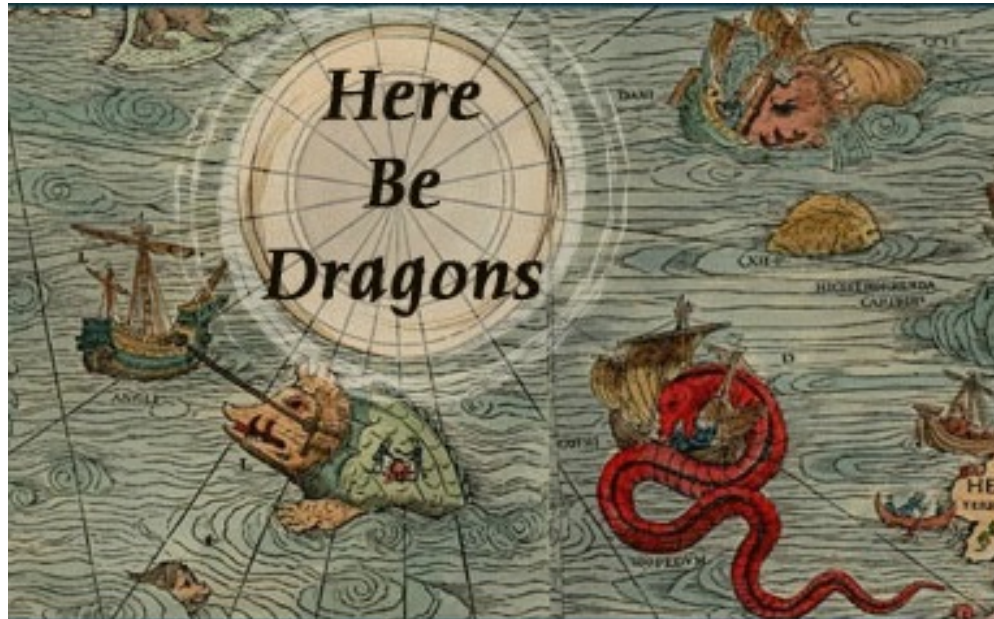


Jousting with Dragons: A Resilience Engineering approach to managing Safety Management Systems (SMS) in the transport sector



 International
Transport Forum

Paris - 23 March 2017

My personal experience with Safety Management Systems

- *First day of flight school*
- *Four different fighter squadrons each with highly advanced Safety Management Systems*
 - *8 fatal aircraft accidents*
 - *14 pilot fatalities*
- *Each of those squadrons were safety award winners prior to the accidents*

Why am I here?

"The art of measuring nothing: The paradox of measuring safety in a changing civil aviation industry using traditional safety metrics" (Lofquist, 2010)

- *What is safety?*
- *How do you define safety?*
- *How can you measure safety?*

What to measure?

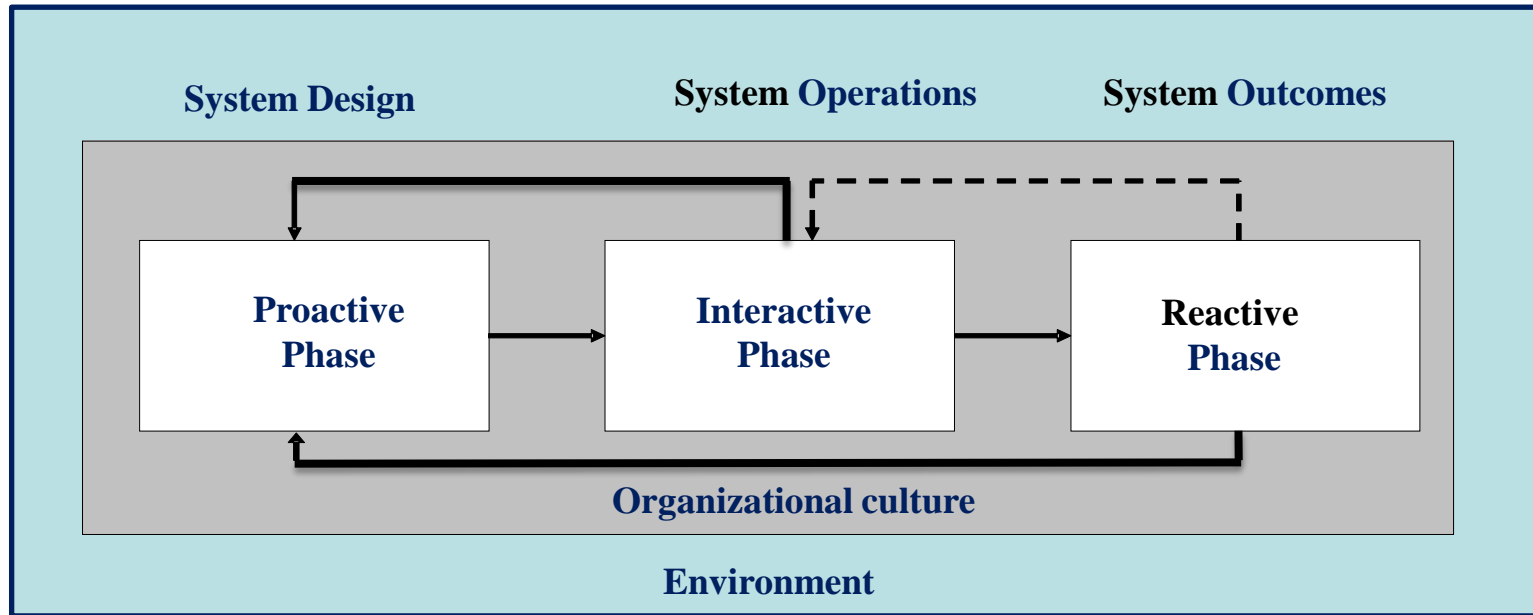
- Normal accident theory
 - Tight and loose coupling
- Organizational accident theory
 - Complexity and human interactions
 - Latent conditions
- High Reliability Organizations
 - Sensemaking
 - Mindfulness

"The paradoxes of almost totally safe transportation systems" (Amalberti, 2001).

- As Safety Management Systems become more effective as we reach ultra-safe levels of performance
 - Nothing to measure
 - Subjective metrics
 - Impossible to predict the next event
 - Most undesired events come as surprises
 - Or do they?

Safety Management Systems

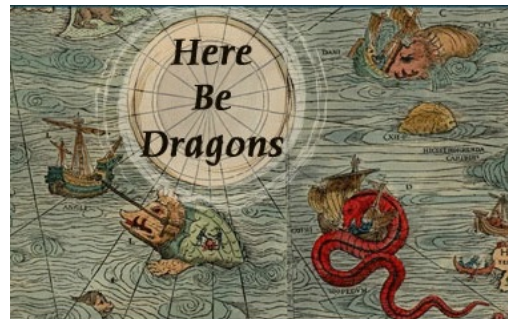
Organizational processes model (Socio-technical)



Time →

Jousting with Dragons

- Crossing operational boundaries that lead to surprise
 - Undesired outcomes
 - Unexpected
 - Unpredicted
- How can we predict the next undesired event?



Resilience Engineering

- A multi-disciplinary, theoretical approach to designing and **managing complex, dynamic-adaptive socio-technical systems**
- Bounded rationality
- Safety I vs. Safety II

Resilience

- *"The ability of a system to adjust its functioning prior to, during, or following disturbances so that it can sustain required operations under expected and unexpected conditions"* (Hollnagel, Braithwaite, & Wears, 2013. p. xxv.)
- *"How to make high-risk, socio-technical systems more adaptive to internal and external threats and disruptions to system functioning through the quality of resilience"* (Hollnagel, Woods, & Levesen, 2006).

How can we achieve better effectiveness of current Safety Management Systems?

- Engineer resilience into SMS that can capture the faint signals of drift into surprise
 - Structural
 - Psychological
 - Social
- Engage the "*man-in-the-loop* "

How can we do this?

- Leadership and culture
 - Understand the nature of complex, dynamic-adaptive environments
 - Limitations of static rules, regulations, procedures, checklists, etc.
 - Control-based (compliance) vs. relationship-based leadership
 - Empower individuals at the sharp end
 - Sensemaking/mindfulness/Just culture
- Capture the signals of drift (soft metrics)
- Reporting mechanisms that enable action