

Procedures and Human Work

The Varieties of Human Work

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Senior Specialist Safety & Human Factors

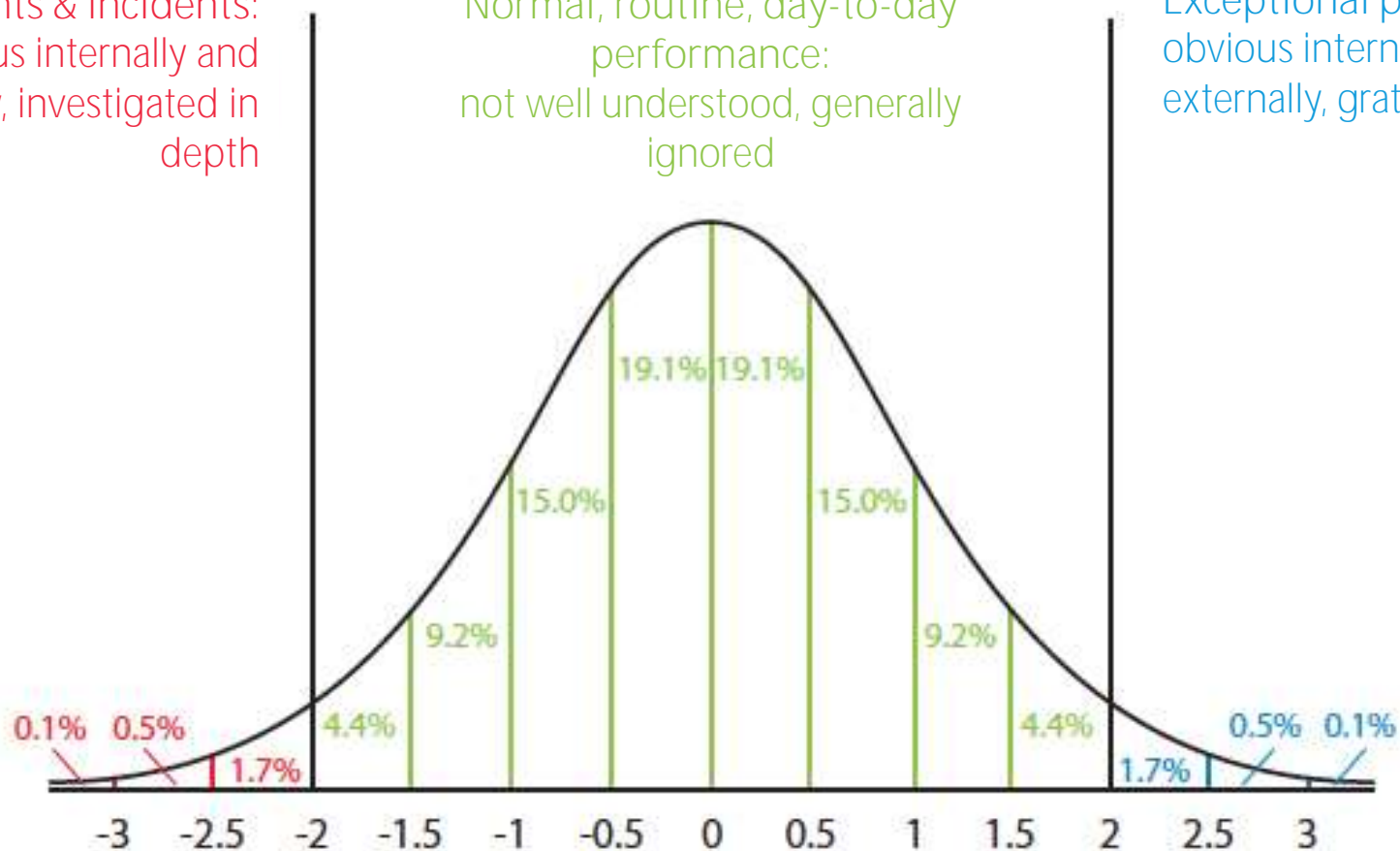
Network Manager Safety Unit

EUROCONTROL Safety Forum, 4-5 June, Brussels

Accidents & incidents:
obvious internally and
externally, investigated in
depth

Normal, routine, day-to-day
performance:
not well understood, generally
ignored

Exceptional performance:
obvious internally, hard to see
externally, gratefully accepted



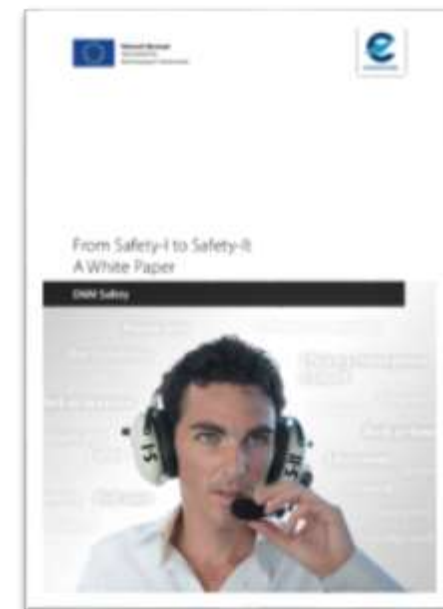
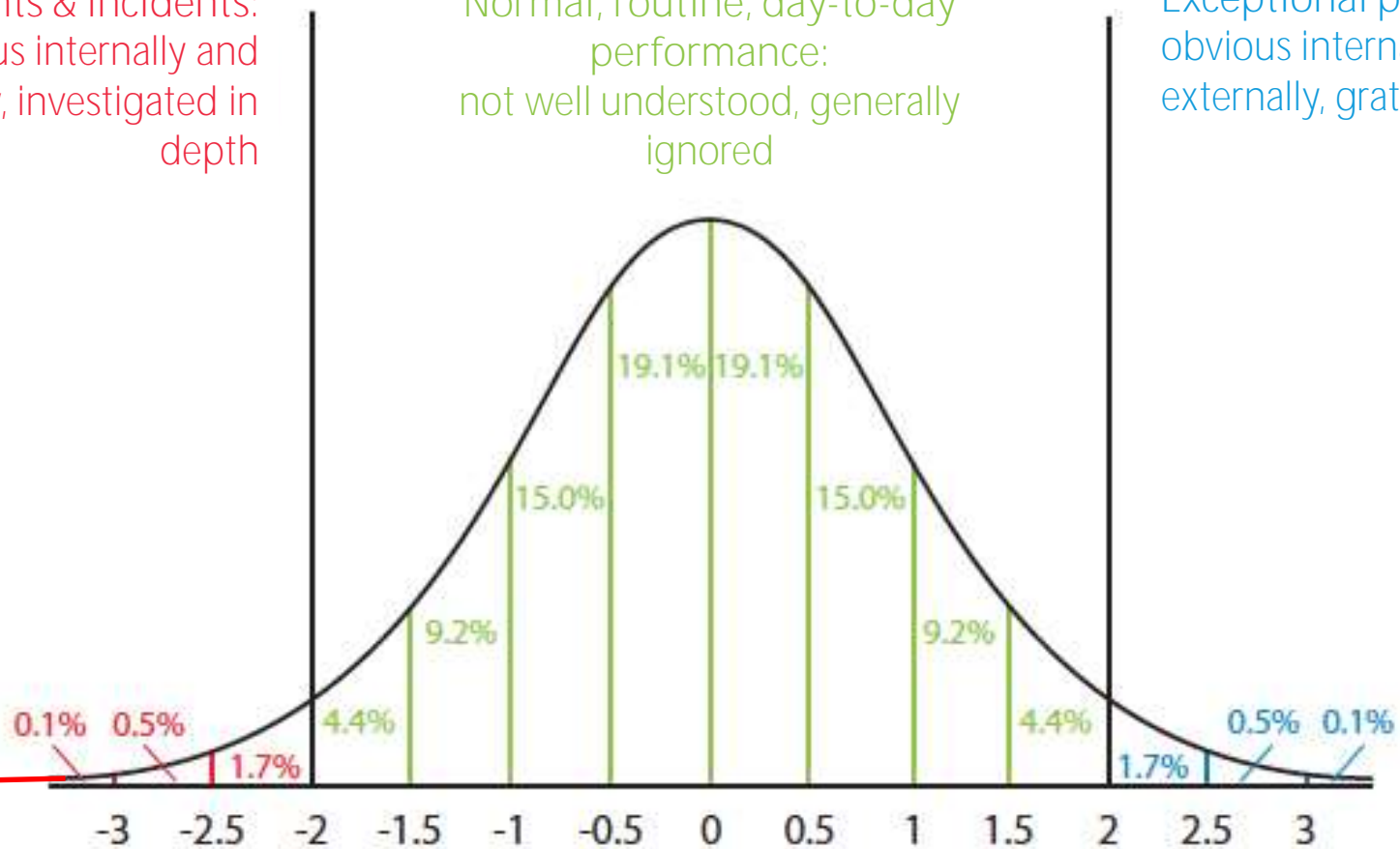
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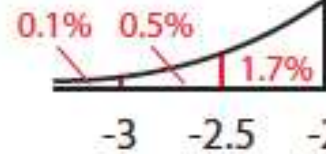
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externally, gratefully accepted

Commercial Aviation

<0.0001%



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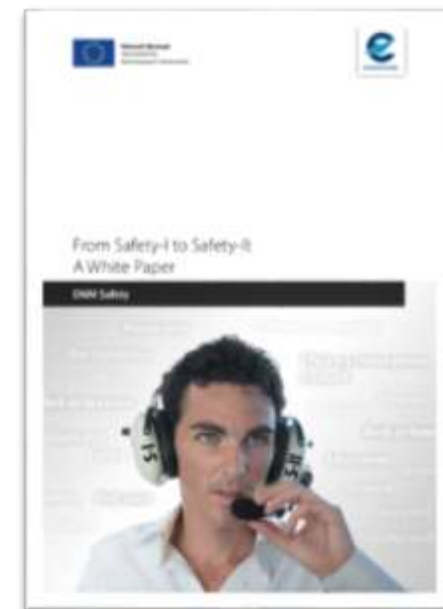
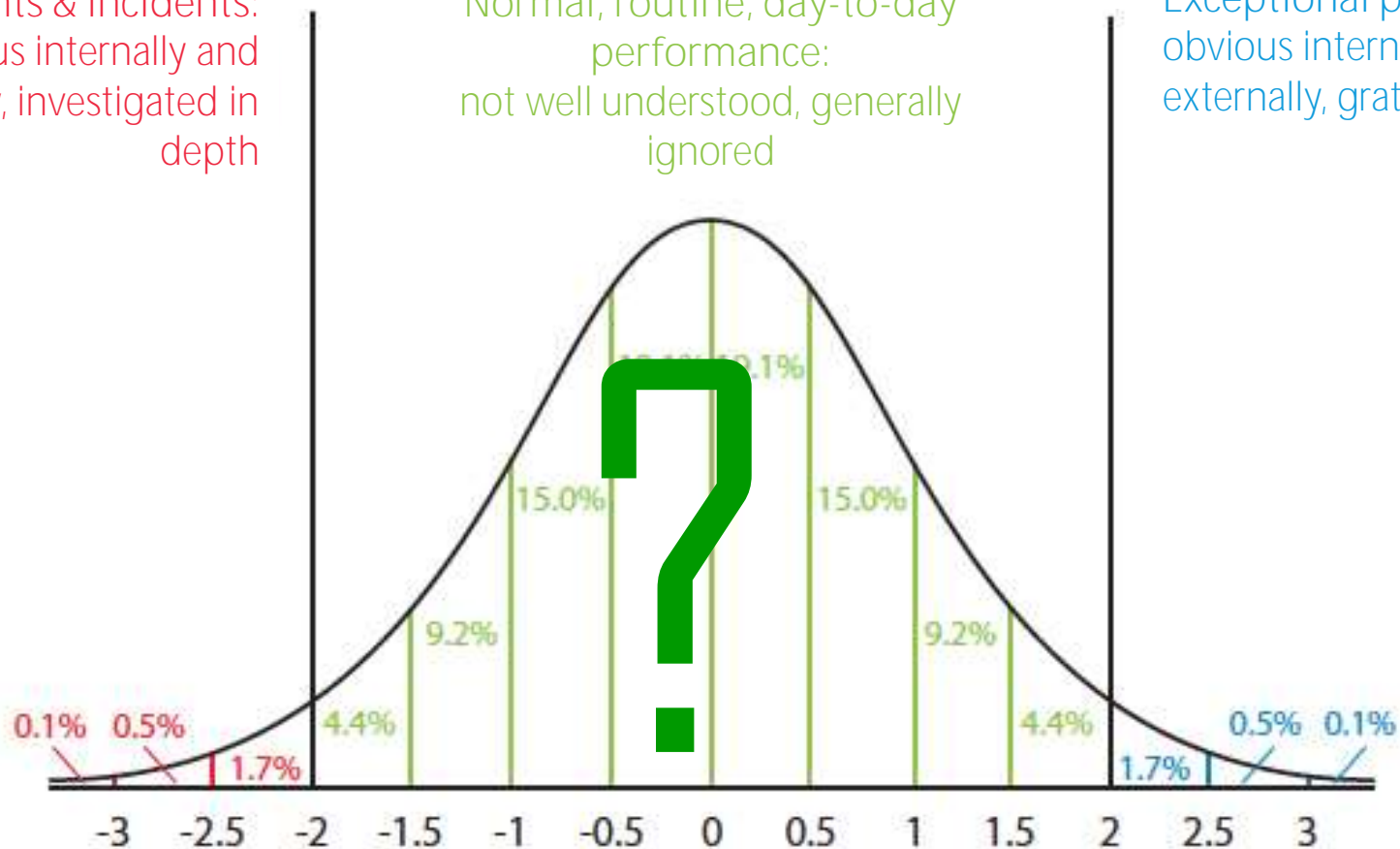


Errors
Unsafe Acts
Failures
Deviations
Violations
Non-compliance
Carelessness
Recklessness

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Effective-as-designed?

Effective-as-operated?

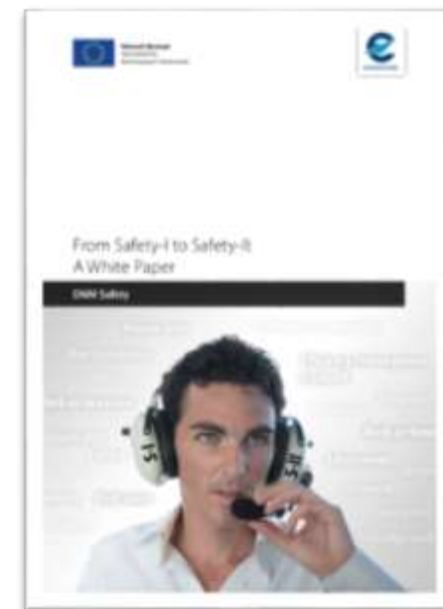
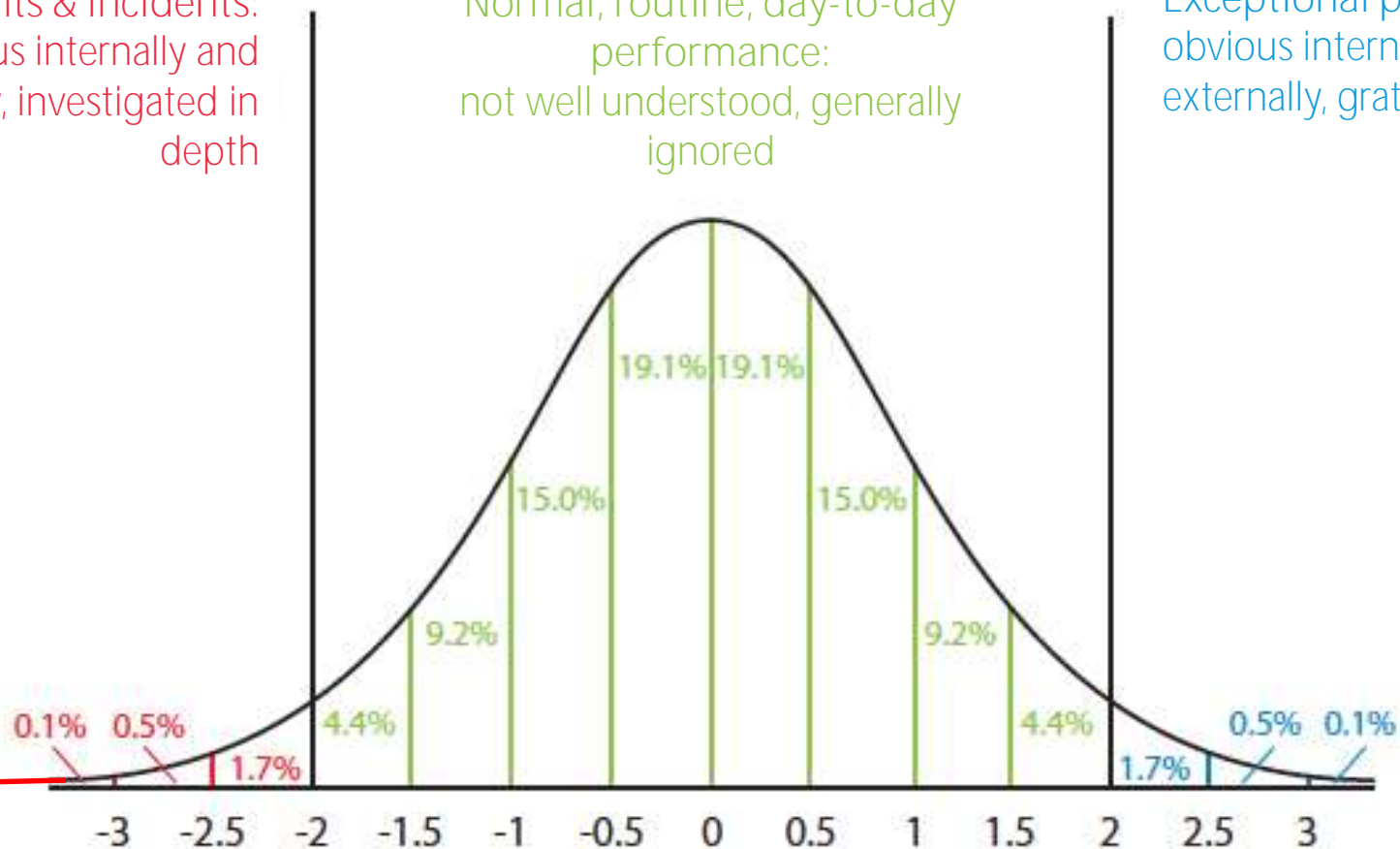
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Commercial Aviation

<0.0001%



ATCOs	Rank	
C15 We are sufficiently involved in changes to procedures.	3	
B18 Changes to the organisation, systems and procedures are properly assessed for safety risk.	11	
C08 I receive sufficient safety-related refresher training.	12	
C07r We often have to deviate from procedures.	15	
B27 Other people in this organization understand how my job contributes to safety.	16	
C19 The procedures associated with my work are appropriate.	16	
C14r I often have to take risks that make me feel uncomfortable about safety.	18	
C11 Adequate training is provided when new systems and procedures are introduced.	20	
C04 The procedures describe the way in which I actually do my job.	32	
C20 I have sufficient training to understand the procedures associated with my work.	43	

A person is shown from the side, working on a network switch. The switch is a black rack-mounted unit with many ports. Numerous yellow Ethernet cables are plugged into the ports, and the person is using their hands to manage the cables. The background is dark and out of focus.

THE VARIETIES OF HUMAN WORK

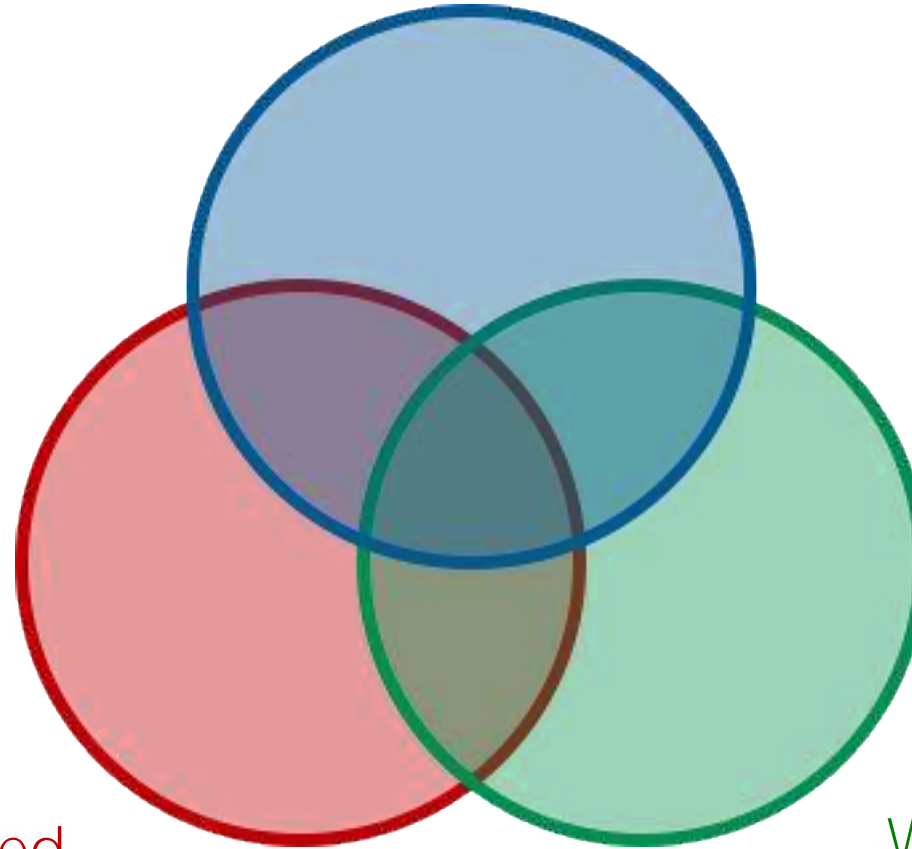






Work-as-Done

Work-as-Disclosed
Work-as-Observed
Work-as-Simulated
Work-as-Analysed
Work-as-Measured
Work-as-Judged

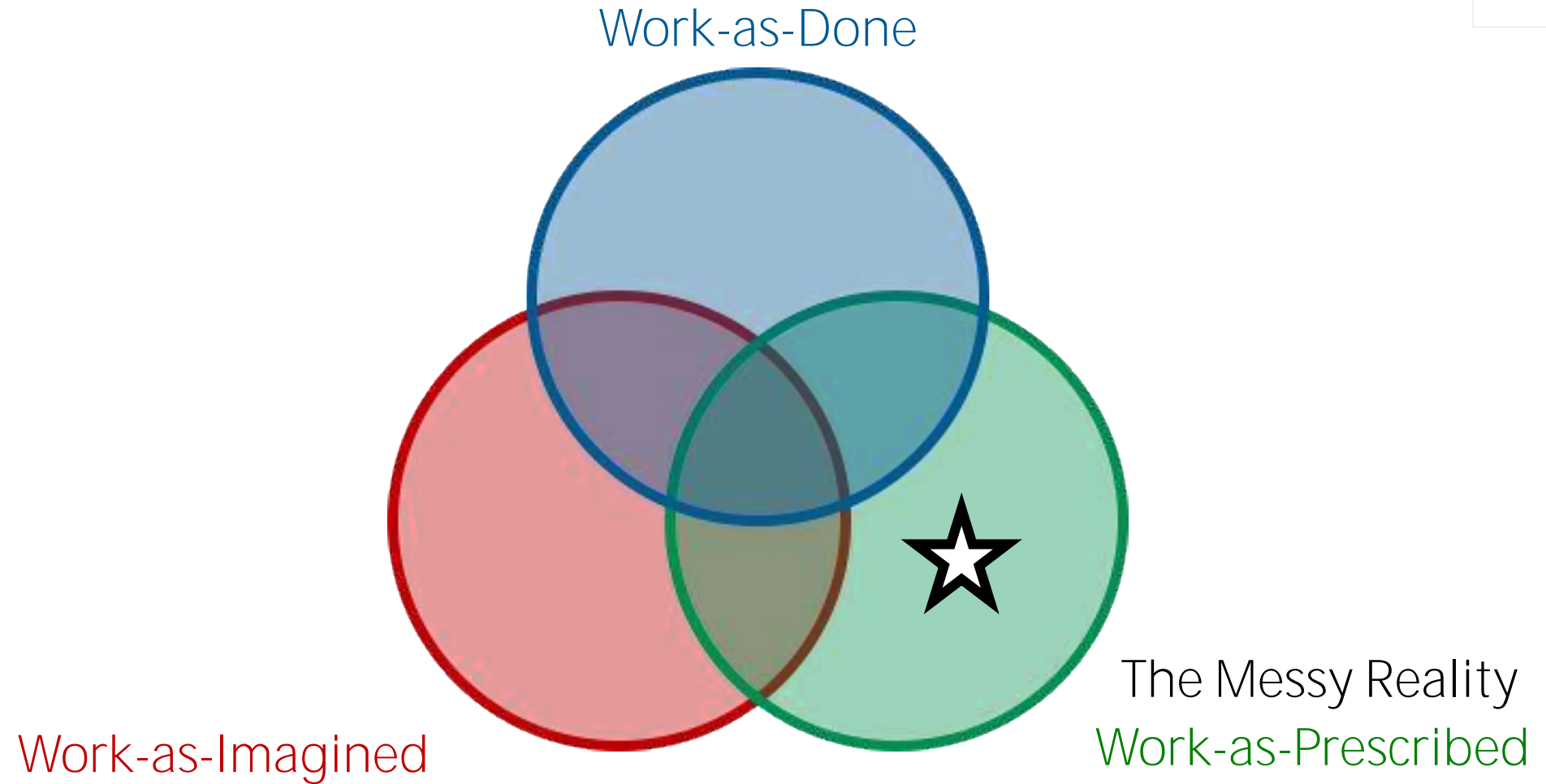


Work-as-Imagined

Work-as-Prescribed

THE ARCHETYPES OF HUMAN WORK





“ Tell me about a situation where **work-as-done** is **not as-prescribed** and usually not **as-imagined** by others ”

USE OF MODE S DURING LOSS OF FLIGHT DATA

A1000
DLH3VA
370 -

A0560
EZY2383
350 -

A0126
DLH928
351 ↓ 28

A1000
SIA25
400 - N

A0565
NJE682A
301 ↑ 41

A1000
DLH445
390 - N H

A0543
EZY391G
337 ↑ 35 H
37

A0514
BMA161
387 ↑ 39

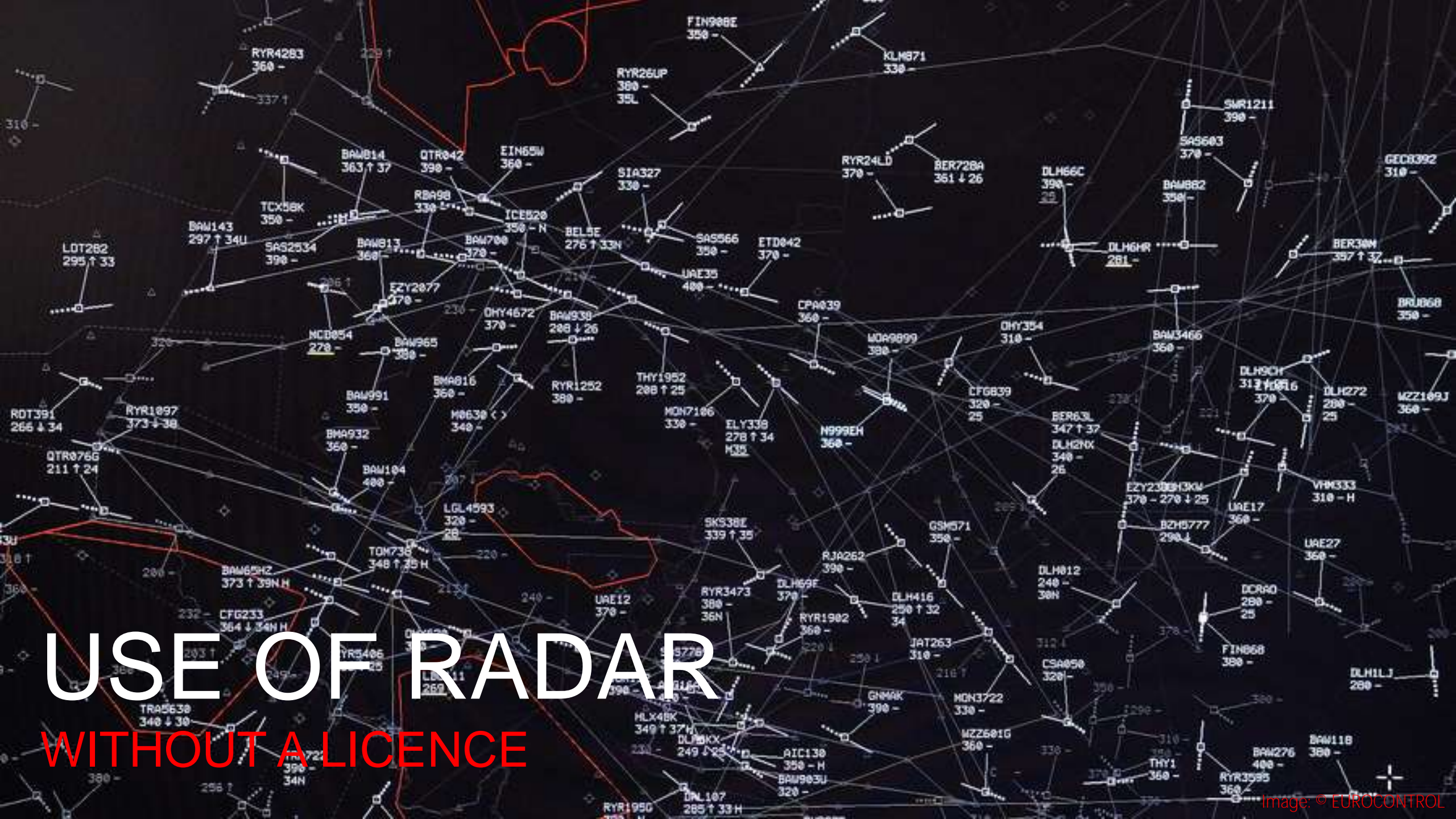
A1000
UAL50
400 -
37XN

A1000
DLH8MC
390 -

A1000
DLH5AC
370 -

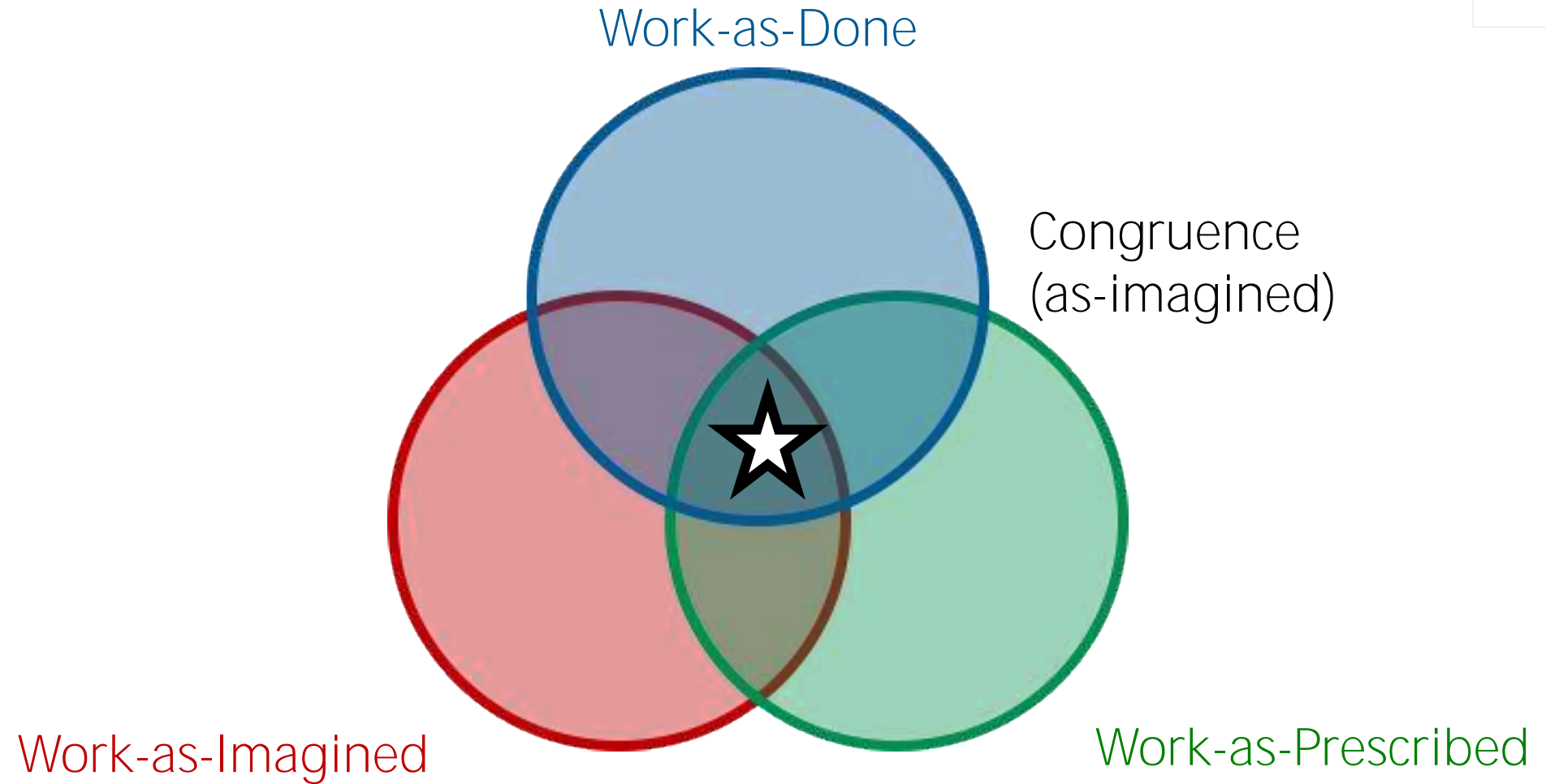
A2036
N888VS
470 -

A1000
DLH6U
330 - N



USE OF RADAR

WITHOUT A LICENCE



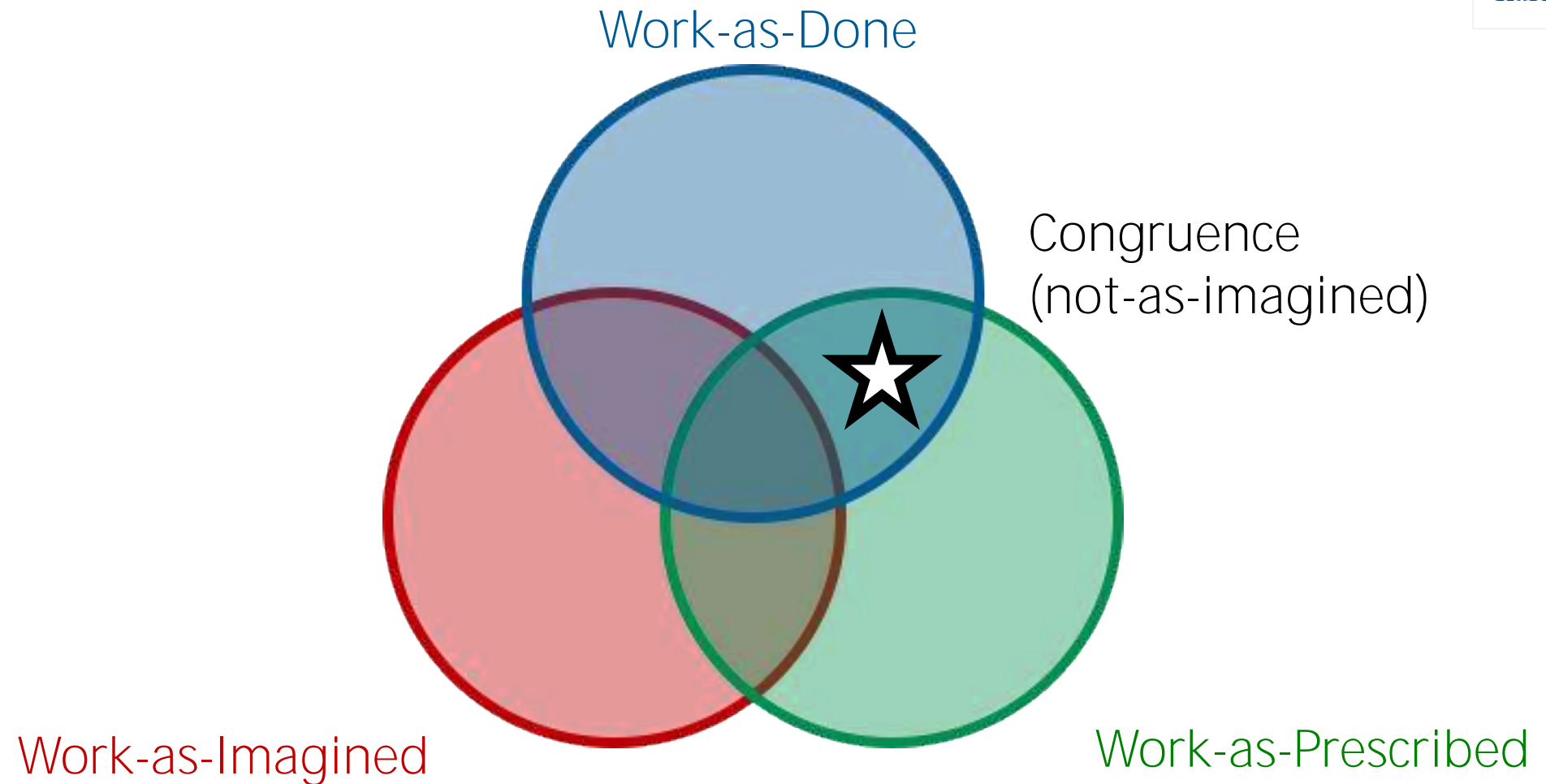
“

Tell me about a situation where **work-as-done** is **as-prescribed** and **as-imagined** by others.

”



STANDARD OPERATING PROCEDURES



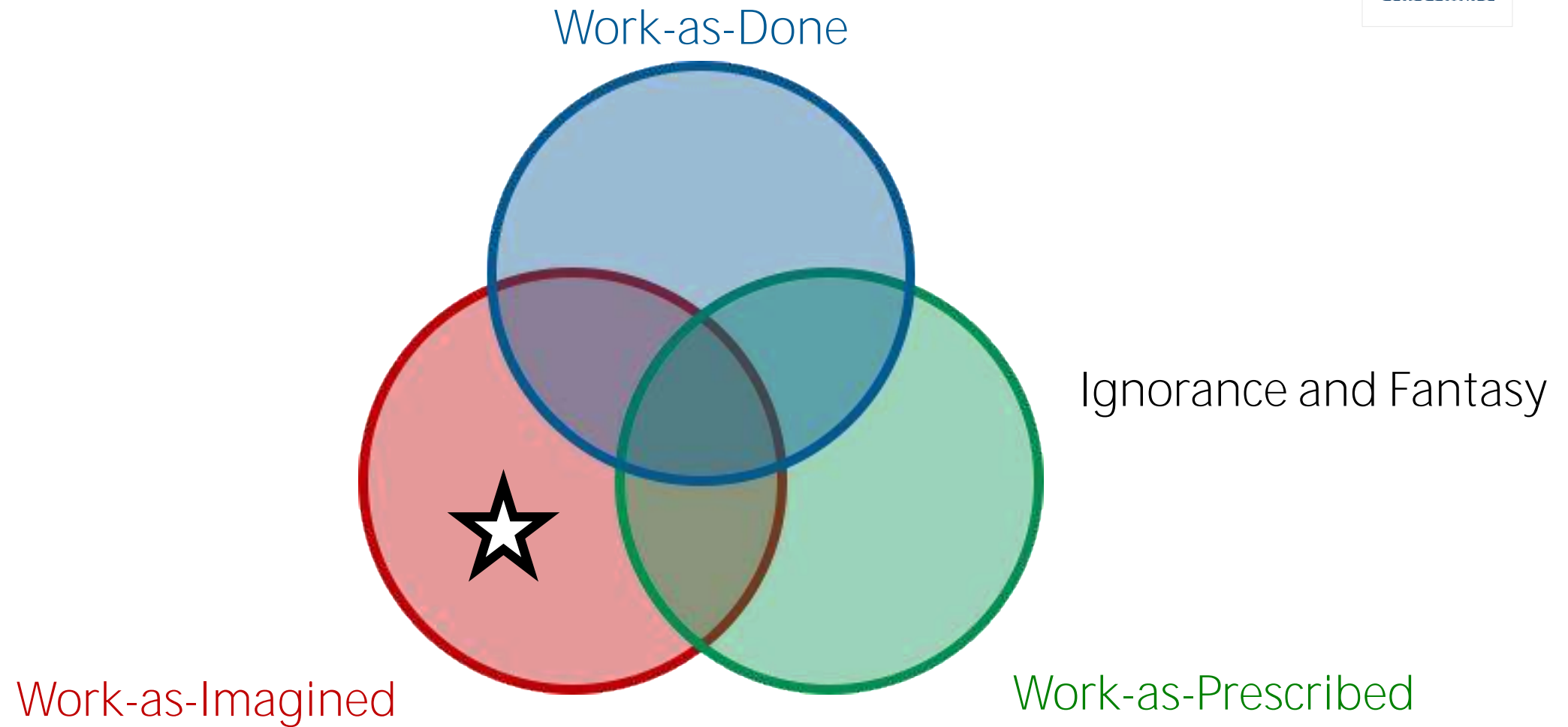
“ Tell me about a situation where **work-as-done** is **as-prescribed** but **not as-imagined** by others. ”

STANDARD PRESSURE SETTING



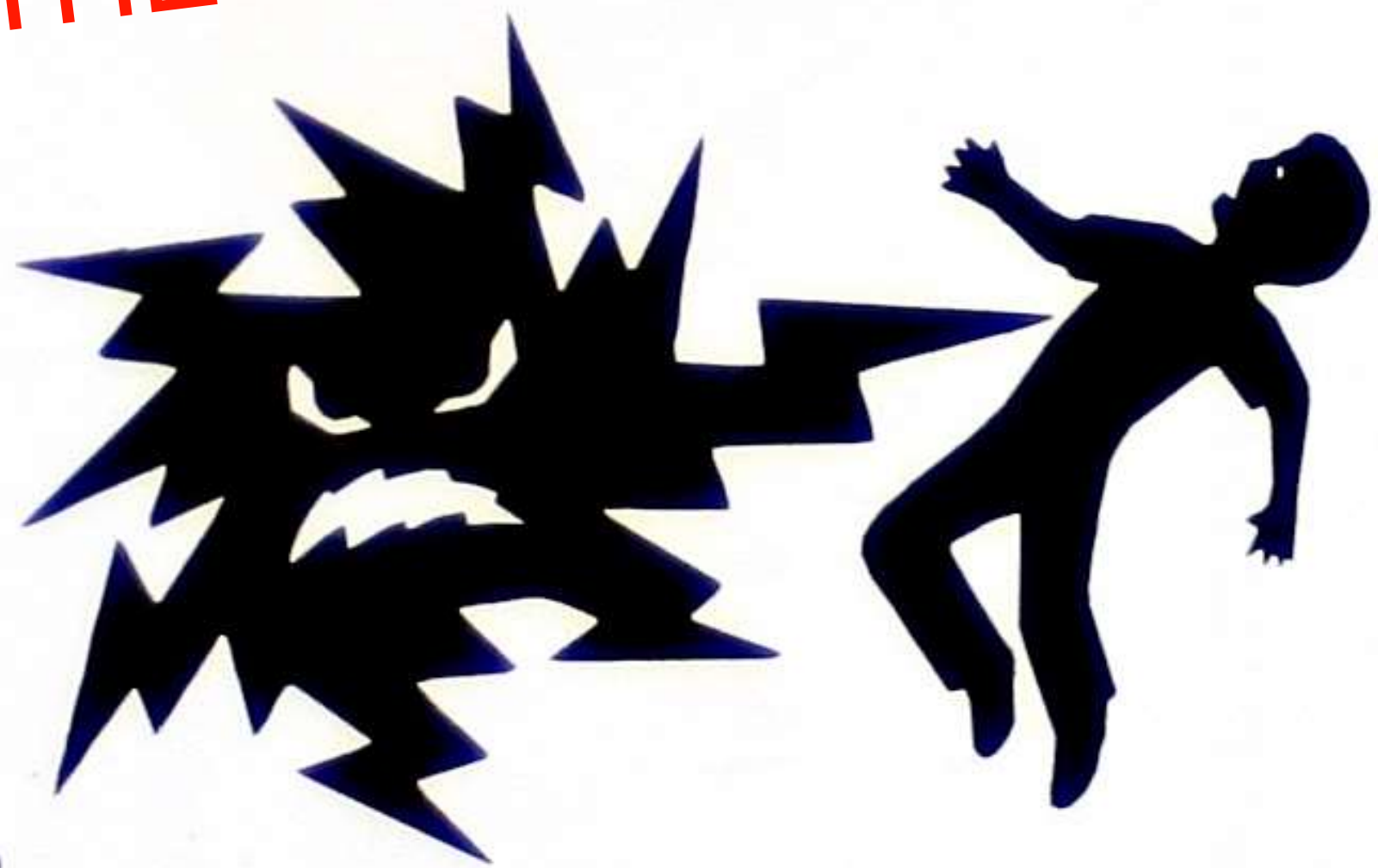
TRIPLE DOUBLE SHIFTING





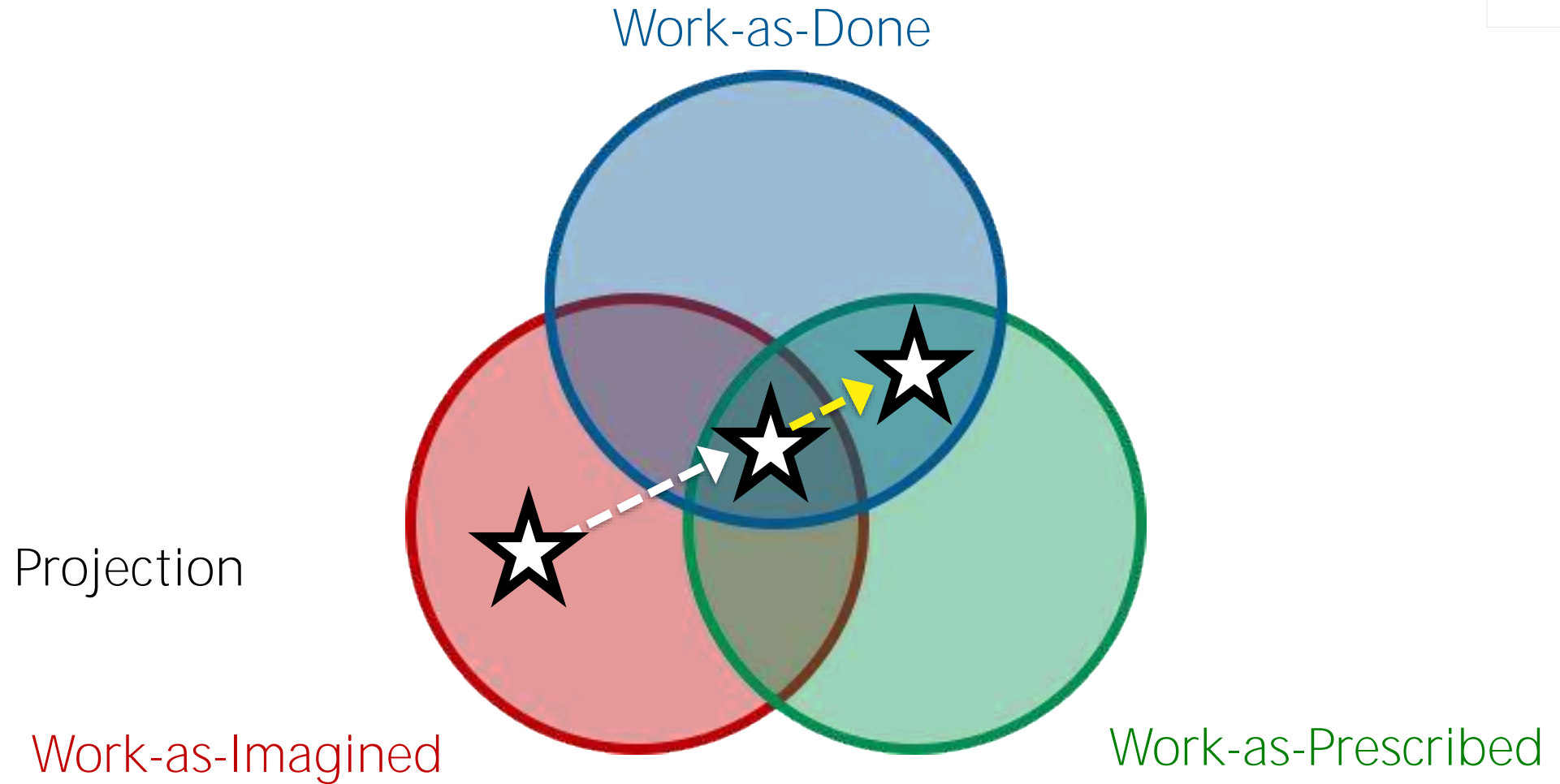
“ Tell me about a situation where current **work-as-imagined** is not **as-done** ”

THE LIGHTING CIRCUIT



**Hazardous voltage
inside.
Can shock, burn
or cause death.**

**Keep out.
If open or unloose,
immediately cut
power.**

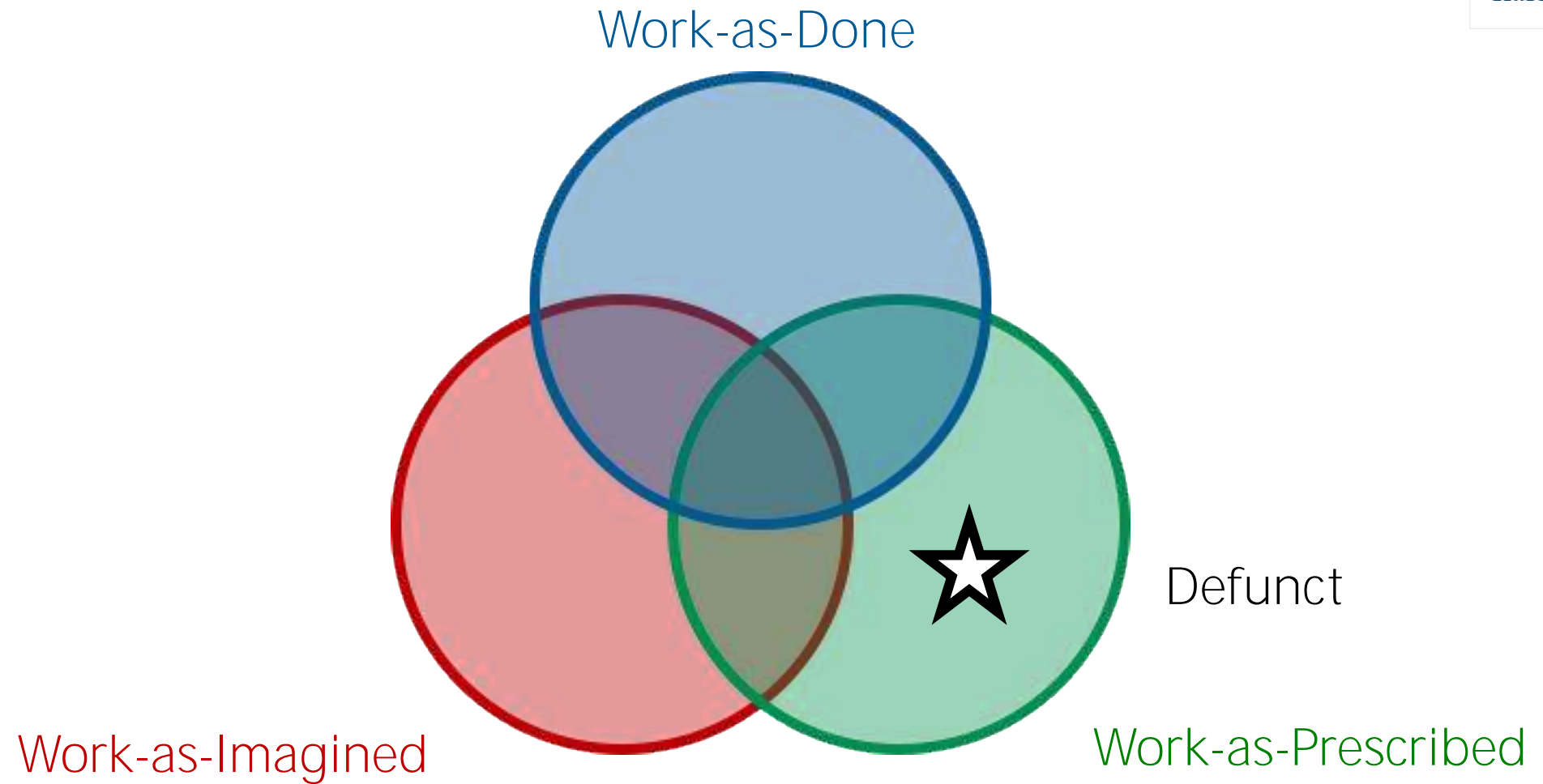


“ Tell me about a situation where **work-as-imagined** was projected into the future. It may or may not be as-done ”

AFTER

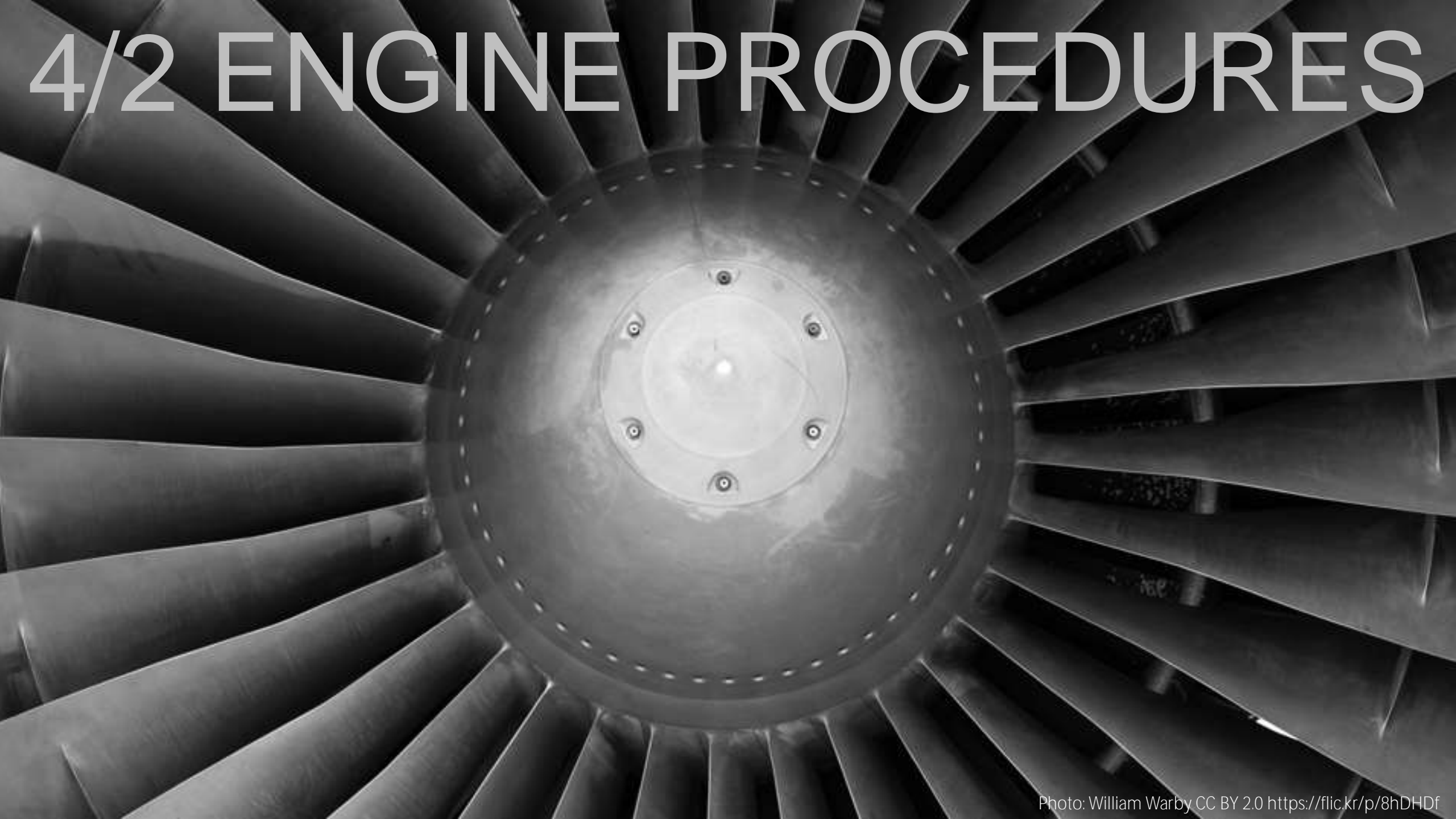
THE RUNWAY INCURSION





“ Tell me about a situation where **work-as-prescribed** is not **as-done**

”



4/2 ENGINE PROCEDURES





UNDERSTANDING

1. Psychological safety must be cultivated to really understand work-as-done
2. Work must be understood in terms of local rationality - why the things we do make sense at the time
3. Protection is required for the goodwill use of creative expertise – policy, principles and philosophy

INTERVENTION

1. Procedural solutions to systemic or isolated problems can make matters worse
2. Tightening procedural requirements can reduce necessary degrees of freedom
3. Human-centred design and systems methods are needed for procedure design

DESIGNING FOR WORK-AS-DONE

1. Understand work-as-done (WAD)
2. Collaborate on work-as-imagined (WAI)
3. Co-design prototype work-as-prescribed (WAP)
4. Implement in work-as-done
5. Test WAI and WAP against WAD
6. Repeat above until WAI-WAP-WAD gap acceptable
7. Monitor WAI-WAP-WAD gap

MIND THE GAP - GAP

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The ability or opportunity to understand and judge the value or importance of what has occurred



WORK-AS-IMAGINED & WORK-AS-DONE

MALICIOUS COMPLIANCE
by Sidney Dekker

**CAN WE EVER IMAGINE
HOW WORK IS DONE?**
by Erik Hollnagel

SAFETY IS IN THE EYE OF THE BEHOLDER
by Florence-Marie Jegoux,
Ludovic Mieusset and Sébastien Follet

I WOULDN'T HAVE DONE WHAT THEY DID
by Martin Bromiley

September 2017

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SAFETY AT THE INTERFACES: COLLABORATION AT WORK

THE VOICE OF AN ANGEL
by Sidney Dekker

**FROM EXPERIENCE
REPORTS TO EXPERIENCE
SHARING**
by Robert M. Little, Rebecca White, Alison
and Catherine Foster

**COLLABORATIVE
ADAPTATION IN A
CONSTRAINED SYSTEM**
by John Doyle and Peter Bowers

**HIGH PIERCE COMPETITORS
JOINED FORCES TO MEET
OFFSHORE HELICOPTER
OPERATIONS SAFETY**
by Katherine Redden

They had come to collaborate
with one another's experience

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COMPETENCY AND EXPERTISE

THE DARK SIDE
by William Fife

**COMPETENCE
LEARNING OR LEARNING
TO LEARN**
by John Doyle

**THE GOOD, THE BAD
AND THE UGLY**
by Sidney Dekker

**LEARNING FROM EXPERT
PSYCHOLOGY
A CHALLENGE FOR
ALL CHIRAL FOLK**
by Peter Bowers

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CHANGE CHANGING TO ADAPT AND ADAPTING TO CHANGE

**MOVIE SWITCHING IN
AIR TRAFFIC CONTROL**
by John Doyle

**CLOSE ENCOUNTERS
WITH THE LEGAL KING: A NEED
FOR AIRSPACE CHANGE**
by John Doyle

**THE JUST CULTURE
JOURNEY IN THREE
LOADING BAYS AND
LOOKING FORWARD**
by Robert M. Little, Maria Christensen
and Peter Bowers

**FOUR MODES OF CHANGE:
TO, FOR, WITH, BY**
by Robert M. Little

**LEARNING FROM
PSYCHOLOGY AND
PSYCHOTHERAPY**
by Peter Bowers

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