

RAeS Human Performance Conference

Harry Nelson

“From Pyramids to Pepsi ”

A look at the challenges that our industry is likely to face in the coming decades.

What if ?



Resilience

Many definitions of resilience –

Preventing further deterioration

Ability to recover from something

Respond and Change

Toughness

Ability to learn and improve

Strength

Flexibility

What is resilience?

“ Resilience is the ability to recognise, absorb, adapt to and recover from disruptions ... ”

Resilient Pilot - The pyramid model



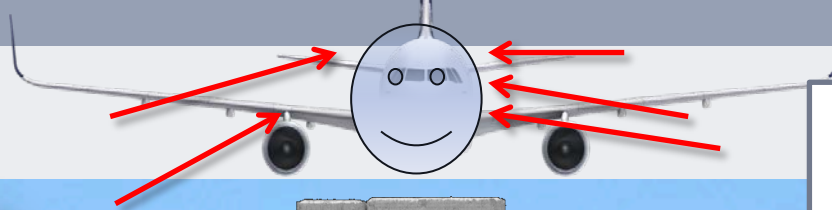
Great Pyramid of Giza



'Resilient structures - the pyramid of Chichen Itza'



Resilience



Threats
 Errors
 Distraction
 Startle
 Fatigue

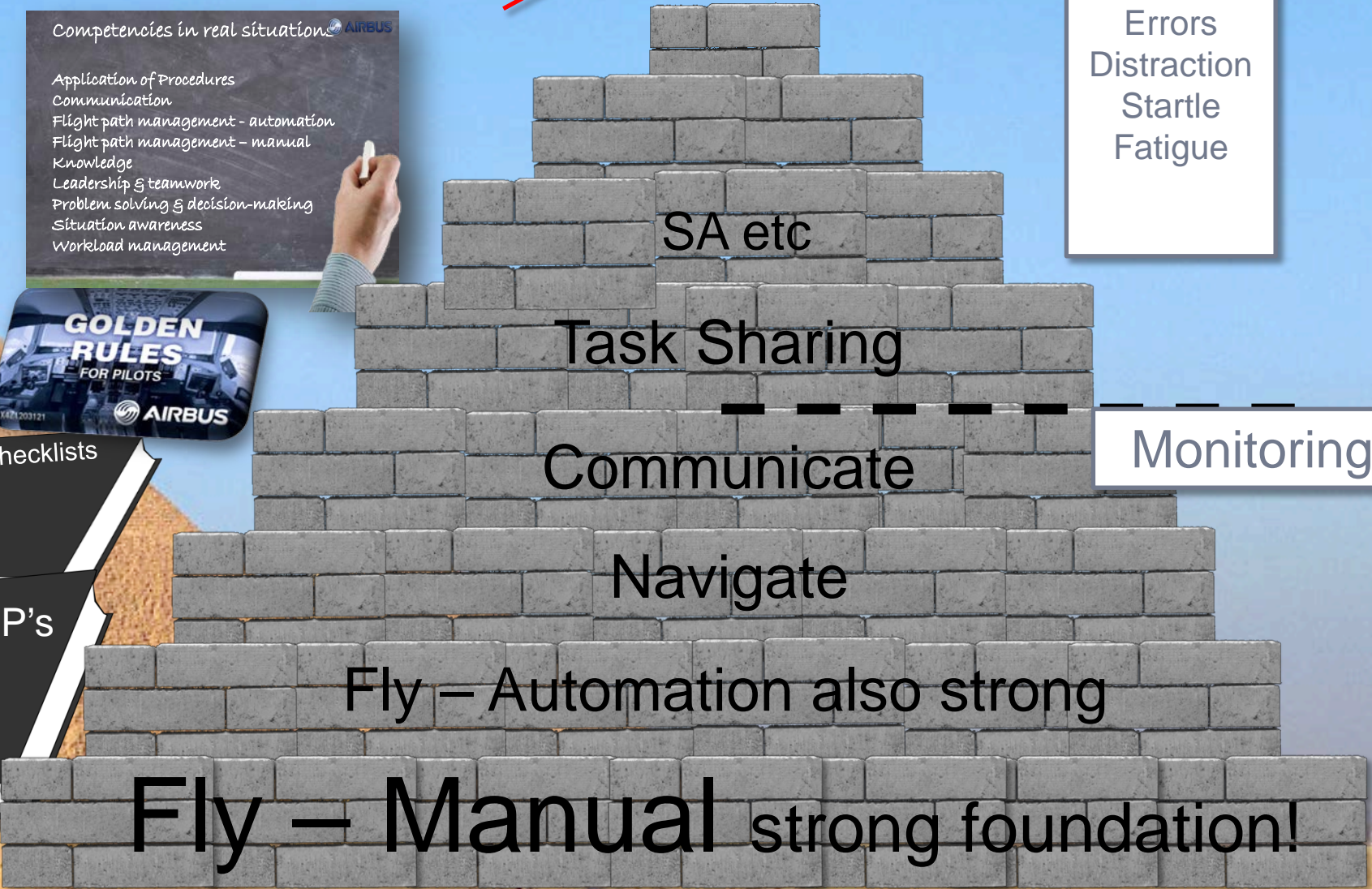
Competencies in real situation 

- Application of Procedures
- Communication
- Flight path management - automation
- Flight path management - manual
- Knowledge
- Leadership & teamwork
- Problem solving & decision-making
- Situation awareness
- Workload management

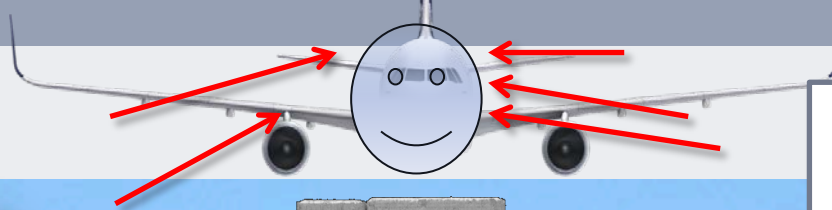


Checklists

SOP's



Resilience



Threats
Errors
Distraction
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Competencies in real situation 

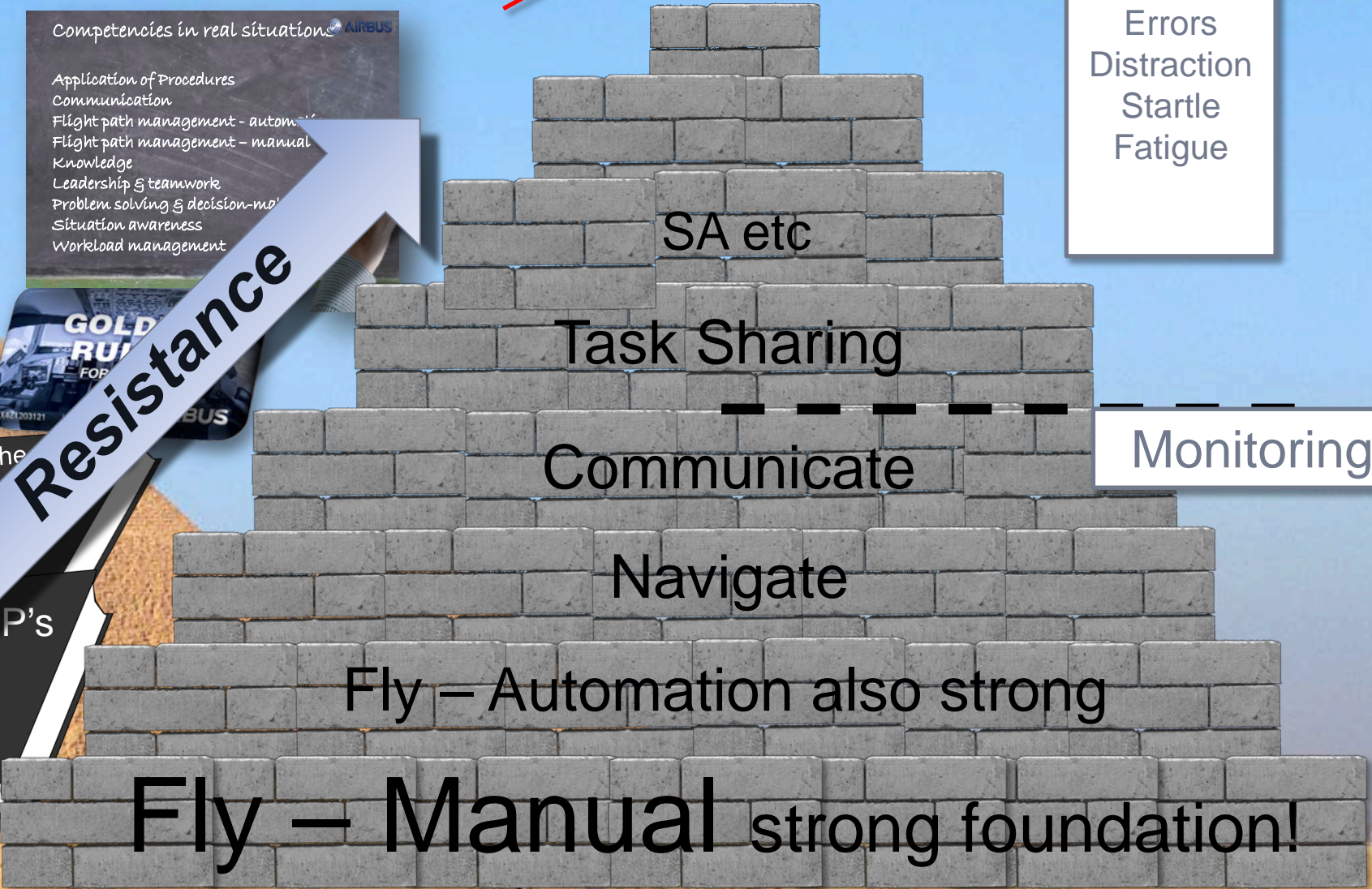
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Resistance



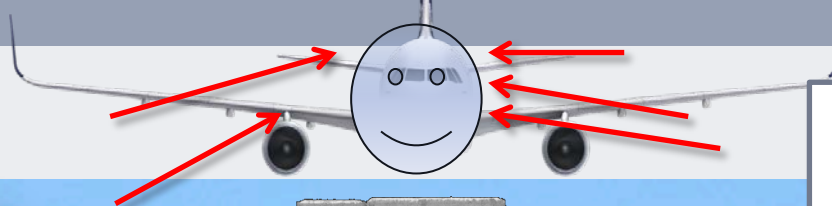
Ch...

OP's



Monitoring

Resilience



- Threats
- Errors
- Distraction
- Startle
- Fatigue

Competencies in real situation

- Application of Procedures
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- Flight path management - autom.
- Flight path management - manual
- Knowledge
- Leadership & teamwork
- Problem solving & decision
- Situation awareness
- Workload manage



Learn

SA etc

Task Sharing

Communicate

Navigate

Fly – Automation also strong

Fly – Manual strong foundation!

Monitoring

What is expected – Reaction in terms of Time and Decision Making

Hours

Minutes

Seconds

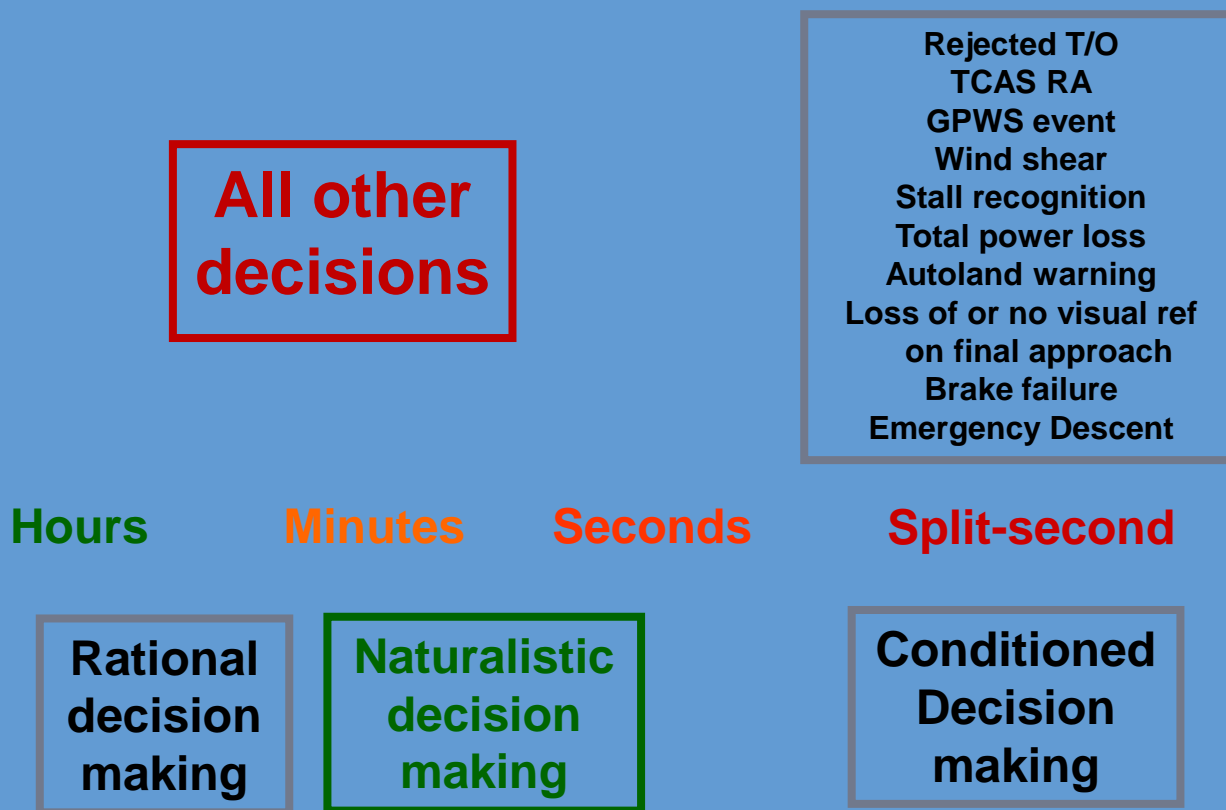
Split-second

**Rational
decision
making**

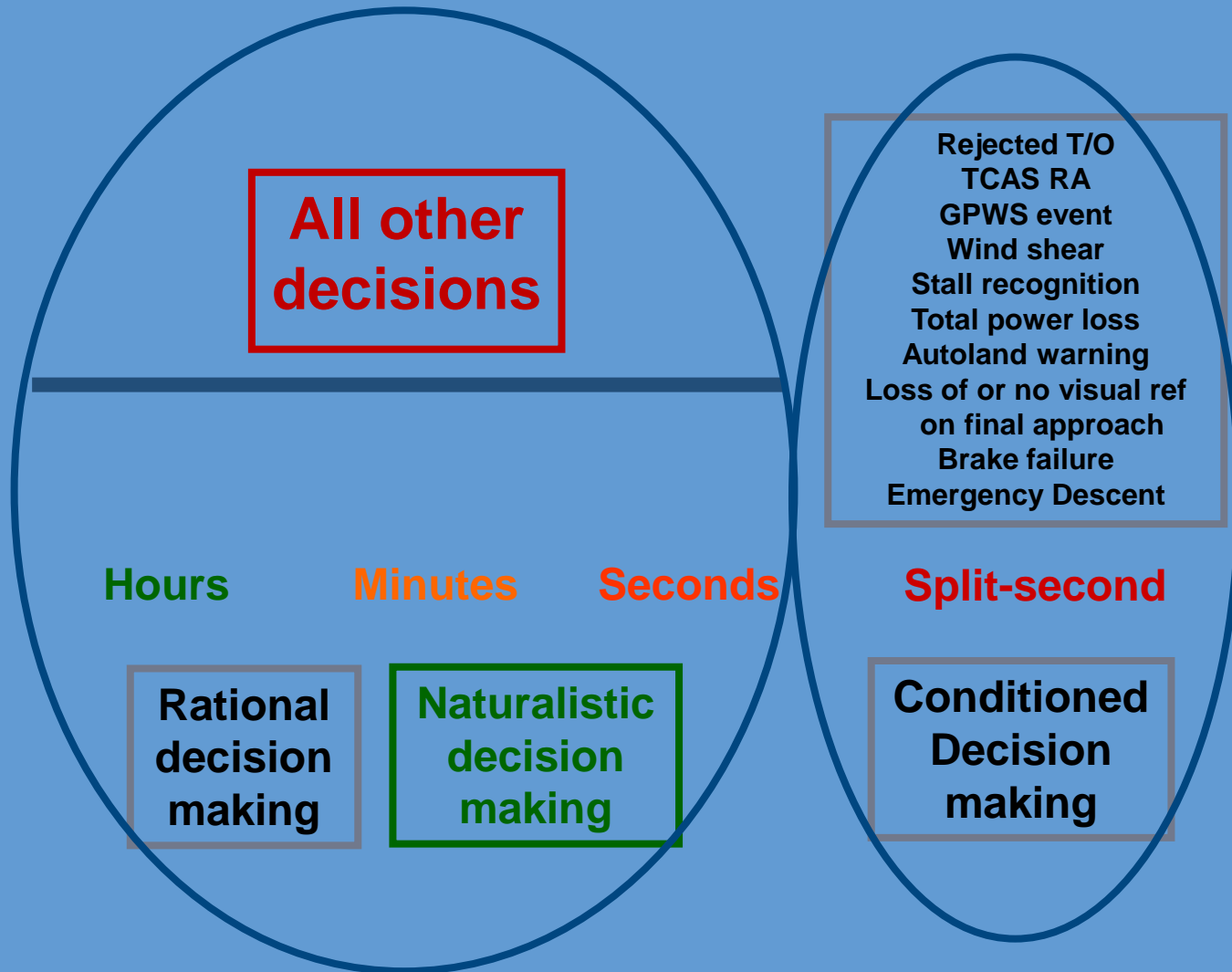
**Naturalistic
decision
making**

**Conditioned
Decision
making**

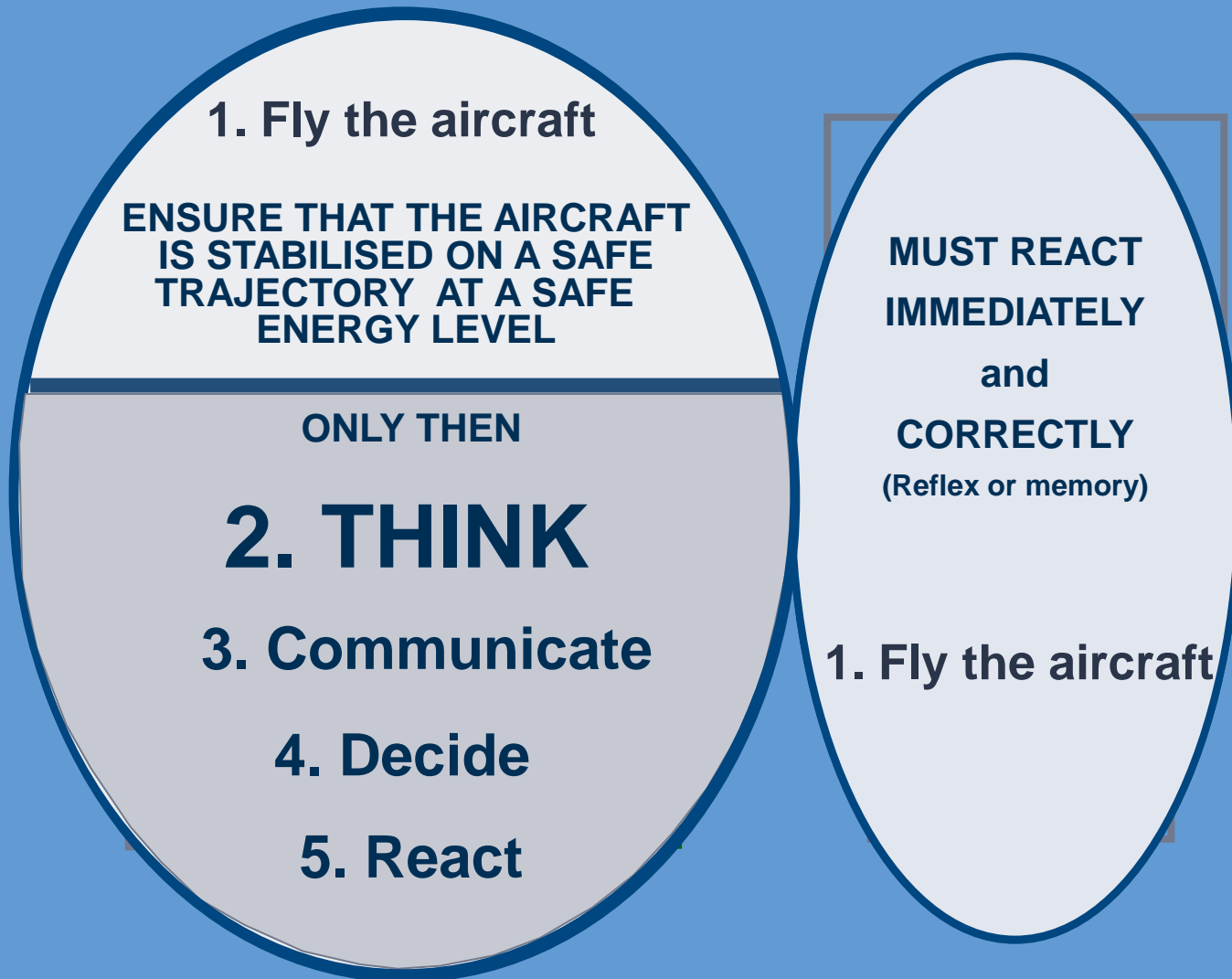
What is expected – Reaction in terms of Time and Decision Making



What is expected – Reaction in terms of Time and Decision Making



What is expected – Reaction in terms of Time and Decision Making



What is resilience?

“Resilience is the ability to, recognise, adapt, recover and learn from unusual or exceptional events”

(so as to be able to sustain an operational and safe state, now and in the future)

Pyramids - Resilient structures



Paradox of resilience

Avoid cascading
systemic failures

Return quickly to a
“normal” functional state

Resistance

V

Adaptation

Adherence to procedures
Checklist disciplines
Training
Control of “system1” behaviour
Application of those competencies

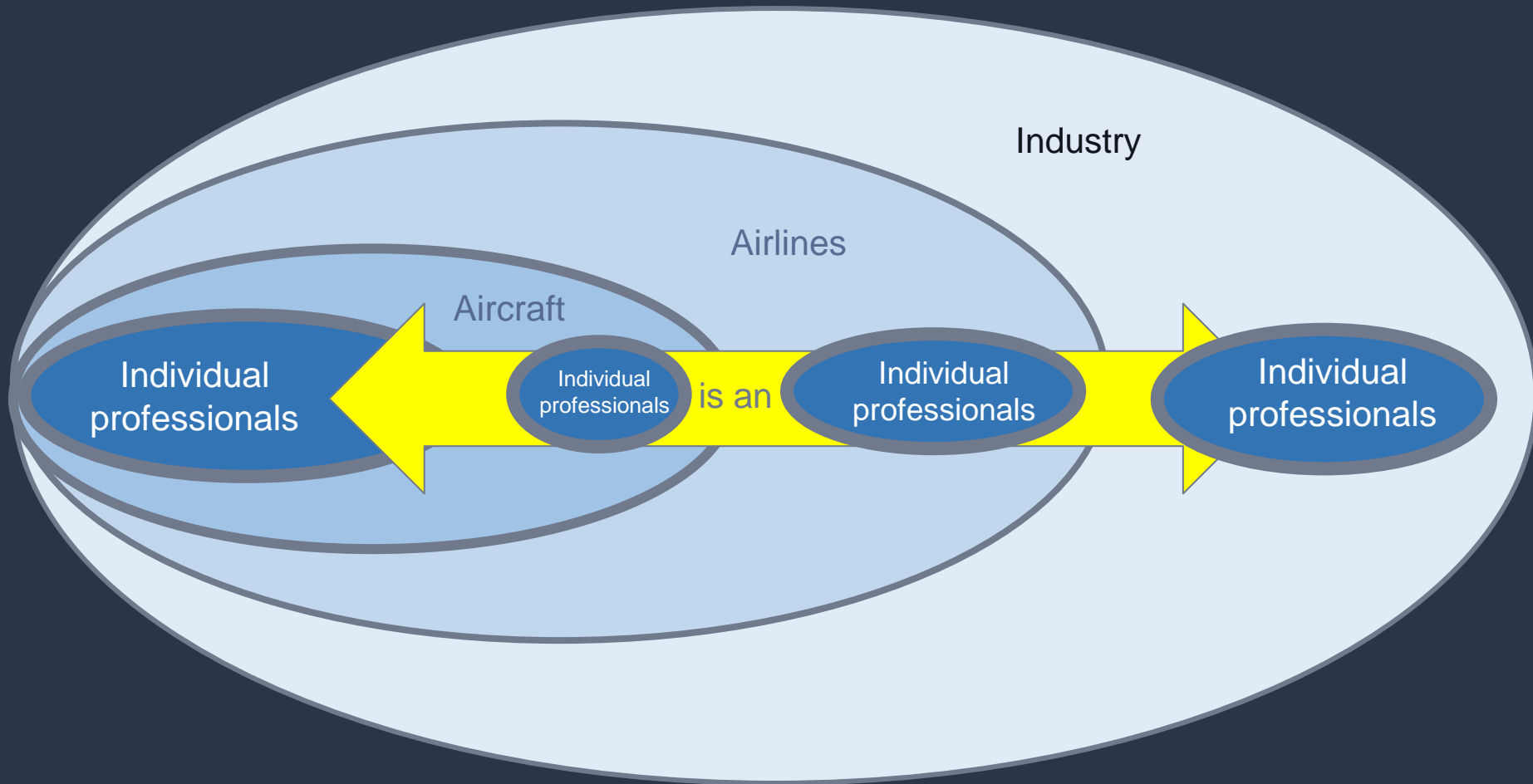
Assimilation of situation
Knowledge
Workload capacity
Flexible response
Use of best information



Minimise any disruption
recover and learn

We need to resolve this paradox

People - and Resilience



People - and Resilience

Individual
professionals
in one industry

Resilience is about people - it's a people "thing"

People --- Courage needed to make significant progress



Bernard Zeigler



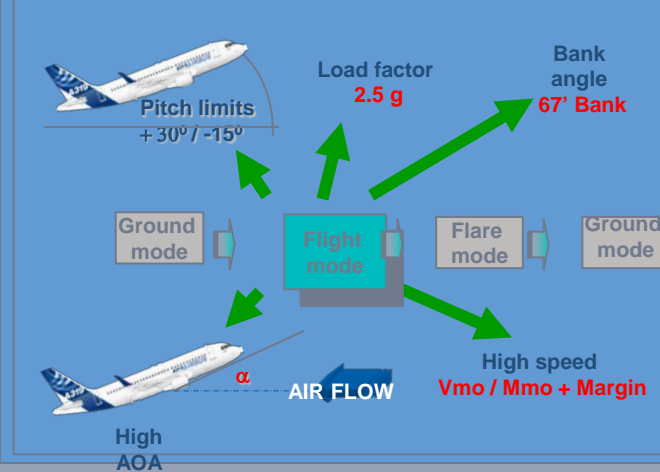
Gustav Whitehead



Jacques Rosay



Isambard Kingdom Brunel



Changing social scene

Are we seeking the fatal flaw in these changing behaviours—

Attitude to risk

"Celebrity culture"

Service "sucks"

Trial by media

Trust in software

What home telephone?

"My rights" not "my responsibilities"

Safety Culture

The “Sir Charles Hadden-Cave QC” report to the House of Commons on the Nimrod accident in Afghanistan made responsibilities very clear. It was entitled:

“A FAILURE OF LEADERSHIP, CULTURE AND PRIORITIES”

He named and shamed 10 senior individuals who in his view carried direct and indirect responsibility for the accident

e.g. Mr Haddon-Cave criticised a General ---- “He should have realised it could come at the expense of safety and airworthiness”,

e.g. .Mr Haddon-Cave accused a Group Captain of a "fundamental failure of leadership" in drawing up the "safety case" into potential dangers in the fleet.



Safety Culture - The role of leadership



Paul O'Neil
CEO of ALCOA
1987 to 2000

From his first day he focused on 1 policy

Worker Safety

He made Safety the No 1 item on every managers agenda

He demanded notification of every incident within 24 hrs

He took personal responsibility for all injuries to his people

“to disrupt a habit”

He prioritised Safety and used
data to achieve his objective

Safety Culture - The role of leadership



ALCOA 1986		ALCOA 2000	
1/3 rd US incident rate		1/20 th US incident rate	
Net Income	264 M	Net Income	1.6 B
Sales	4.6 B	Sales	22.9 B
Employees	35,700	Employees	140,000
Mkt Cap	2.9 B	Mkt Cap	29.9 B

In his view, his greatest achievement was to leave a resilient legacy of safety

A safety minded culture.

Safety Culture - The role of leadership

He has three questions for people in organisations that aspire to greatness:

1. *“Are you treated with dignity and respect by everyone you encounter?”*

2. *“Are you given the things you need, so that you can make a contribution that brings meaning to your life?”*

3. *“Do you get recognised for what you do?”*

“Greatness” implies a truly resilient organisation

Safety Culture -- Another courageous senior executive



Cynthia Carroll

Nearly 200 deaths in 5 years
She unilaterally closed the worst mine
5000 miners were brought to the surface
Re-trained 30,000 workers

Working with the government and the workers unions, she set a new standard for mining safety in South Africa

By 2011 the death rates in Anglo American had dropped by 62% and the wider industry rates had dropped by 25%

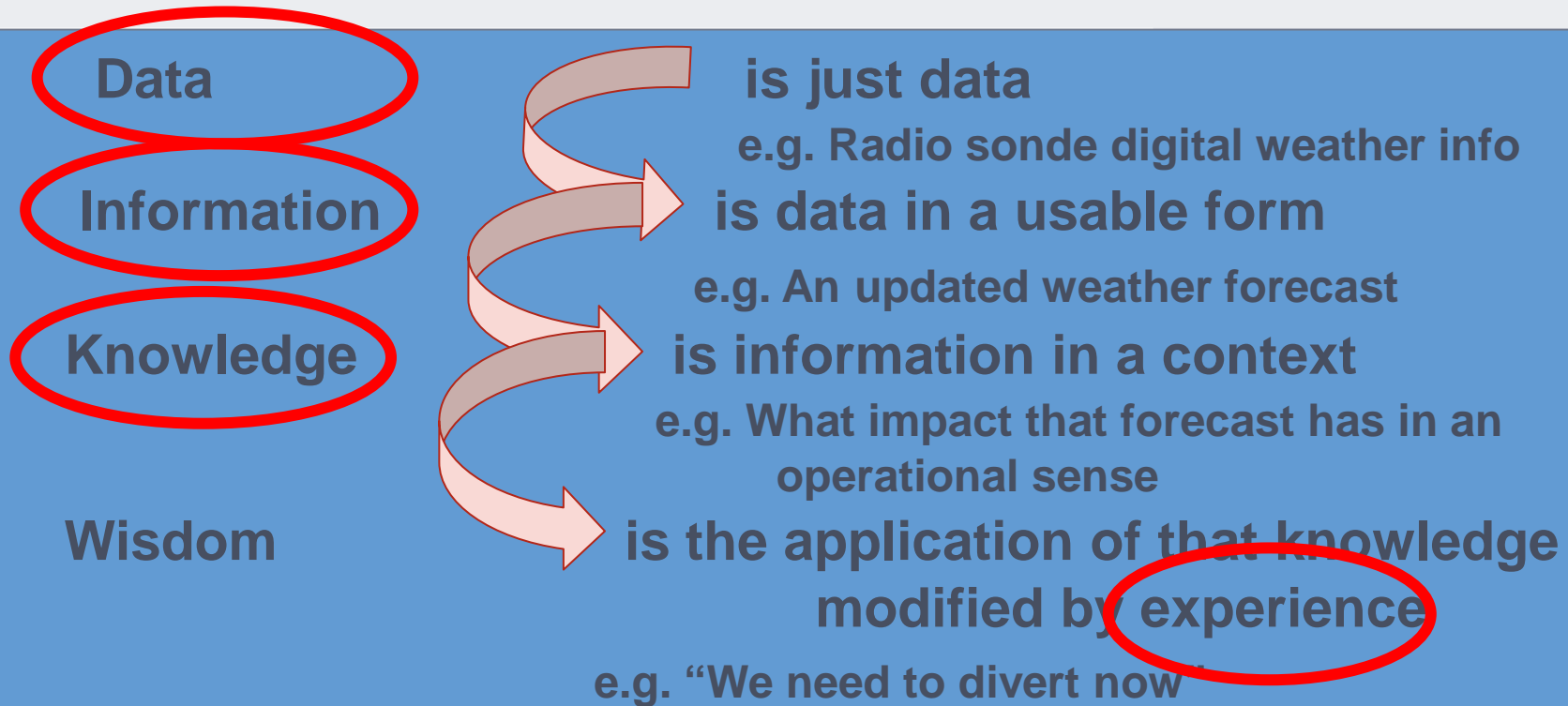
Her goal – zero harm to every worker

She prioritised Safety and used data to achieve her objective

People - Small signals, big results



Data - making use of data as a “value chain”



We have to capture and share data, information, knowledge and experience

How successful we are at capitalising on it's value will be a major factor in preventing the fatal flaw

Data - and safety resilience

- People:

Leadership : Culture : Ownership : Commitment

- Process :

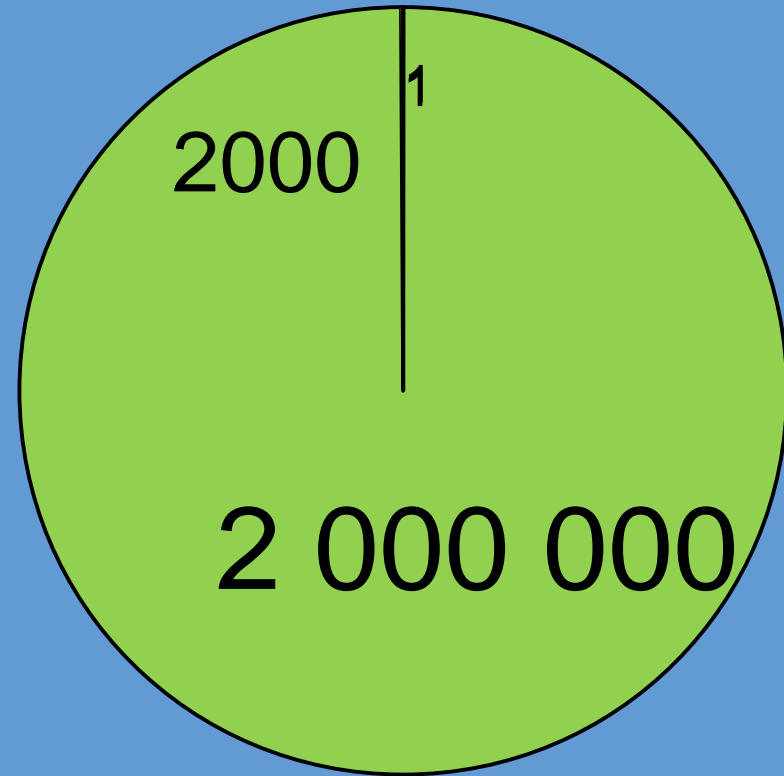
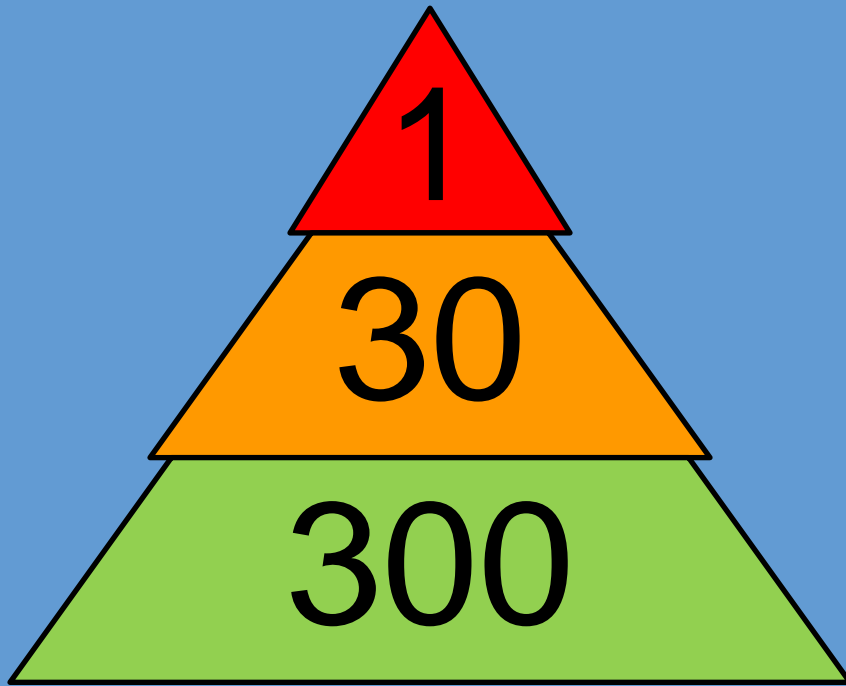
Avoidance : Stabilisation : Recovery : Learning

- Data - Information – Knowledge - Wisdom

- Sharing and communication

As we get better, the challenge will become more severe

Data - The imperative to learn from Best Practice



Use data to learn from positive behaviours and events

Gaining a broader view



Let's look at the build up to Eyjafjallajokull



Let's look at the build up to Eyjafjallajokull

1982 BA9
4 engine
failure due to
ingestion of
volcanic ash
Indonesia

New ash dispersion
model
UK

Engine efficiency
Greater "sensitivity" to ingested substance
Various locations

Volcanic activity monitoring

1989 KLM 867
4 engine
failure due to
ingestion of
volcanic ash
Alaska

Eruption

2010

1982

2010

Let's look at the build up to Eyjafjallajokull

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NO FATALITIES

New ash dispersion
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LOCALLY KNOWN

Engine efficiency

Greater "sensitivity" to ingested substance

Various locations

Volcanic activity monitoring

"We are Scientists"

1989 KLM 867
4 engine
failure due to
ingestion of
volcanic ash
Alaska

NO FATALITIES

Eruption

2010

I suspect that there will be more issues of this sort in the future

1982

2010

One industry, one set of objectives ?

Harmonised solutions

Longer term plans

“Balance” of pace

Wider industry needs must “trump” local issues

Maximise learning opportunities

Establish a globally accepted “just culture”

The industry must progressively work towards one set of agreed safety objectives

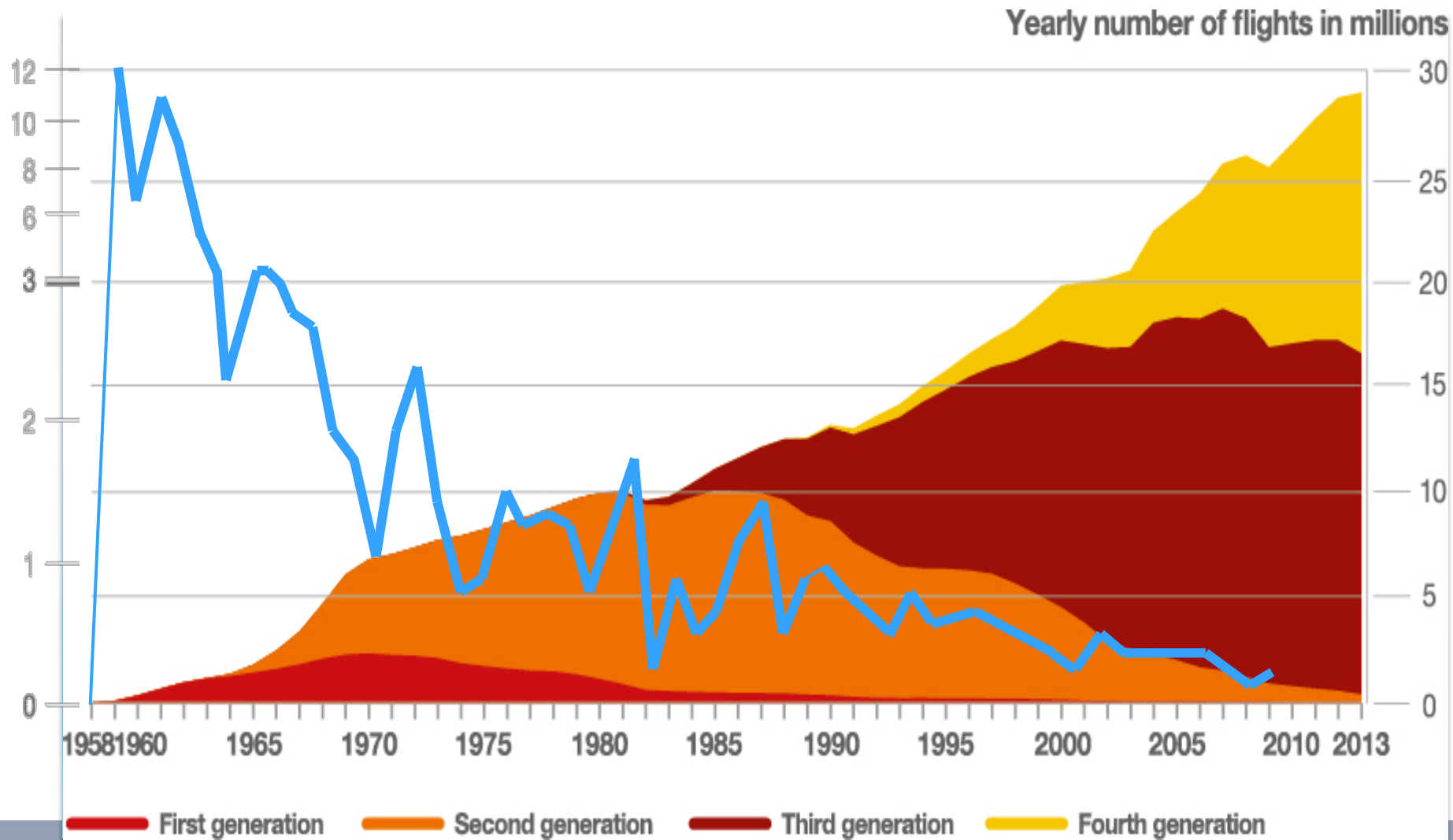
One industry, one set of objectives ?

Tear the walls down



Growth and Capacity

Yearly fatal accident rate per million flights



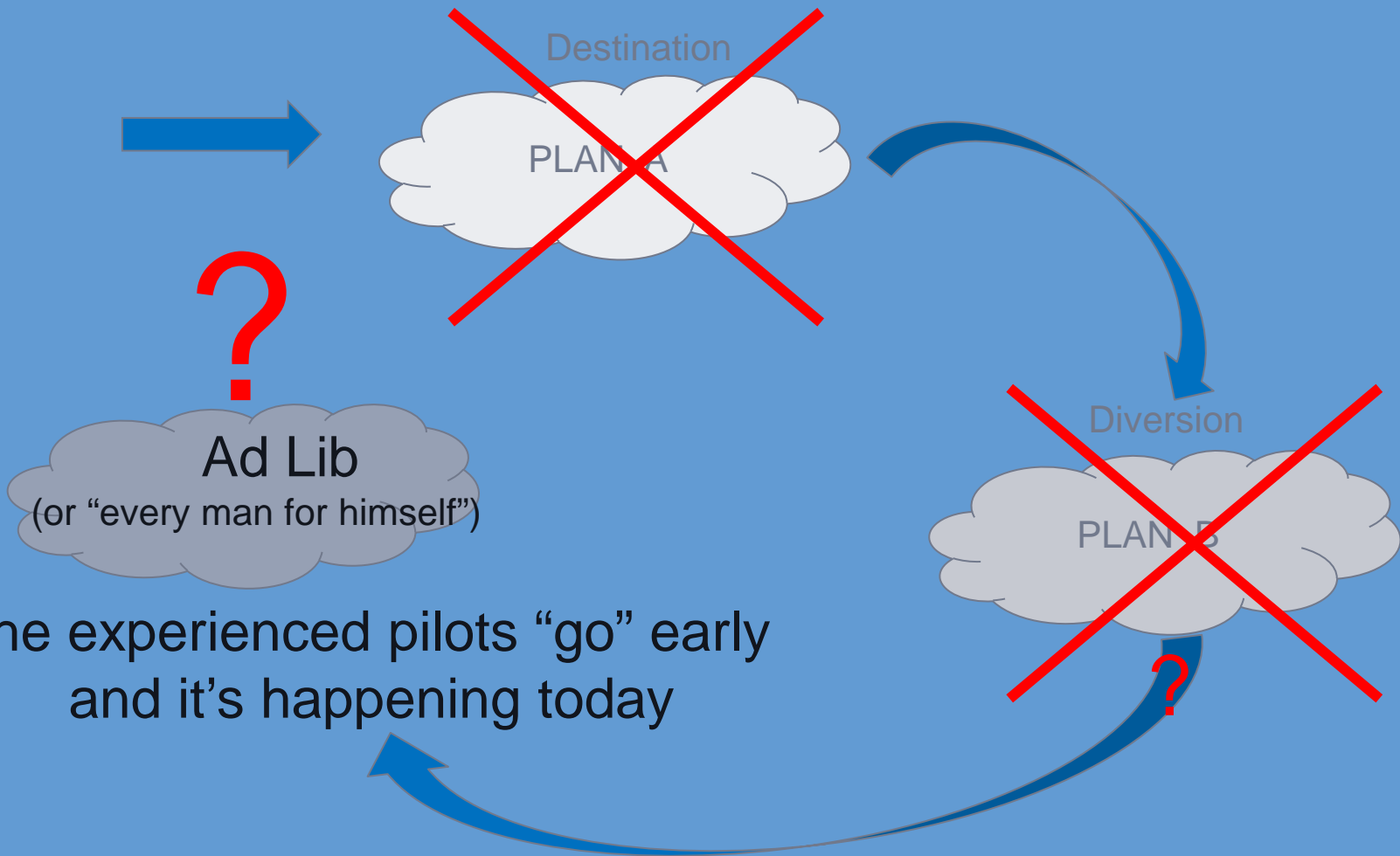
Growth and capacity



Getting it wrong

**Getting it right?
Or wrong!**

Growth and Capacity - An example - Multiple diversions



The experienced pilots “go” early and it’s happening today

Growth and Capacity -- Make your assets sweat !!

Capacity is also being consumed by “efficiency” policies

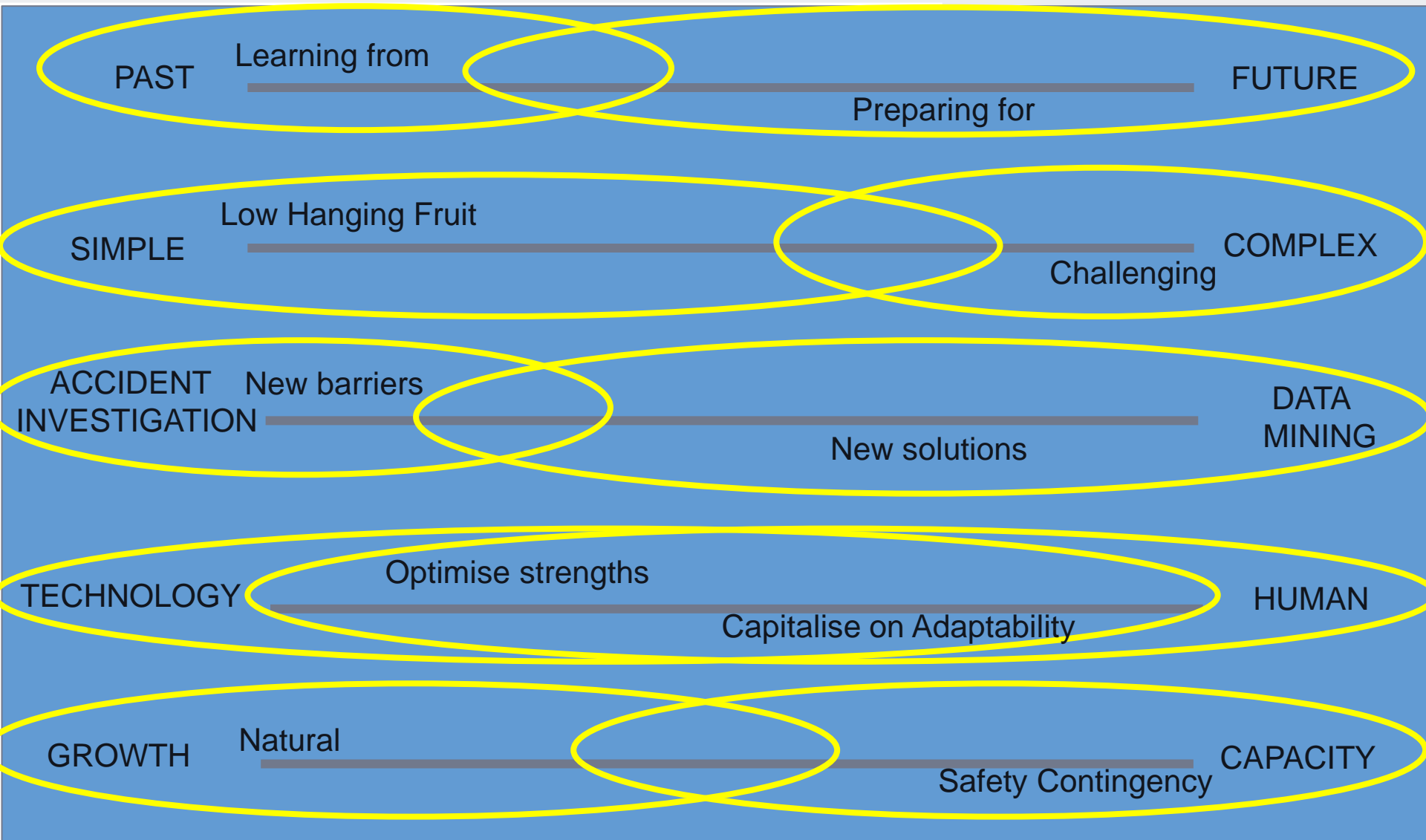
But is safety contingency capacity fully considered and regulated ?



So where will we find that fatal flaw?

- **Not having one set of agreed global safety objectives**
- **Failing to secure industry wide resilience through “people focused” safety culture change**
- **Failing to handle data in a consistent industry wide manner**
- **Inability to manage growth versus capacity properly**
- **Driving for “efficiency” without safety contingency**
- **Not taking into account those changing social attributes**
- **Having too narrow a view**
- **Not taking seriously the security threat – now !**

The need for a "balanced" approach



To minimise the risk associated with that fatal flaw

- **Beware the “innocence” of software**
- **Capitalise on human adaptability**
- **Emphasise the value of “listening”, really listening**
- **Make learning and particularly teaching “cool”**
- **Make progress through small ideas or many small steps**
- **Develop our leadership skills**
- **Develop “first and second follower” skills**
- **Move towards “we”, not “me” thinking**
- **Develop “groups” inside airline rostering systems – build teams**
- **Achieve balance**

Paul O'Neil also said ...

“ We are not going to budget safety”

and finally

***“Safety should never be a priority –
it should be a pre-condition
.....It's like breathing”***

“Mens agitat molum”

Thank you for
listening to me

