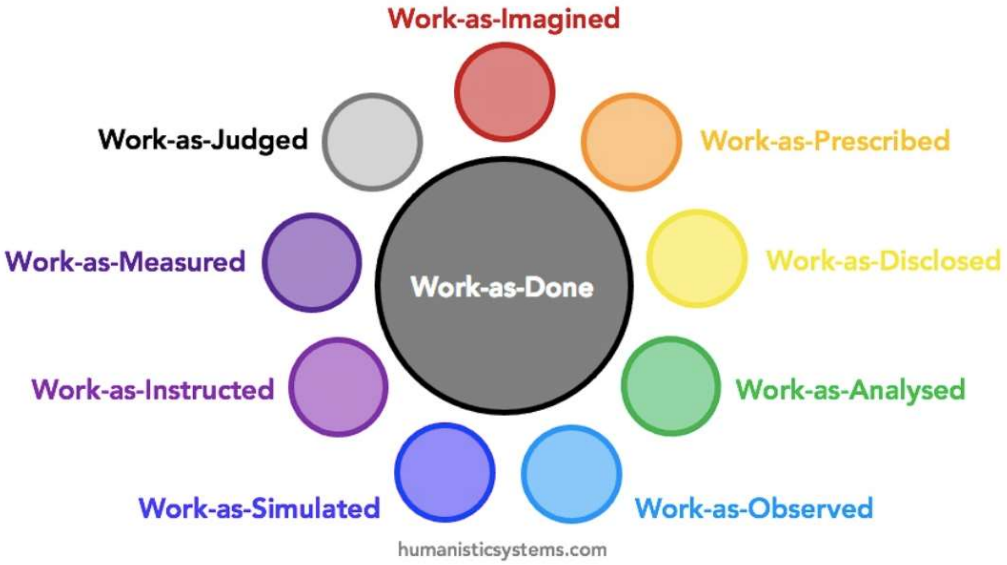
Complexity and safety: from top management to field operations



Steven Shorrock *(Eurocontrol): https://humanisticsystems.com/2016/12/05/the-varieties-of-human-work/*

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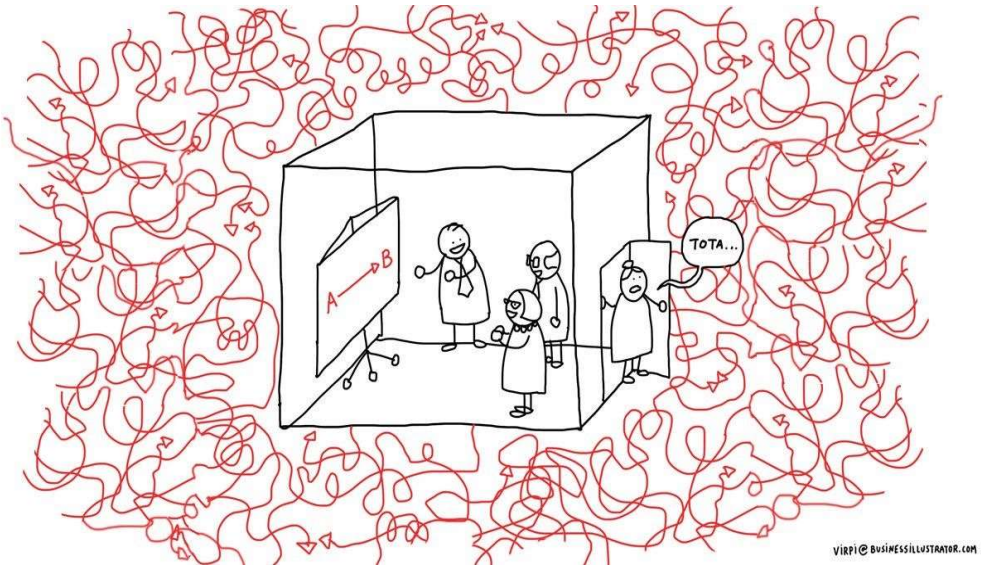
Complexity and safety: from top management to field operations



Lectures from professor José Carlos Bruno, human factors specialist and petroleum engineer.

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Human Factors Approach - Aerospace and O&G industries

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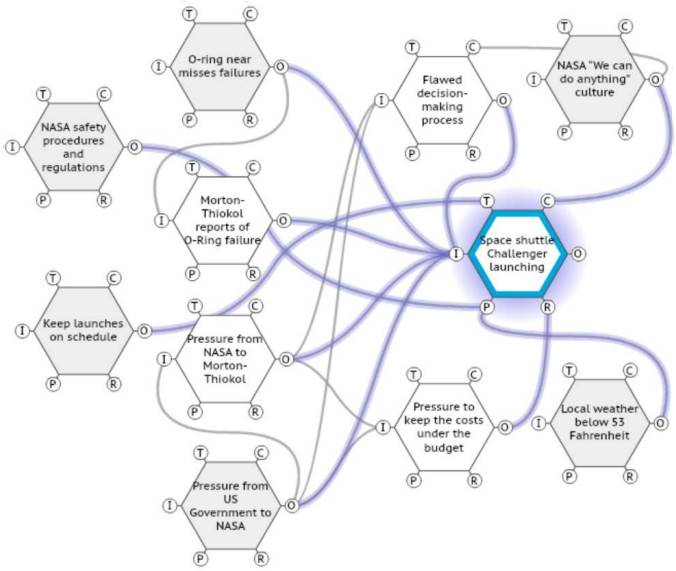
Complexity and safety: from top management to field operations



The organizational culture of "We can do anything, we put a man in the moon!" was a key factor in the Challenger accident.

The flawed decision-making process was a consequence of this culture plus the pressure from NASA and from US Government.

The local weather, a Human Factor of the Environmental dimension, was decisive in the failure of the SRB system.

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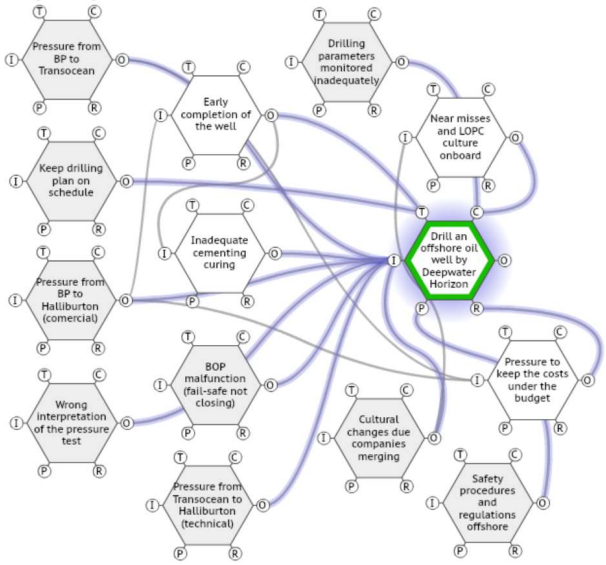
Complexity and safety: from top management to field operations



The near misses and LOPC culture of tolerance, generated by the various business merging, was a key factor in the Deepwater Horizon accident.

The early completion of the well was a consequence of bussines pressure between companies and affected simultaneously drilling time and cement curing.

The drilling parameters, which were inadequately monitored, delayed recovery actions and emergency response.

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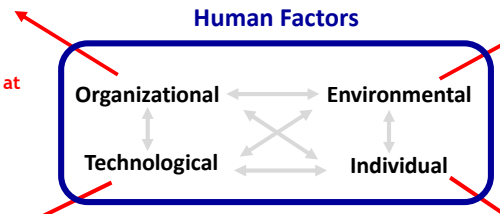
Complexity and safety: from top management to field operations

1) "…in NNN, the atmosphere that we could achieve anything was present everywhere…"
2) "…when we are onboard, we feel that thing, that pressure from XXX, that we must do right, fast and in the way that XXX wants to…"

1) "…you have no idea of the pressure on your body when you leave the Earth's atmosphere…"
2) "…the drilling floor vibration is so intense that I sometimes have to struggle with the controls…"

1) Aerospace
(former astronaut, retired specialist at MC and a researcher at NASA)
2) O&G
(drillers, operators and front-line managers of offshore platforms)



More coincidences than differences!

1) "…the o'ring malfunctioning were not the only technical issue of SRB system, there was other serious problems too…"
2) "…the rust problem and the poor maintenance difficult the operation of almost all equipment of the oil separation area…"

1) "…at that event, it wasn't just their PhD that brought them home, but mostly their experience…" (Apollo 13)
2) "…not everyone was born to work offshore; it is necessary to know the individual characteristics of each one…"

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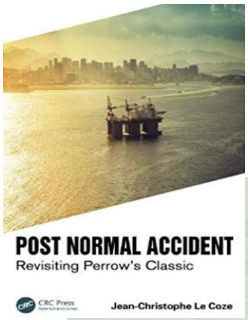
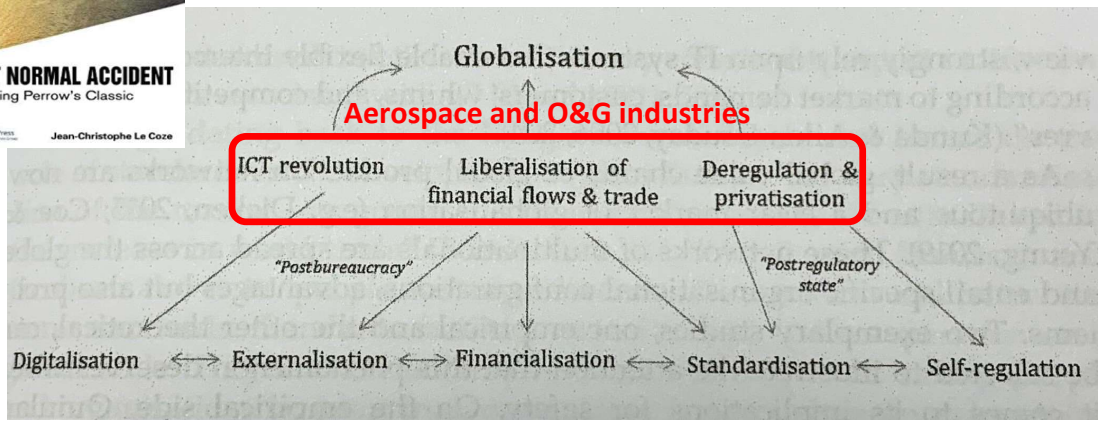
Complexity and safety: from top management to field operations



Globalisation and trends shapes a new envinroment of high-risk systems, specially in Aerospace and O&G industries!



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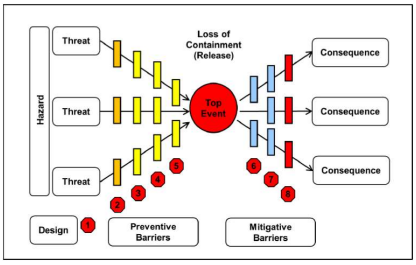
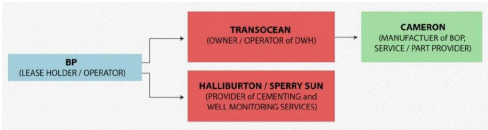
Complexity and safety: from top management to field operations

Human Factors approach to Process Safety in the Offshore area using FRAM



Process Safety Analysis Considering Human Factors in High Tech Industries



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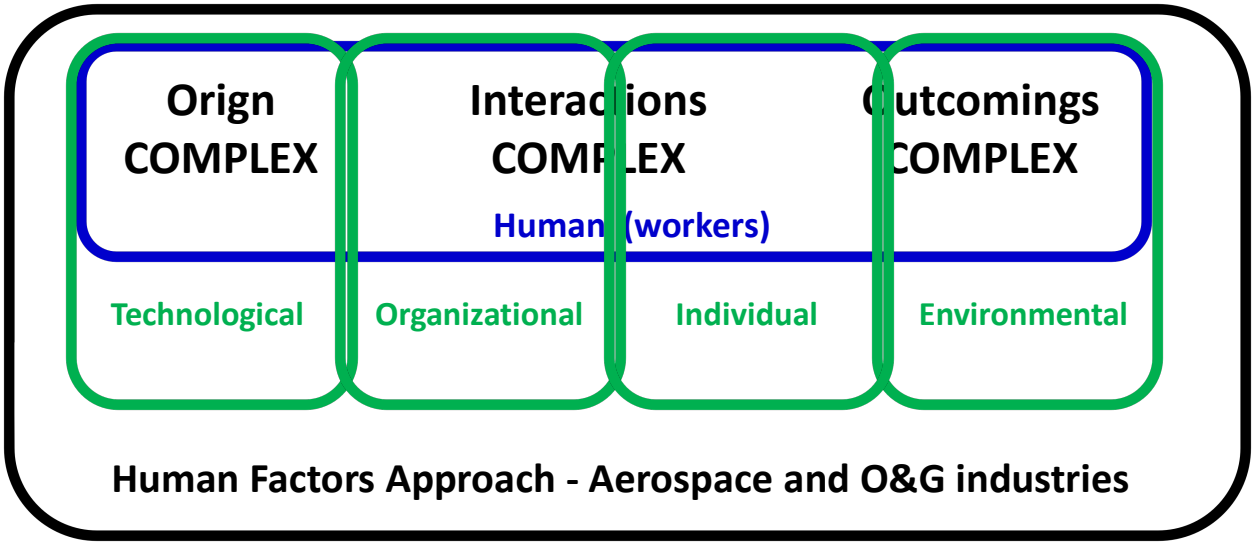
Complexity and safety: from top management to field operations



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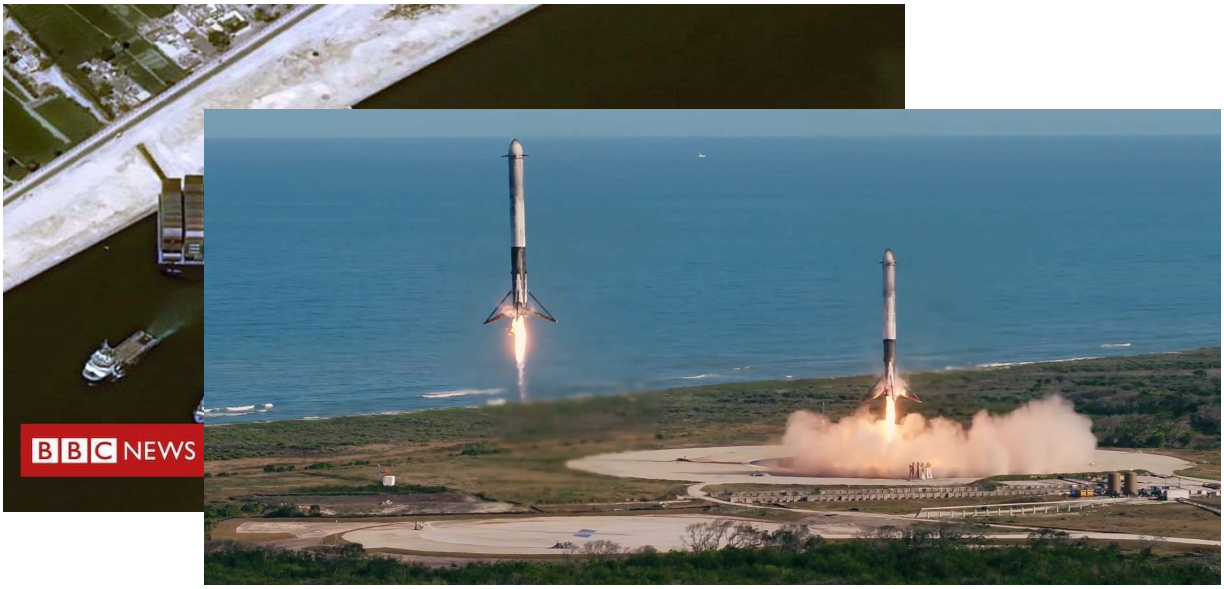
Complexity and safety: from top management to field operations



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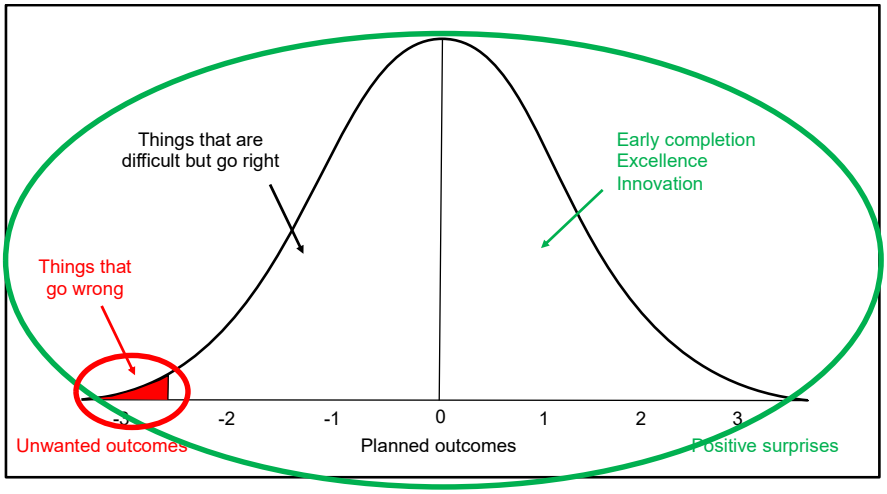
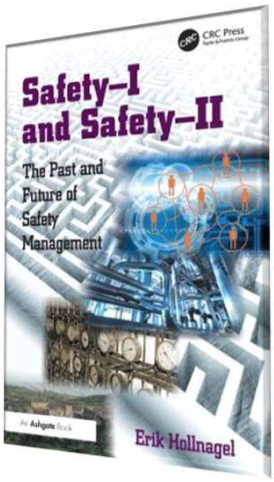
Complexity and safety: from top management to field operations

From Safety-I to Safety-II





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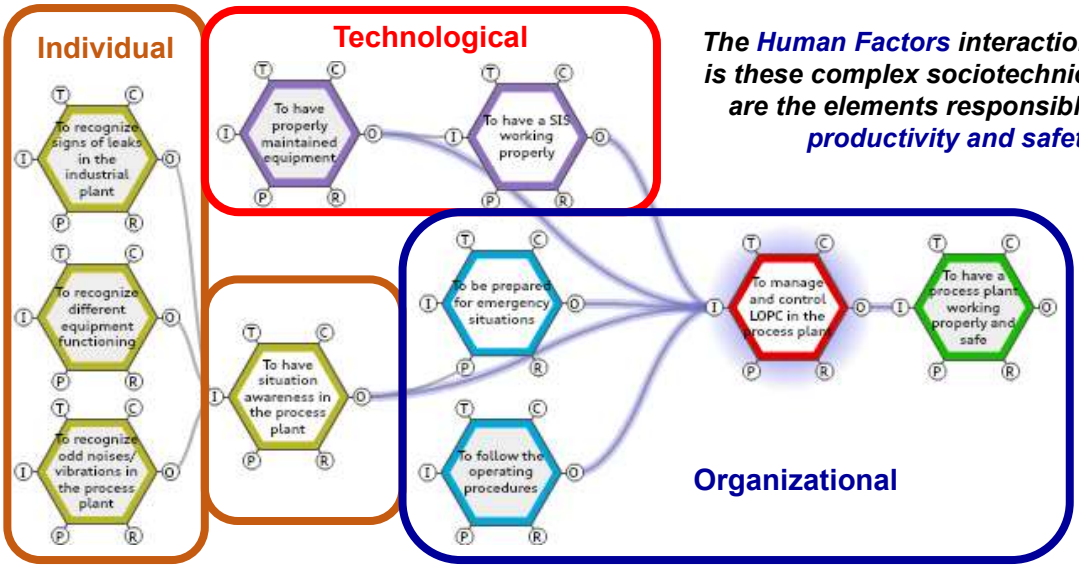
Complexity and safety: from top management to field operations



The Human Factors interactions present is these complex sociotechnical system are the elements responsible for the productivity and safety!

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High cognitive ability

86 billion total neurons

16 billion in the cerebral cortex

We think in a complex way, we build even more complex socio-technical systems**, and we also interact in a complex way…**

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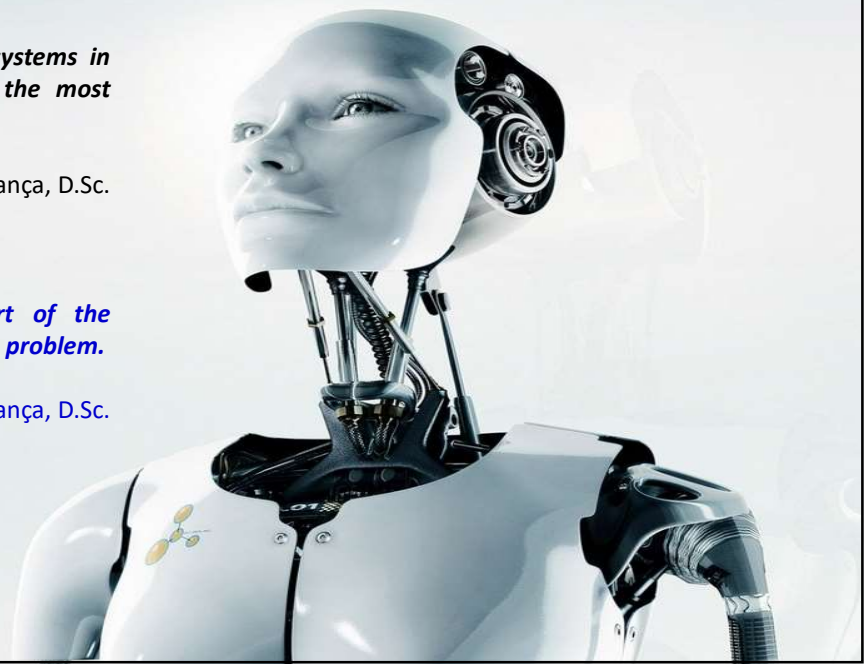
Among the various complex systems in the World, the Humans are the most complex system of all.

Josué Eduardo Maia França, D.Sc.

People, workers, in any part of the World, are the solution, not the problem.

Josué Eduardo Maia França, D.Sc.



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YouTube

FRAMigo

YouTube ***"Professor Josué E. Maia Franca"***

https://www.youtube.com/channel/UCPkMye2YSEE27phy8R0kWxQ

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josue.maia@gmail.com

Obrigado!

Tack så mycket!

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