Network Manager
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the European Commission

EUROCONTROL

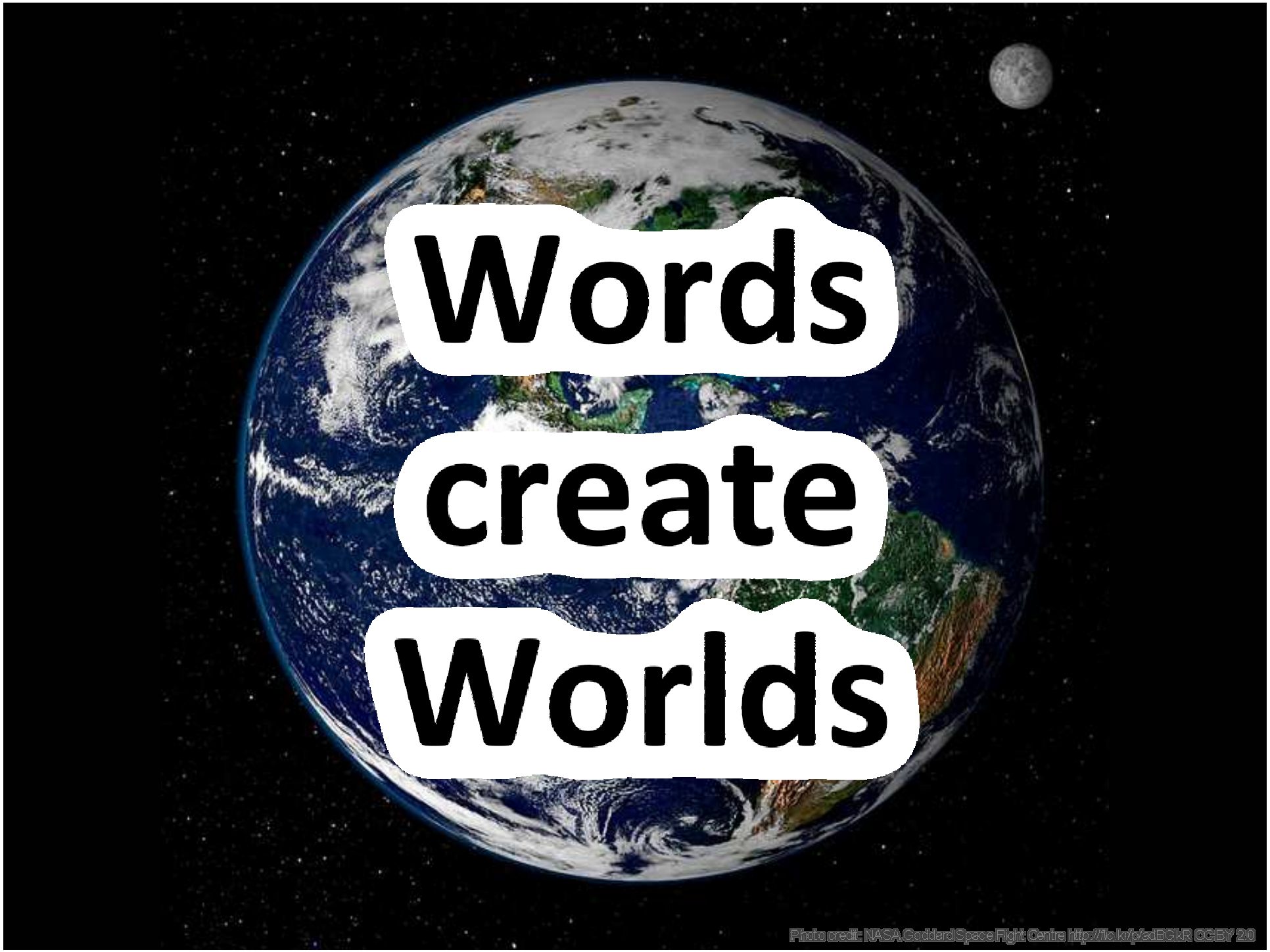
Ten principles for the consideration of human performance and system behaviour

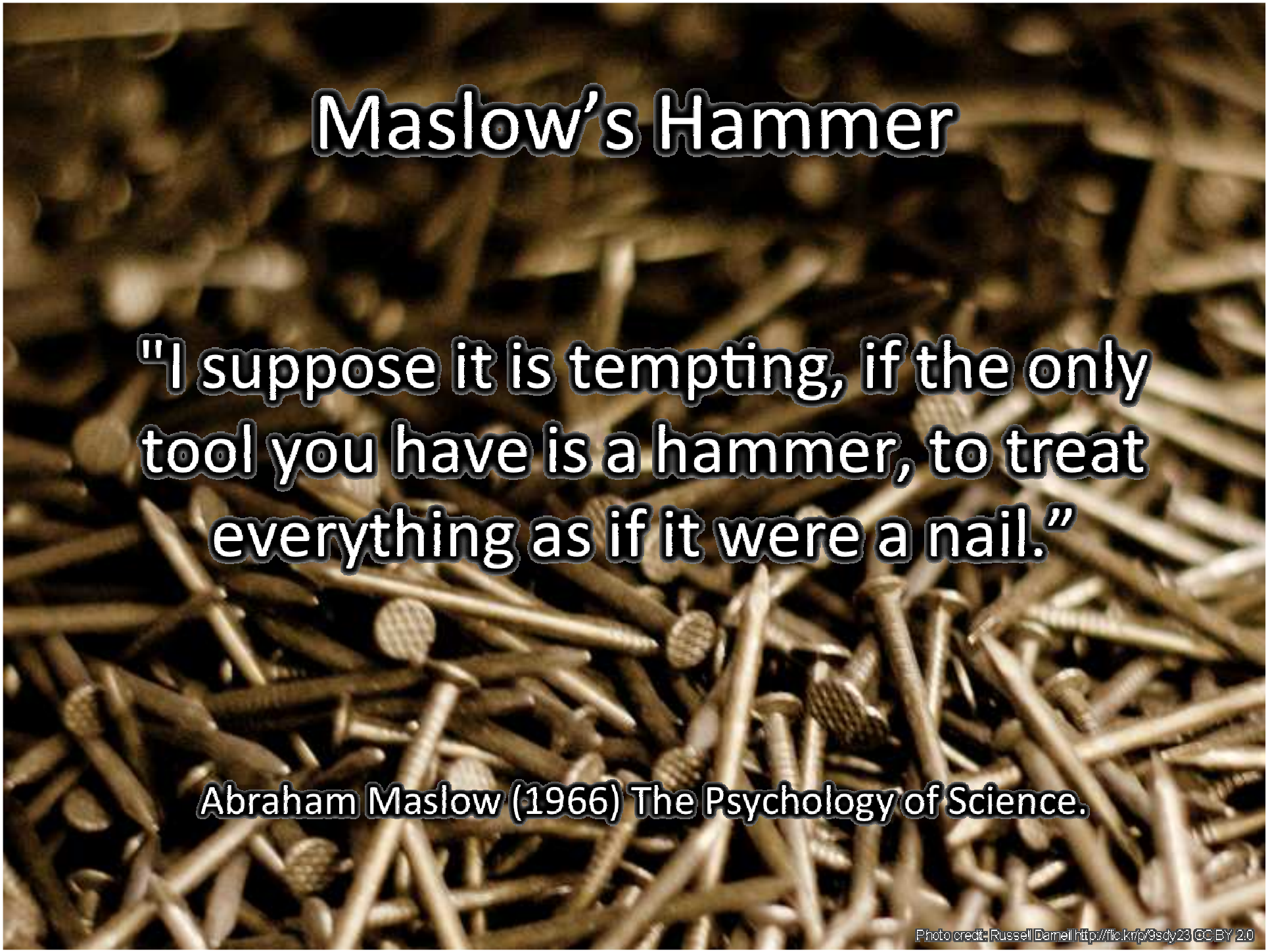
Steven Shorrock
Safety Development Project Leader

with Tony Licu (Eurocontrol) & Jorg Leonhardt (DFS)

Part 1: ‘Human Error’?

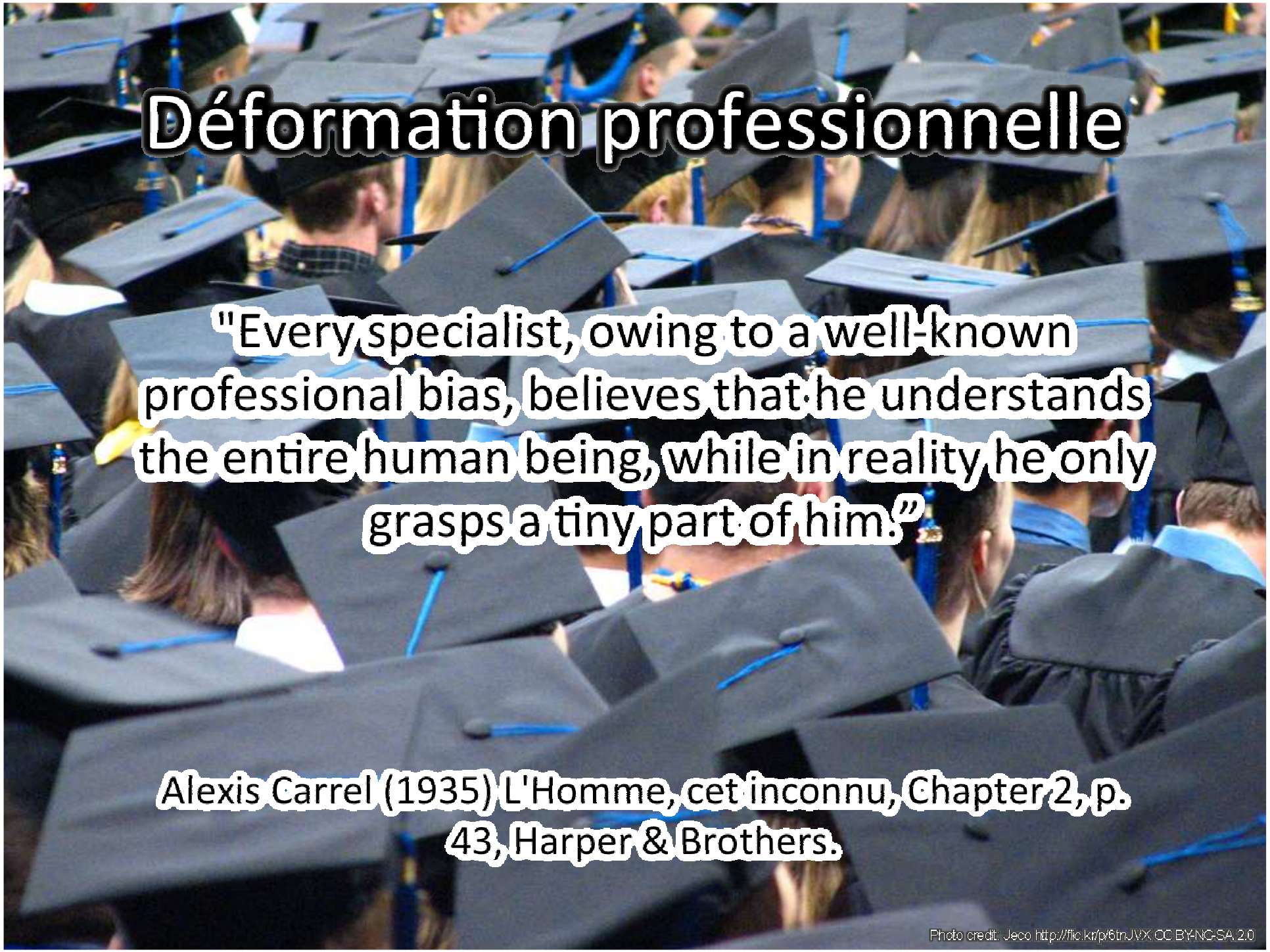

Indonesia Sukhoi pla
Investigators in Indonesia have
error for a plane crash in
people on board d
Error Seen in Nigeria Air Crash
error blamed in S
human error -
Paris train crash: human error not to blame
Human error is not to blame for the train derailment that killed six people outside Paris on Friday evening, but an unattached rail joint may have caused the accident.
And
the collision between
Sulpicio Express
ilot
MADRID —
Egypt transp
occasion
a pilot's failure to
Russian investiga
error in Kazan air crash




Maslow's Hammer
"I suppose it is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail."
Abraham Maslow (1966) The Psychology of Science.
Photo credit: Russell Darnell http://flic.kr/p/9scdy23 CC BY 2.0


Our Nails
Recklessness
Human error
Unprofessionalism
Failure
Loss of situation awareness
Fault
Violation
Malpractice
Poor manual flying skills
Inattention
Carelessness
Blunder
Incompetence
Slip
CRM failure
Mistake
Blame
Lapse
Negligence
Photo credit: Russell Darnell http://flic.kr/p/9scdy23 CC BY 2.0


Déformation professionnelle
Safety
Justice
Human error
Loss of situation awareness
Poor manual flying skills
Slip
CRM failure
Lapse
Inattention
Failure
Violation
Mistake
Blunder
Recklessness
Unprofessionalism
Fault
Malpractice
Carelessness
Incompetence
Blame
Negligence
Photo credit: Jeco http://flic.kr/p/6tnJVX CC BY-NC-SA 2.0


Déformation professionnelle
"Every specialist, owing to a well-known professional bias, believes that he understands the entire human being, while in reality he only grasps a tiny part of him."
Alexis Carrel (1935) L'Homme, cet inconnu, Chapter 2, p. 43, Harper & Brothers.
Photo credit: Jeco http://flic.kr/p/6tnJVX CC BY-NC-SA 2.0

‘Human error’ or inhuman systems?

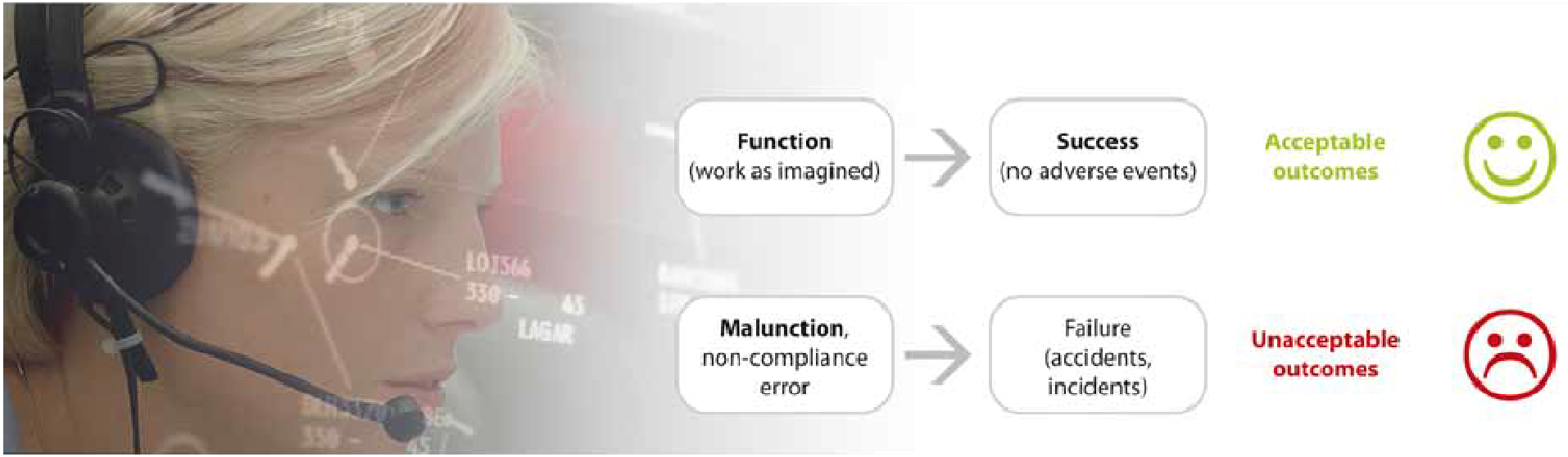
- ‘Human error’ is a often a post hoc social judgment
- ‘Human error’ requires a standard
- ‘Human error’ points to individuals in a complex system
- ‘Human error’ stigmatises actions that could have been heroic in slightly different circumstances
- ‘Human error’ processes are often vital for task performance
- ‘Human error’ is an inevitable by-product of the pursuit of successful performance in a variable world

The use and abuse of ‘human error’
http://www.safetydifferently.com/the-use-and-abuse-of-human-error/

‘Human error management’

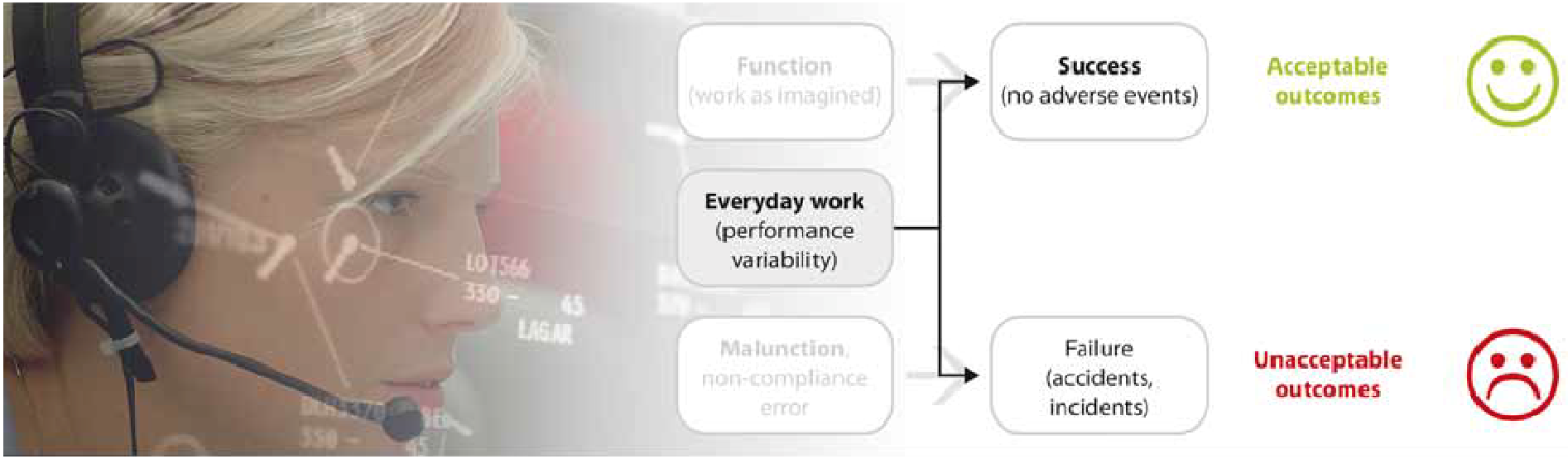
Blame, shame & punishment
Slogans & reminders
Retraining
‘Performance management’
Targets
Threat and error management
Human error taxonomies
Crew/Team Resource Management
Automation

‘Human error’ assumes **bimodal** performance



From Safety-I to Safety-II: A White Paper
www.**skybrary**.aero/bookshelf/books/2437.pdf

…but we *know* that performance is **variable**!



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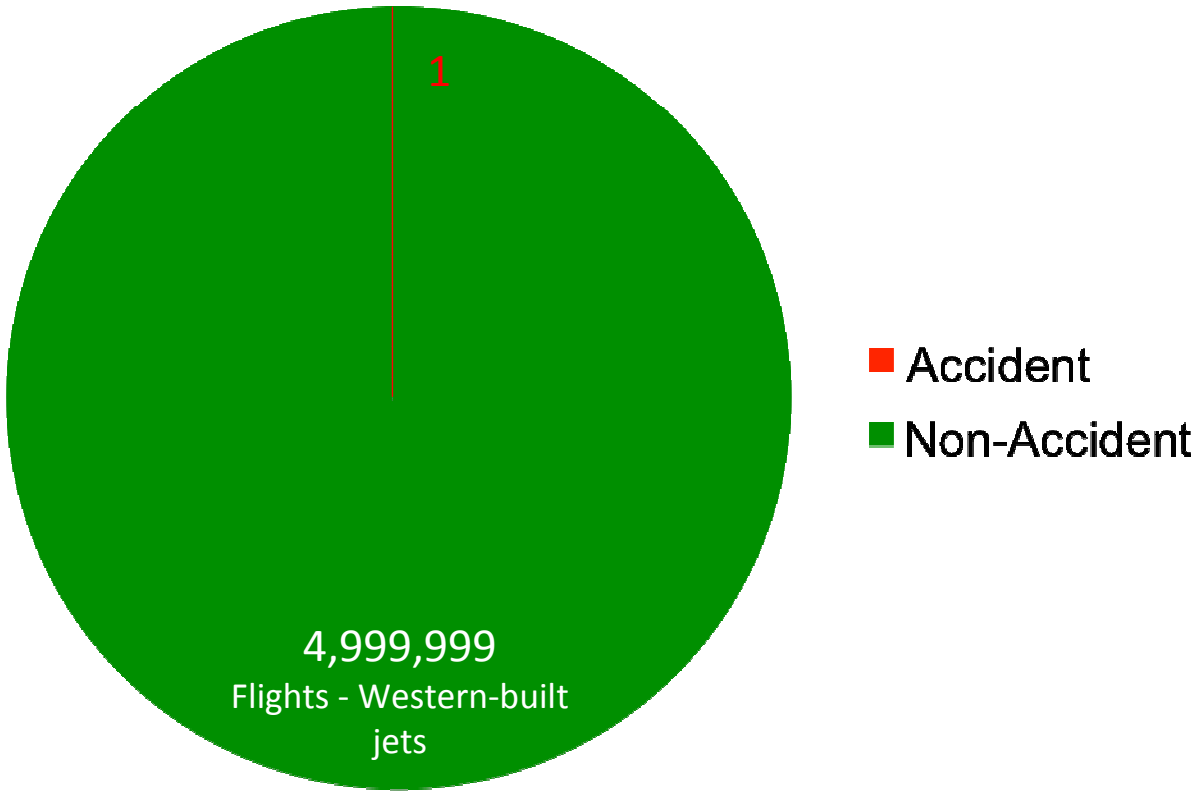
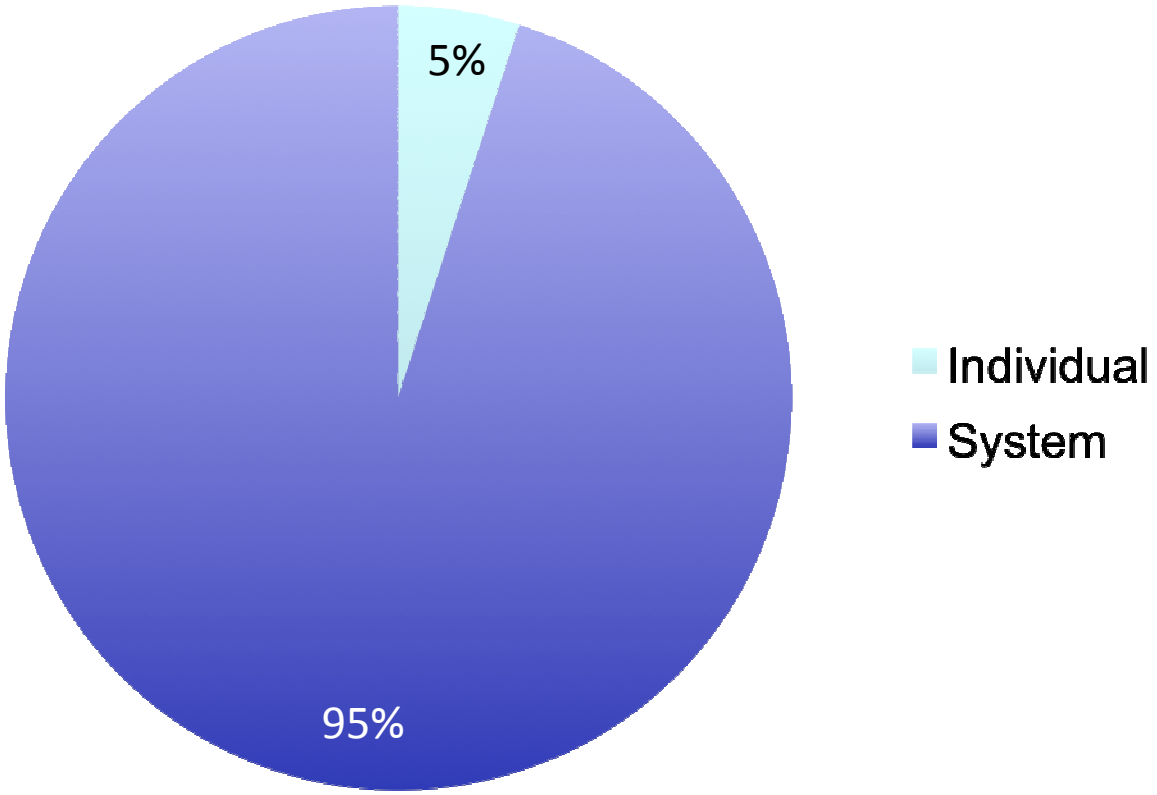
Part 2: Individual and System Behaviour

Things that go right & Things that go wrong



IATA (2013) 2012 best in history of continuous safety improvements. Press release no. 8, 28 Feb 2013.

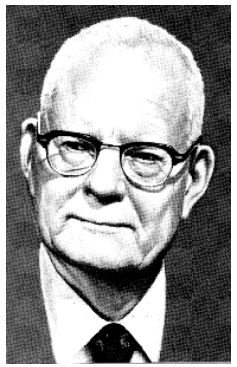
Individual or System Behaviour?
Deming's 95/5 rule



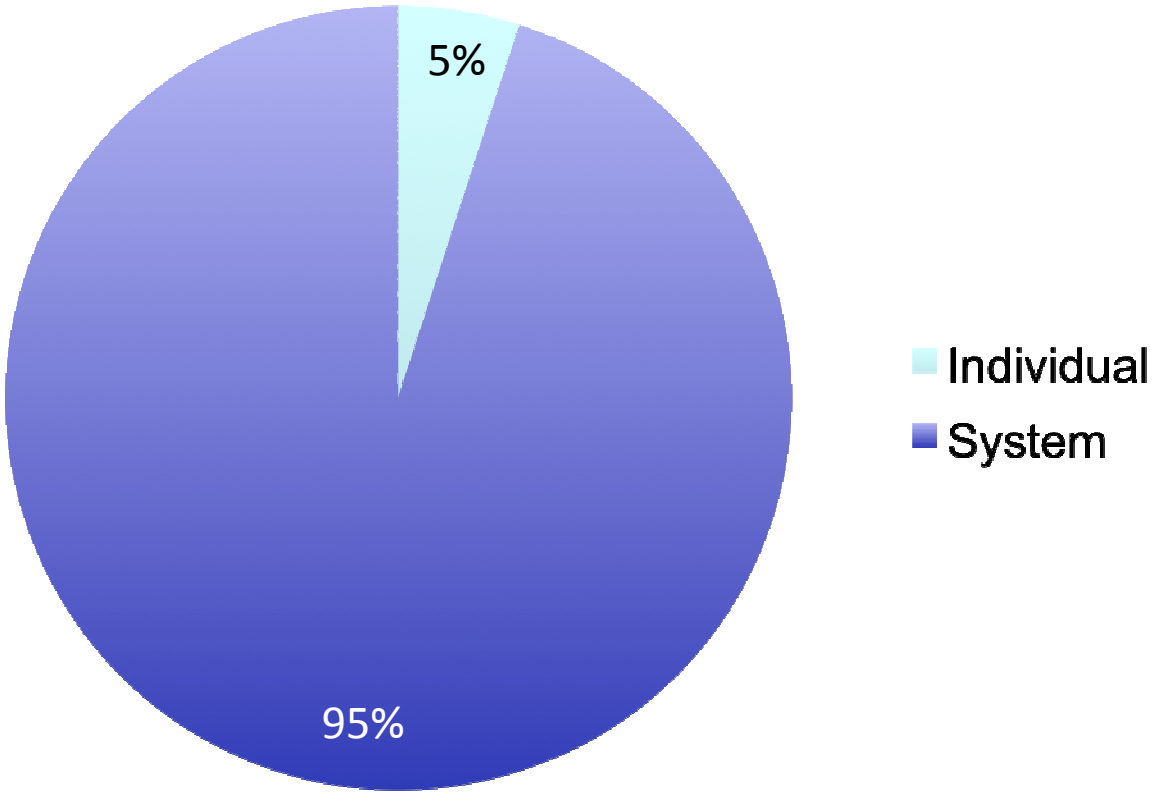
"95% of the quality problems are a result of the system. 95% of the time we blame the person, fire the person. Then we can't understand why the next person has the same problem!"

Dr. W. Edwards Deming

Statistician, Management Consultant, Professor, Author



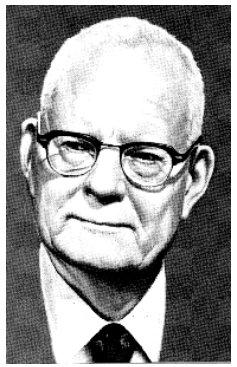
Individual or System Behaviour?
Deming's 95/5 rule

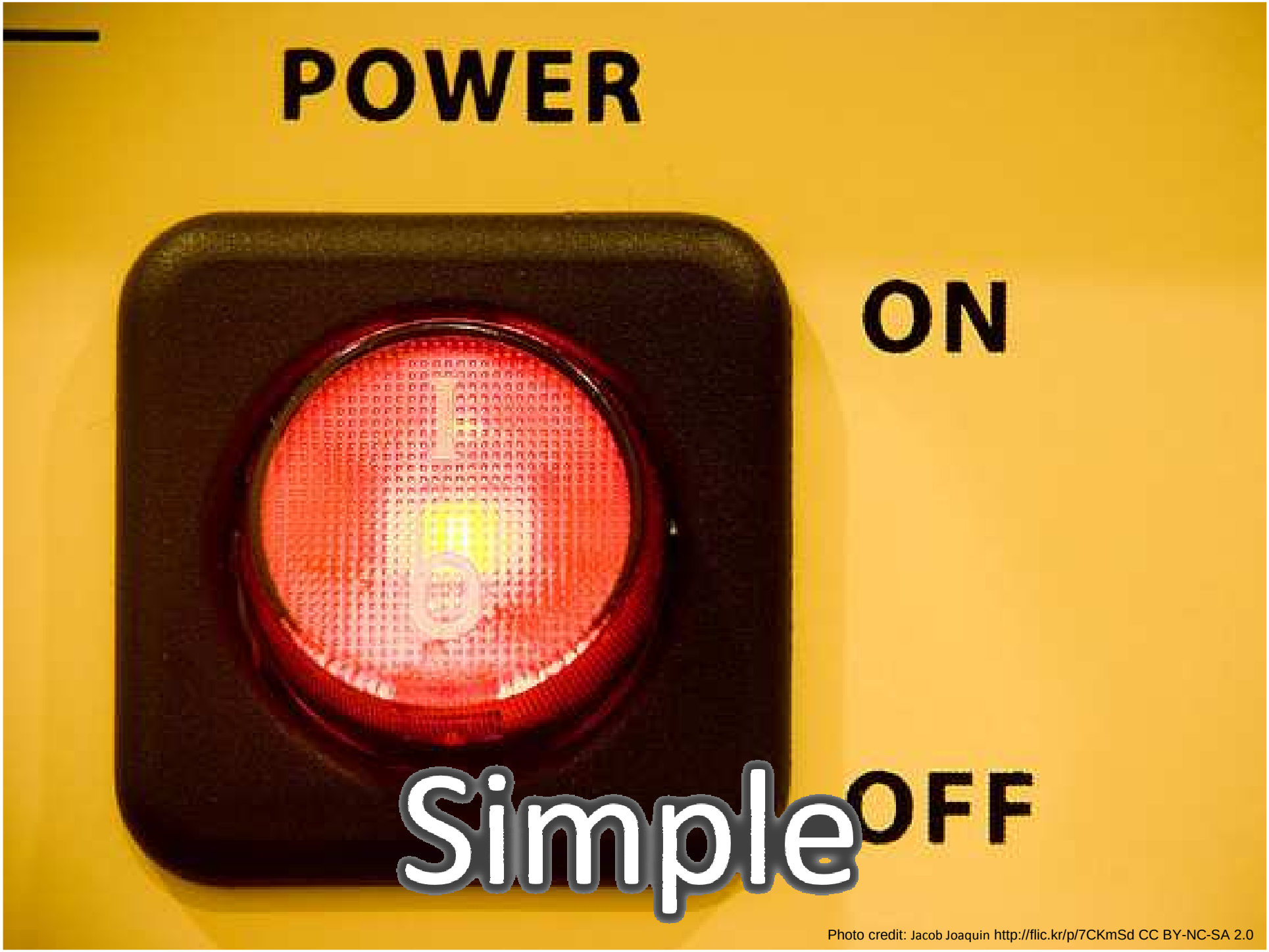


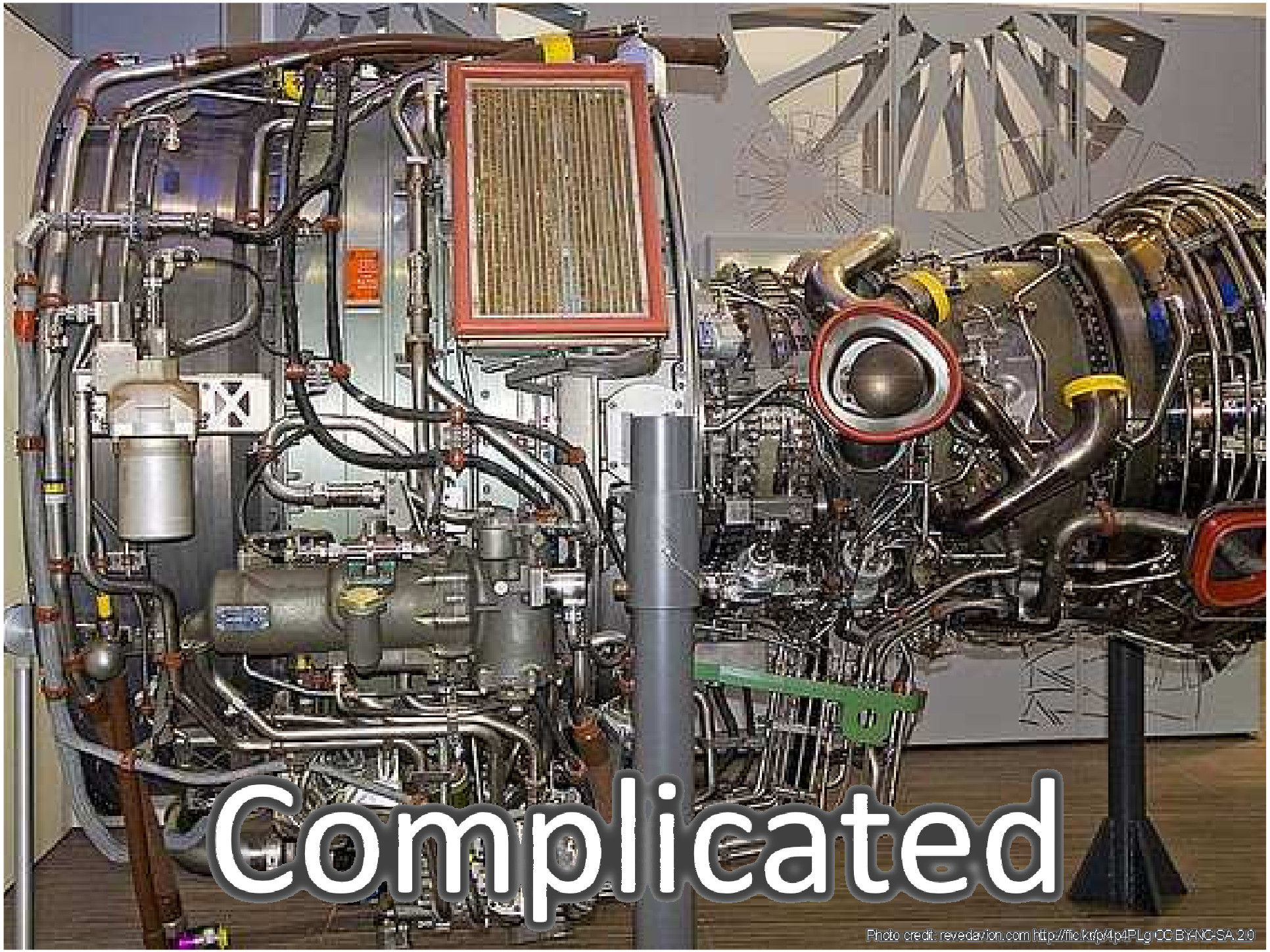
"It is a mistake to assume that if everybody does his job, it will be all right. The whole system may be in trouble."

Dr. W. Edwards Deming

Statistician, Management Consultant, Professor, Author






Complicated
Photo credit: revedavion.com http://flic.kr/p/4p4PLg CC BY-NC-SA 2.0


Complex
TOPIX
1300.04
1295.37
1313.00
1295.34
Photo credit: Stefan http://flic.kr/p/5ndJR/ CC BY-SA 2.0

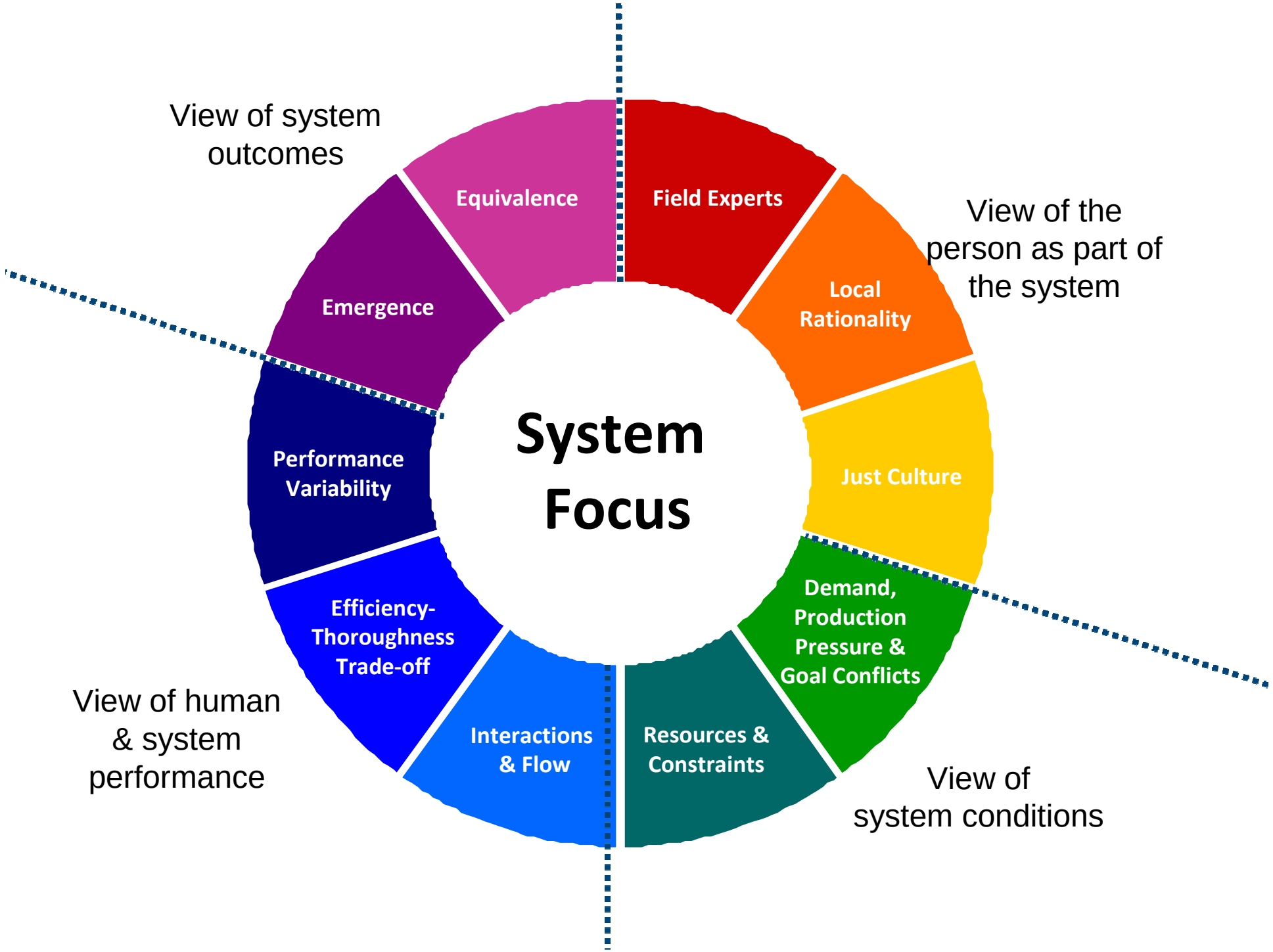

How can we better make sense of how things normally go right but occasionally go wrong in systems?
Photo credit: Johnson Cameraface http://flic.kr/p/aaLgwp CC BY NC SA 2.0

Part 3: Ten principles for the consideration of human performance & system behaviour

Rationale

- Established ways of thinking about people, systems and safety do not fit reality
- Need to move on from ‘human error’
- Put human performance into context
- Integrate insights from **systems safety, systems thinking**, **systems ergonomics**
- Be sensitive to **ethical considerations**
- Make theory engaging, relevant and memorable for all


System Focus
Equivalence
Field Experts
Local Rationality
Just Culture
Demand, Production Pressure & Goal Conflicts
Resources & Constraints
Interactions & Flow
Efficiency-Thoroughness Trade-off
Performance Variability
Emergence


View of system outcomes
View of the person as part of the system
View of human & system performance
View of system conditions
System Focus
Equivalence
Field Experts
Local Rationality
Just Culture
Demand, Production Pressure & Goal Conflicts
Resources & Constraints
Interactions & Flow
Efficiency-Thoroughness Trade-off
Performance Variability
Emergence

System Focus

Foundation. Safety must be considered in the context of the overall system, not isolated individuals, parts, events or outcomes.

Field Experts

Principle 1. The people who do the job are the specialists in their field and a critical source of safety knowledge.

To understand Work-As-Done and improve how things really work, involve and talk to those who do the work.

Local Rationality

Principle 2. People do things that make sense to them given their goals, understanding of the situation and focus of attention at that time.
Activities and occurrences need to be understood from the perspectives of those involved.

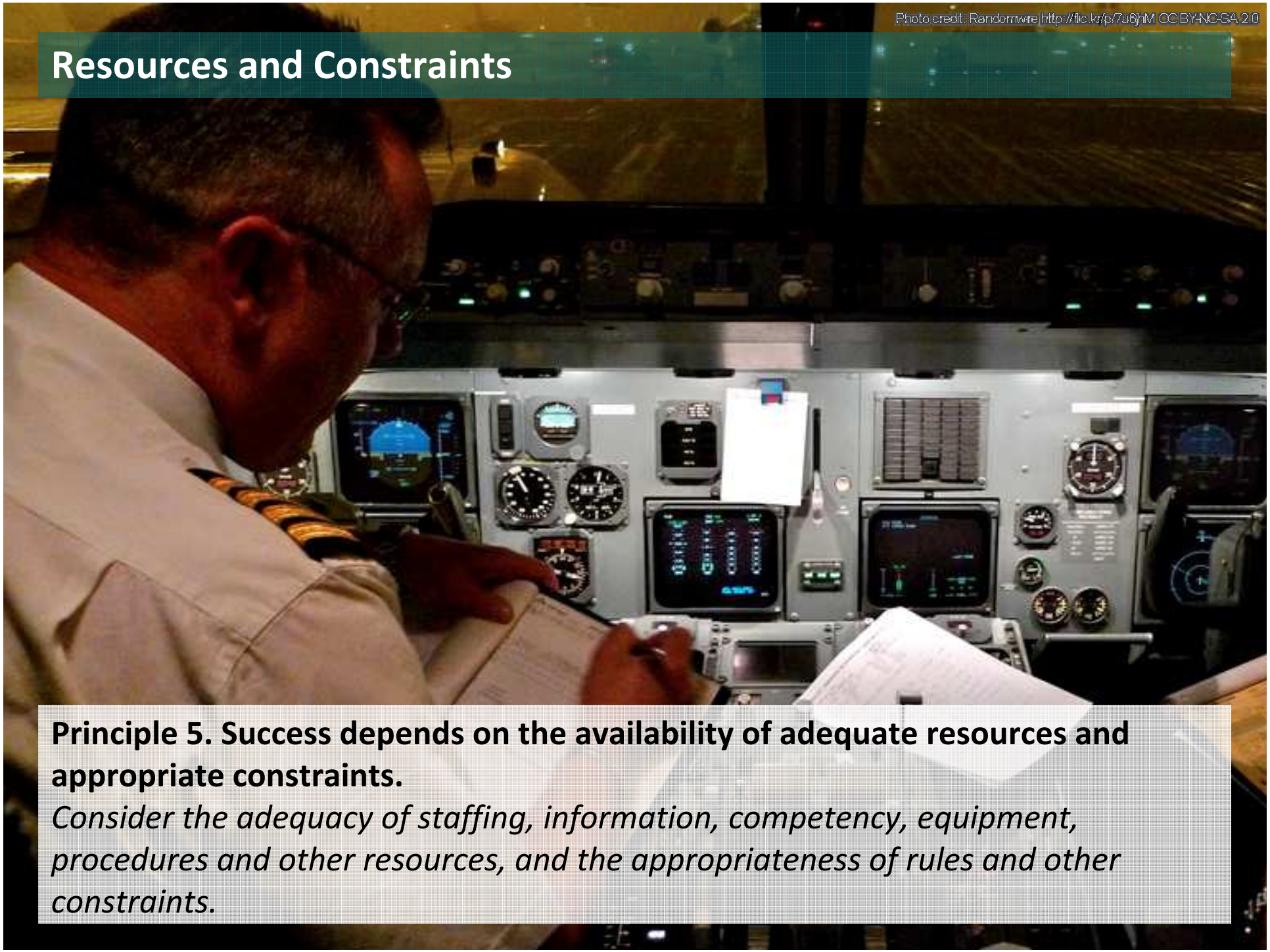
Just Culture

Principle 3. People usually set out to do their best and achieve a good outcome.
Adopt a mindset of fairness. Understand actions in context, and use non-judgmental and non-blaming language.

Demand, Production Pressure & Goal Conflict

Principle 4. Pressures relating to efficiency and capacity have a fundamental effect on performance.

Performance needs to be understood in terms of demands, resulting pressures and conflicts between goals.



Resources and Constraints

Principle 5. Success depends on the availability of adequate resources and appropriate constraints.

Consider the adequacy of staffing, information, competency, equipment, procedures and other resources, and the appropriateness of rules and other constraints.

Interactions & Flow

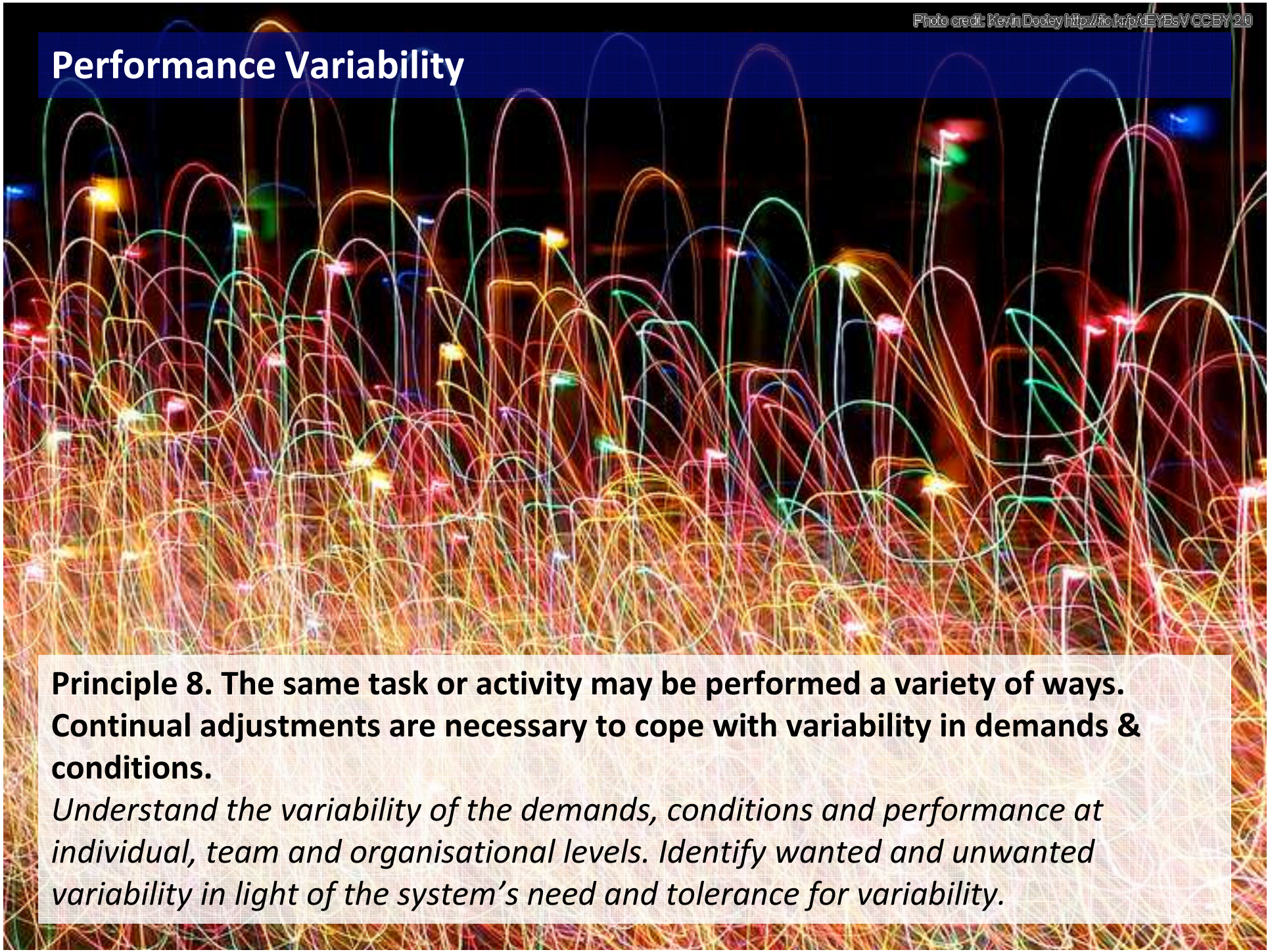
Principle 6. Work progresses in a flow of inter-related and interacting functions and activities.

Understand performance in the context of the flow of activities and functions and their interactions, including preconditions for interactions (such as system conditions, previous task steps and checks).

Efficiency-Thoroughness Trade-Off (ETTO)

Principle 7. People have to balance the thoroughness and efficiency of performance in a complex and uncertain environment.

Consider how people balance efficiency and thoroughness, from their point of view, and the understand the tactics they use to balance efficiency (e.g. multitasking, recognition) and thoroughness (e.g. checking).



Performance Variability

Principle 8. The same task or activity may be performed a variety of ways. Continual adjustments are necessary to cope with variability in demands & conditions.

Understand the variability of the demands, conditions and performance at individual, team and organisational levels. Identify wanted and unwanted variability in light of the system's need and tolerance for variability.

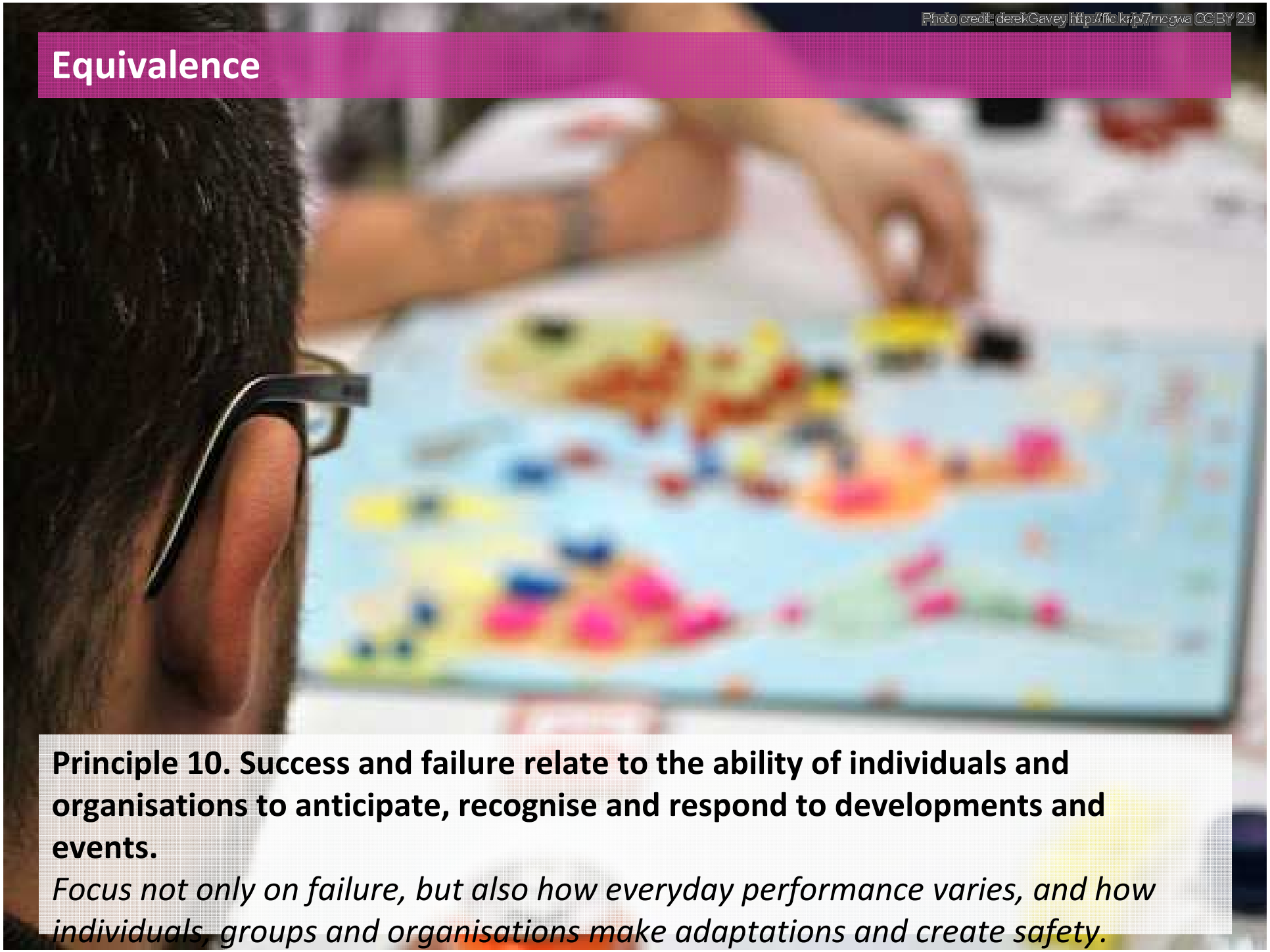
Emergence

Photo credit: Markus Lütkemeyer http://flic.kr/p/5EsRYP CC BY-NC-ND 2.0

Principle 9. System and human behaviour in complex systems is often emergent; it cannot be reduced to components and is often not as expected.

Consider how systems operate and interact in ways that were not expected or planned for during design and implementation.

Photo credit Rafael Matsunaga http://flic.kr/p/JmU2w CC BY 2.0

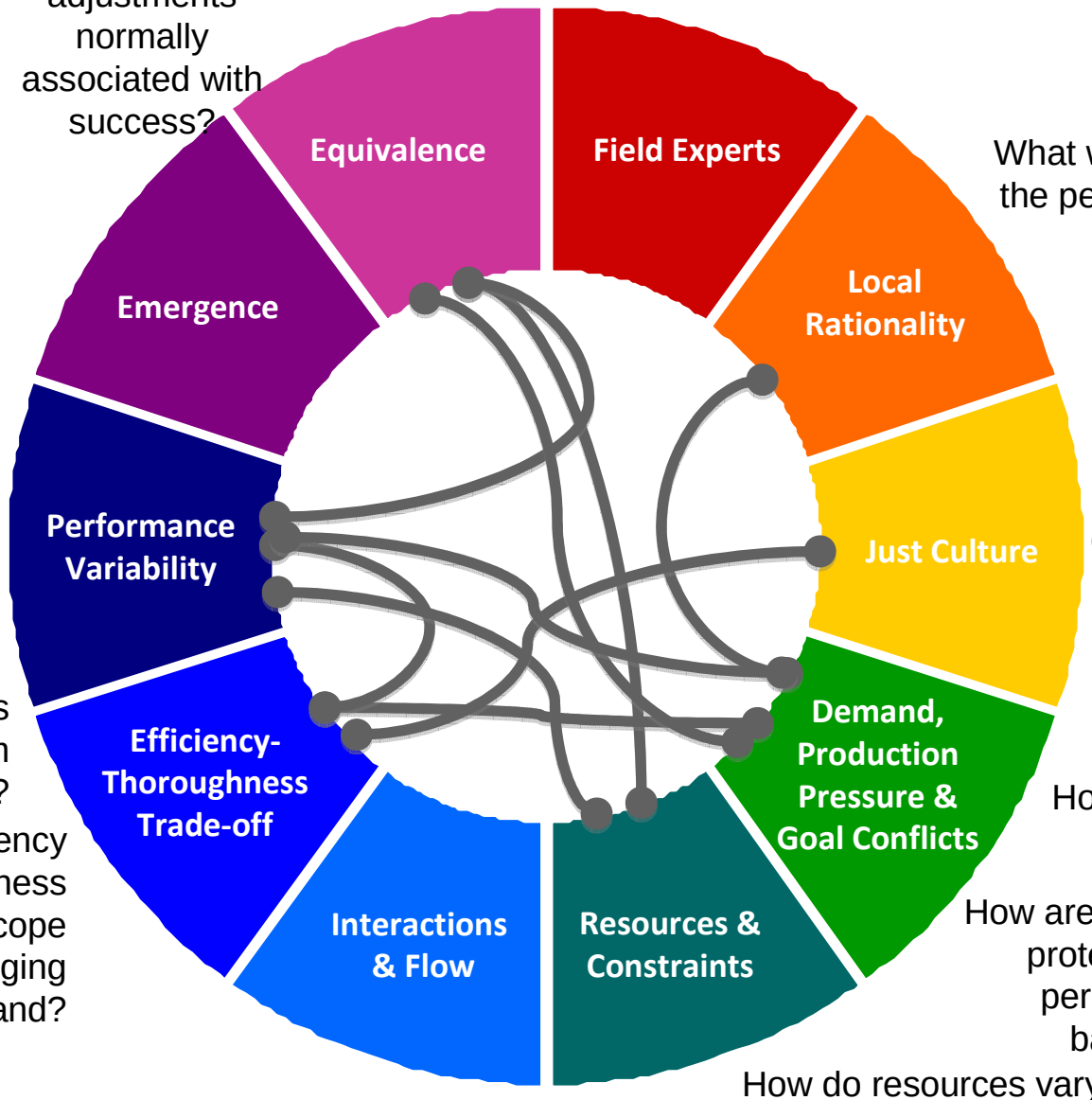


Equivalence

Principle 10. Success and failure relate to the ability of individuals and organisations to anticipate, recognise and respond to developments and events.

Focus not only on failure, but also how everyday performance varies, and how individuals, groups and organisations make adaptations and create safety.

Example Interactions



How are goals, resources and adjustments normally associated with success?

What were the goals for the person at the time?

What are the consequences for the person of ETTOing?

How does demand vary over time?

How are production and protection goals perceived and balanced?

How do resources vary over time and between people, centres, etc?

How are efficiency and thoroughness balanced to cope with changing demand?

How do ETTOs affect system performance?

How do people adjust to constraints and variable resources?

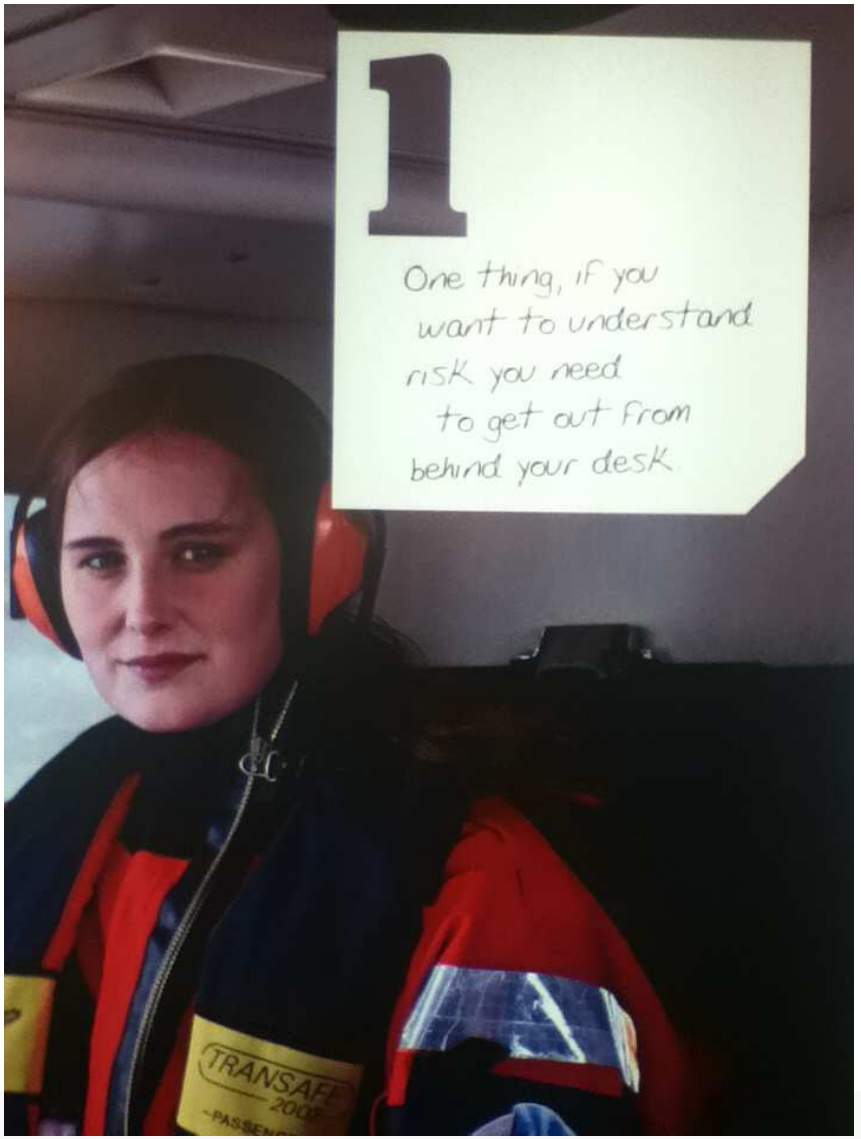
AND FINALLY…We’re not alone

“Well I don’t think there is any question about it. It can only be attributable to human error. This sort of thing has cropped up before, and it has always been due to human error.”

"Well I don't think there is any question about it. It can only be attributable to human error. This sort of thing has cropped up before, and it has always been due to human error."


0:04 / 0:23

"One thing, if you want to understand risk, you need to get out from behind your desk"



Thanks for listening!

steven.shorrock@eurocontrol.int