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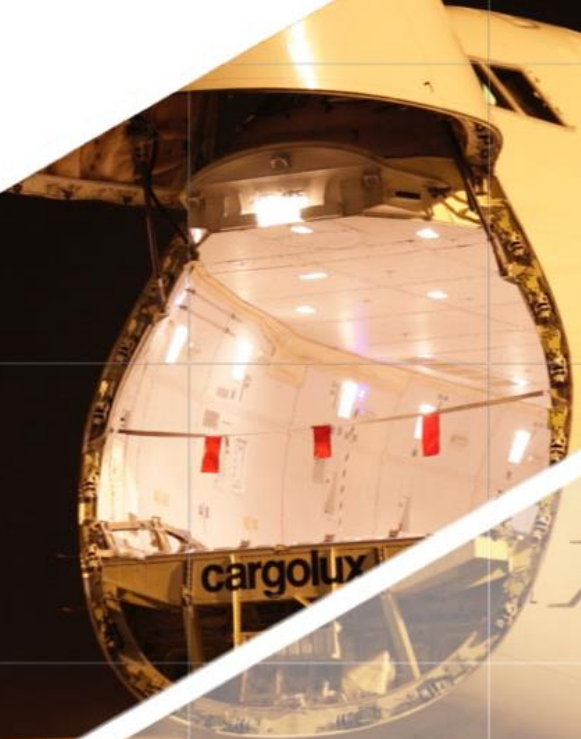


AOC OPS seminarium

**“RMT.0411 ‘Resilience Development’:
How to transfer theory into real life operations?”**

Human Factors Manager G. Steinhardt

15th of November 2016; Stockholm, Sweden



Special thanks and highest recognition for this accomplishment goes to



‘Resilience’ in AMC

(g) CRM training syllabus

Table 1 – Flight crew CRM training

CRM training elements	Initial operator's CRM training	Operator conversion course when changing aircraft type	Operator conversion course when changing operator	Recurrent training	Command course
Relevant to the entire aircraft crew					
Shared situation awareness, shared information acquisition and processing; Workload management; Effective communication and coordination inside and outside the flight crew compartment; Leadership, cooperation, synergy, delegation, decision-making, actions; Resilience development; Surprise and startle effect; Cultural differences.	In-depth	Required	Required	Required	In-depth



‘Resilience’ in regulation: Have we created a lion without teeth?





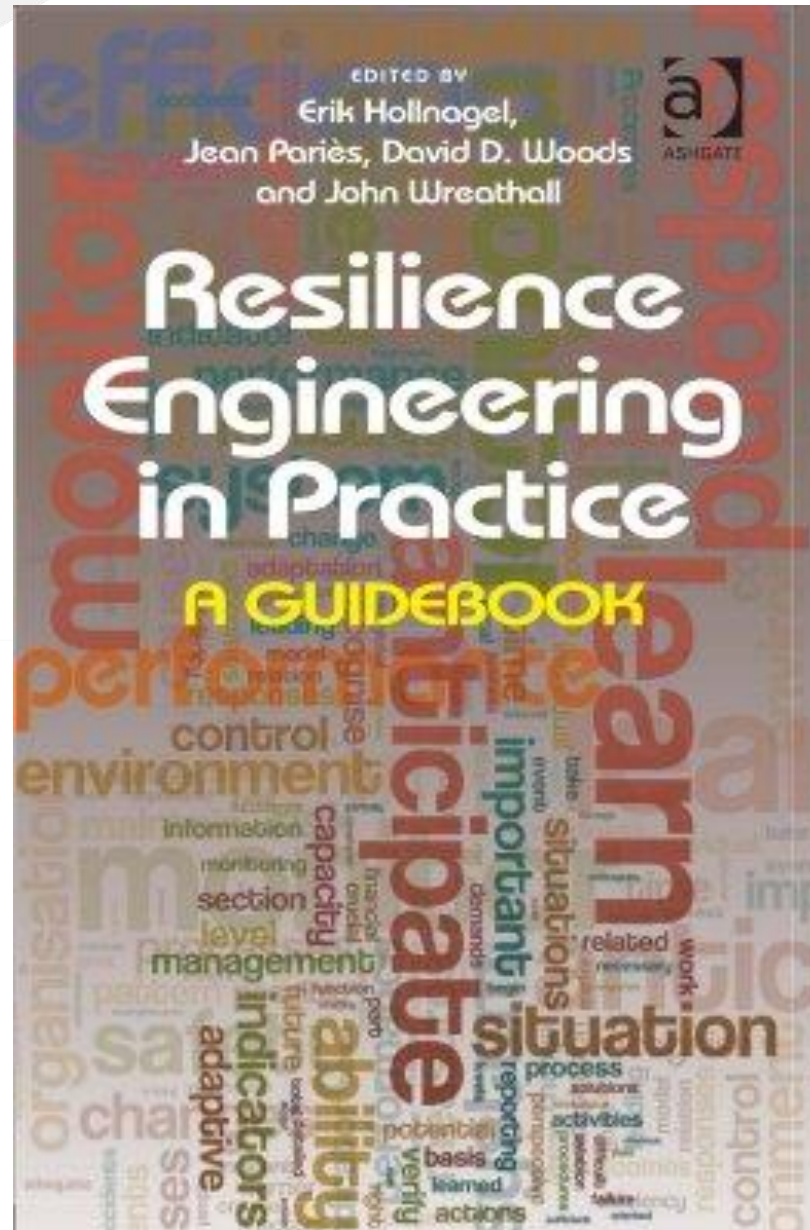
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New Science and Old Aviation

“Nothing is more practical than a good theory.”

Kurt Lewin



Resilience

Definition: Ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.

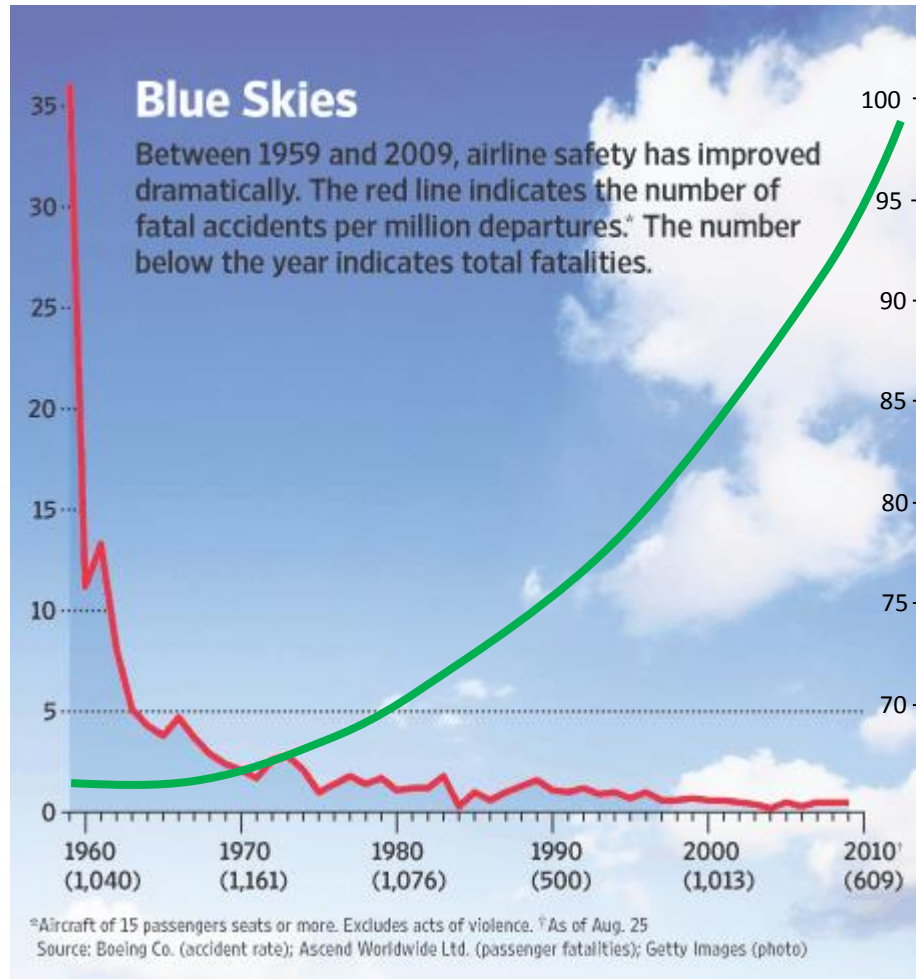
Ability to adjust prior to expected disturbances
 during unexpected
 following

Aim: maintain required operation.



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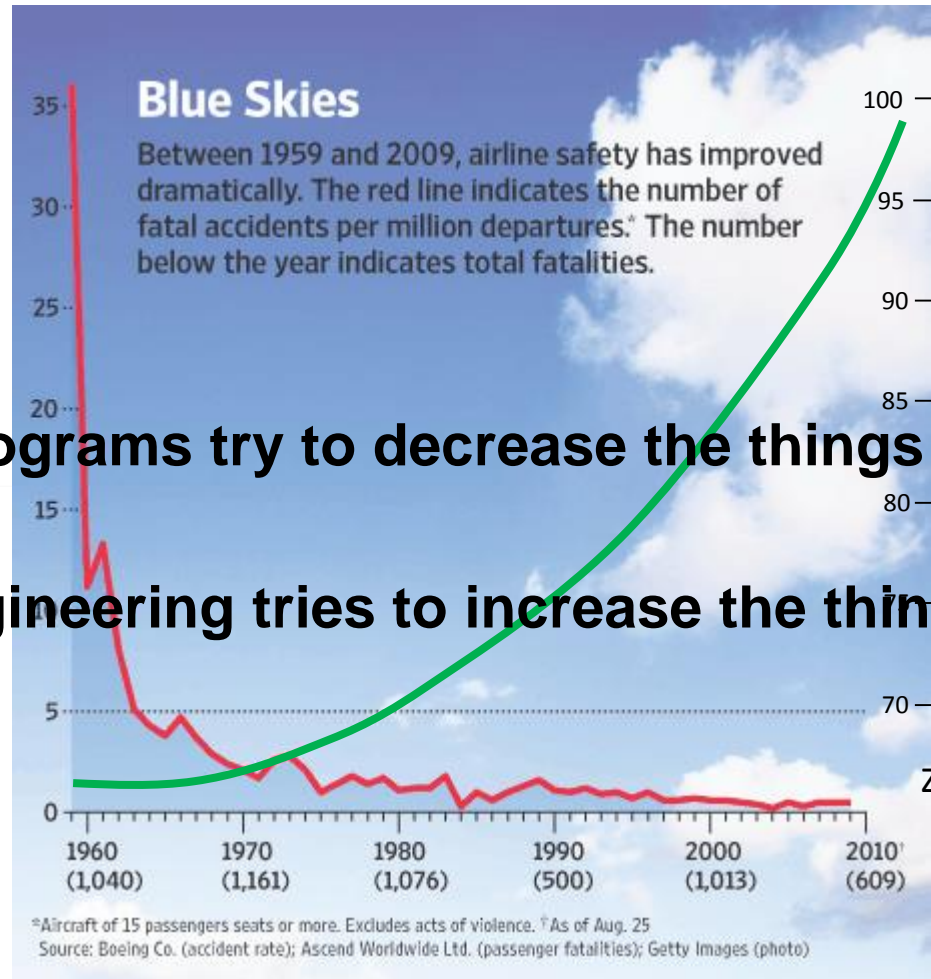
— Things that go wrong

— Things that go right



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Old Safety Programs try to decrease the things that go wrong

Resilience Engineering tries to increase the things that go right.

‘Resilience’ in GM

GM4 ORO.FC.115 Crew resource management (CRM) training

RESILIENCE DEVELOPMENT

(a) The main aspects of resilience development can be described as the ability to:

- (1) learn ('knowing what has happened');
- (2) monitor ('knowing what to look for');
- (3) anticipate ('finding out and knowing what to expect'); and
- (4) respond ('knowing what to do and being capable of doing it').

(b) Operational safety is a continuous process of evaluation of and adjustment to existing and future conditions. In this context, and following the description in paragraph (a), resilience development involves an on-going and adaptable process including situation assessment, self-review, decision and action. Training in resilience development enables crew members to draw the right conclusions from both positive and negative experiences. Based on those experiences, crew members are better prepared to maintain or create safety margins by adapting to dynamic complex situations.



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Resilience



Sidney Dekker

„If things go right under difficult circumstances, it's mostly because of peoples adaptive capacity; their ability to recognize, adapt to and absorb changes and disruptions.“

Resilience

Definition: Ability of a system to adjust its functioning prior to, during, or following **changes and disturbances**, so that it can sustain required operations under both expected and unexpected conditions.

changes and disturbances



System is fluctuating



Risk Profile is changing.

Risk Profile

Every task of a system has a specific Risk Profile

Risk Profile



Risk Profile

Risk Profile Change

In foreseen or unforeseen situations

Due to internal or environmental conditions.

Risk Profile



Risk Profile

Change of Standard Setting
=
Change of Risk Profile

SCCM – CCM

Captain - Copilot

SCCM – SCCM

Captain - Captain

Noticing triggers Action





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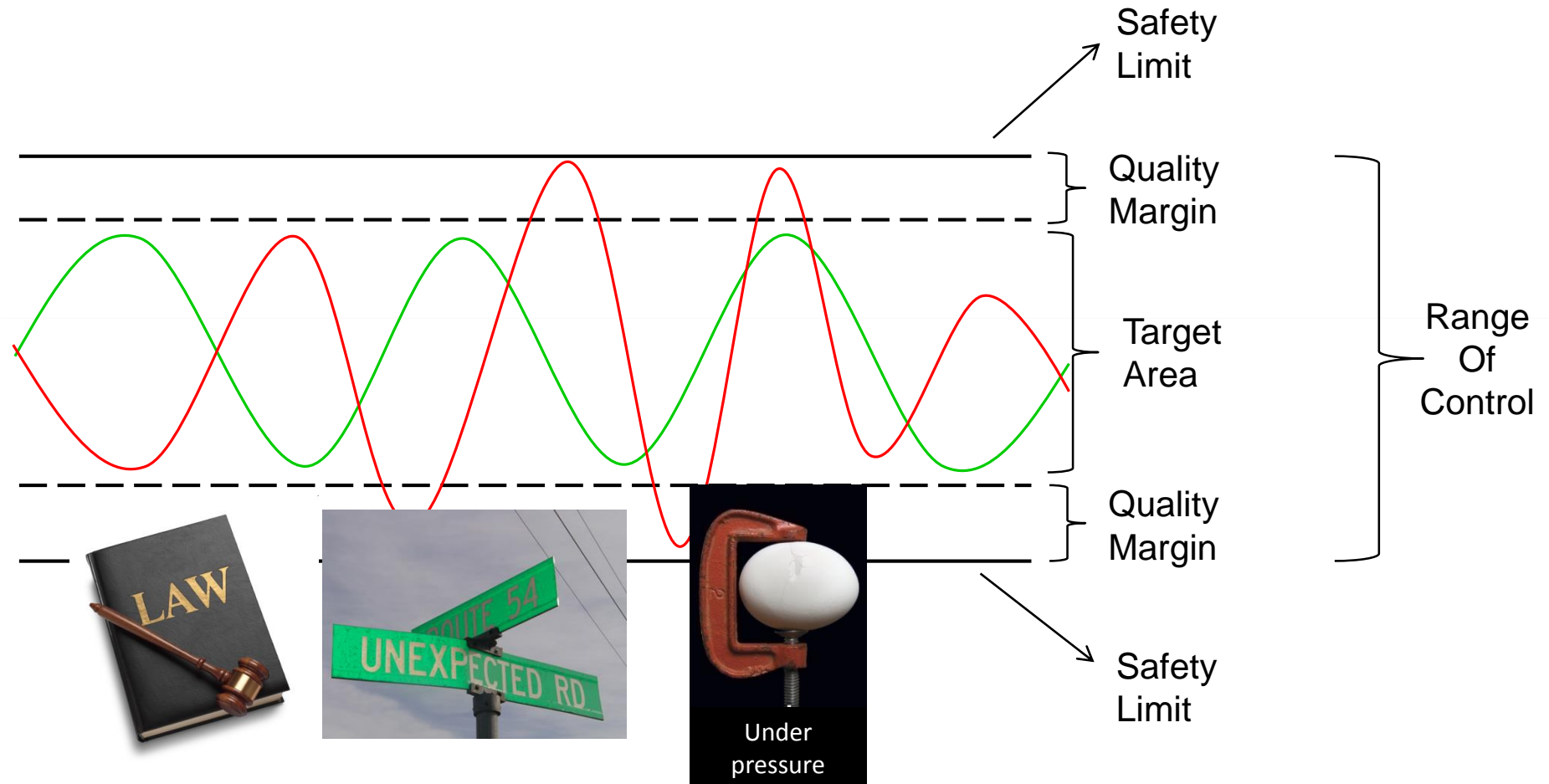
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Noticing triggers Action

When the risk profile changes, coordination between team members seems to be of utmost importance.

Learn the ability to more consistently notice risk profile changes and communicate them.

System Variability in Performance



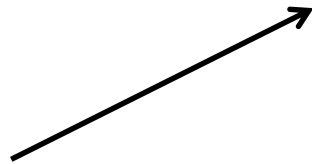


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Loosing Resilience

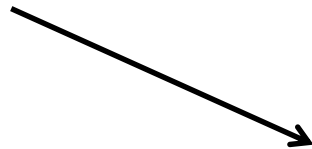
3



Decompensation



Working at cross-purposes



Getting stuck in outdated behaviours

Working at cross-purposes





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Working at cross-purposes



~~Airport Slot~~



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Working at cross-purposes

System Success



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Working at cross-purposes

Premonitions

Top to bottom or bottom up communication is lost.



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Working at cross-purposes

Remedy



Effective communication at a system level, but also at a team or crew level.



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Pilots' Competencies



Luxair



[Inter]Personal Competencies

Communication	12
Teamwork	14
Leadership	16
Workload and Stress Management	18
Situation Awareness and Decision Making	20

The Luxair Flight Crew's Philosophy part on [Inter]Personal Competencies encompasses the scope of Crew Resource Management (CRM). On top of the CRM, our Philosophy emphasises interpersonal and as well personal competencies.

All these key elements are of particular importance and therefore called '[Inter]Personal Competencies'.

[Inter]Personal Competencies

Communication

Requirements

- Use the same channel of communication
- Share information actively
- Clearly state plans and intentions
- Assure that information given is received
- Assure understanding
- Actively ask for feedback
- Accept appropriate criticism
- Provide constructive feedback when appropriate
- Listen actively
- Express uncertainties and ambiguities
- Ask for proposals and openly listen to counter-proposals
- Show respect for other people's feelings and opinions

Definition

Communication between Flight Crew Members may be either social or functional/operational. Both aspects serve a useful purpose, the former helping to build teamwork and the latter being essential to the task of flying an aircraft.



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Loosing Resilience

3

Decompensation

Working at cross-purposes

Getting stuck in outdated behaviours

Getting stuck in outdated behaviours



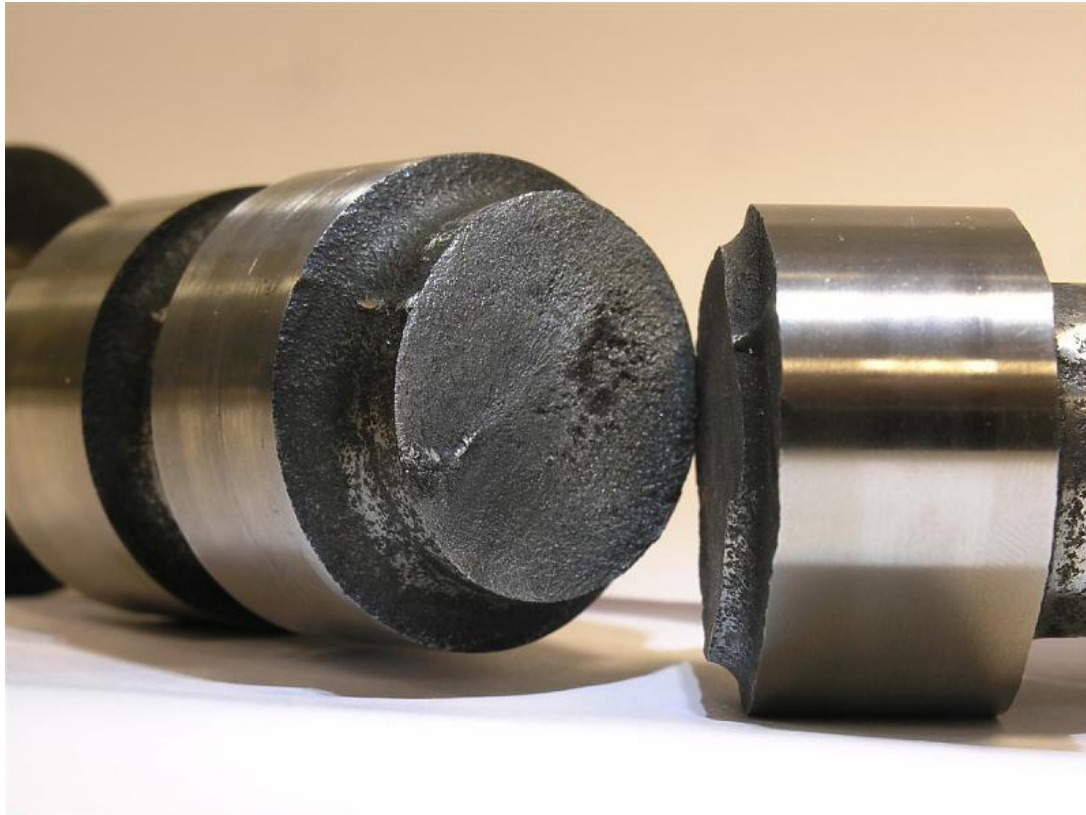
Getting stuck in outdated behaviours



Getting stuck in outdated behaviours



Getting stuck in outdated behaviours



Getting stuck in outdated behaviours



Swissair 111



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Getting stuck in outdated behaviours

Task Success



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Getting stuck in outdated behaviours

Premonitions

A lot of small things go wrong, minor incidents happen

No common team understanding of the situation.



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Getting stuck in outdated behaviours

Remedy



Pursue all signals, especially those which do not confirm your view of the world. Consult your team in order to have a common understanding of the situation. Allow learning from the current situation.



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Pilots' Competencies



Luxair

Situation Awareness and Decision Making

Requirements

- Gather information and identify the problem
- Review causal factors with other crew members
- Develop a mental plan for course of action
- Plan course of action based on all available information
- Confirm selected course of action
- Consider and share risks for course of action
- Monitor and evaluate current status relative to the mental plan
- Project ahead and consider contingencies
- Gain feedback to review the accuracy of own mental model
- Use checklists, procedures and written information
- Use automation effectively
- Speak up when Situational Awareness is breaking down
- Act with respect to time available
- Ask crew members for options
- Listen to input from all crew members
- Adopt multi crew co-ordination concept

Definition

Flight Crew Members have the ability to establish Situation Awareness by the correct perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future.

This is to be achieved mainly by good workload management, team work and communication.

Decision Making is based on Situation Awareness, therefore if Flight Crew Members obtain proper Situation Awareness, they are likely to make appropriate decisions.

Decision Making is a mental process leading to the selection of a course of action among several alternatives.



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Resilience

Definition: Ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.

How do we do that?

Resilience Development

Noticing

Triggers

Action



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Resilience Development

Communicate

Resilience Development

Anticipate



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Resilience Development

Create Buffers



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Resilience Development

Look for Critical Indicators₃



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Resilience Development



C A B L₃



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Resilience Development



C - Communicate

A - Anticipate

B - Create Buffers

L₃ - Look for critical indicators



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Group Work



Please think of a situation of your daily work where you faced a disturbance and where you succeeded in producing a positive outcome, that means a situation which went right.

- What was the situation about?
- When did you notice a risk profile change?
- Which actions (CABL₃) helped to manage the situation?



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Resilience and Human Error



The New View on human error:

The point is not to see where people went wrong, but why what they did made sense to them.

The aim is to help our organisation to learn something valuable from failure, instead of just saying “human error”.

Resilience and Learning





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Resilience and Learning

Definition: Ability of a system to adjust its functioning prior to, during, or following changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.



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Resilience and Learning

Definition: Ability of a system to adjust its functioning prior to, during, or **following** changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions.

prior to	Recognize a situation before it appears
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during	Learn to ...	Be prepared and deal with it
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following	Integrate successful strategies.
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RESILIENCE ENGINEERING

The ability to absorb change

Notice Risk Profile Change !

C - Communicate

A - Anticipate

B - create Buffers

L₃ - Look for indicators

↳ decompensation

↳ working at
cross-purposes

↳ getting stuck in
outdated behaviours

Increase the things that go right !

Sharing Resilience



Sharing Resilience



**ROYAL
AERONAUTICAL
SOCIETY**

<http://www.raes-hfg.com/hfg-ops-membership/safety-culture-and-resilience-development-including-sops-and-organisational-factors/>



<http://www.resilience-engineering-association.org/resources/publications/>

Sharing Resilience





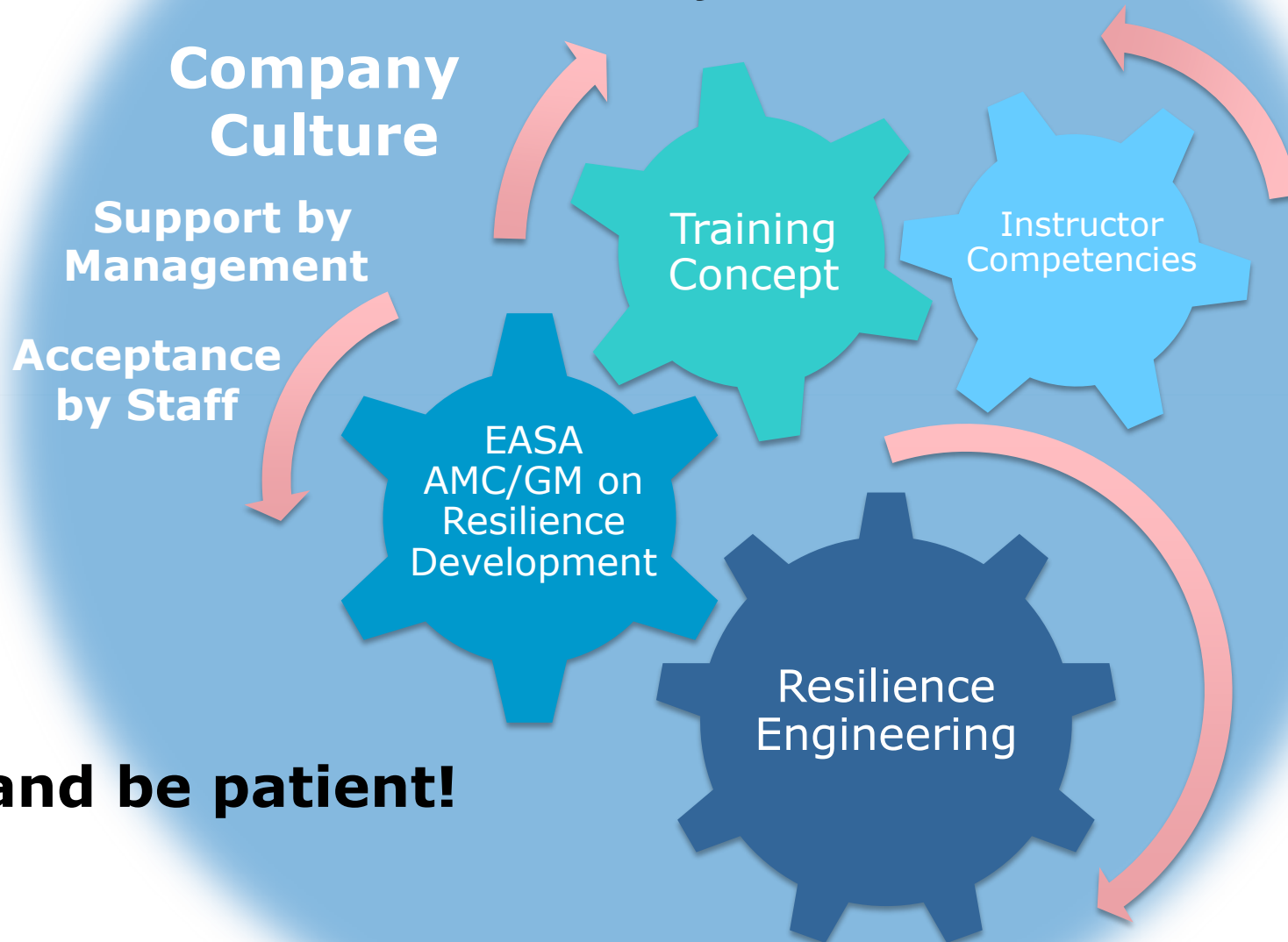
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‘Resilience Development’: The Way Forward



'Resilience Development': The Way Forward



... and be patient!



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**Many thanks for
your attention!**



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