Rail Accident Investigation Branch

Use of Safety-II in accident investigation

Rail Accident Investigation Seminar

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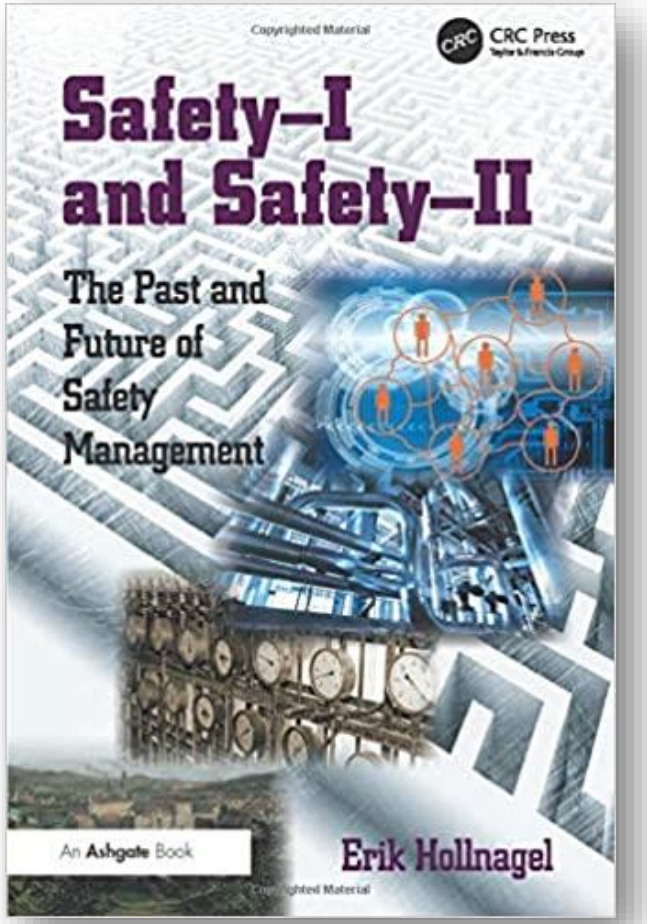
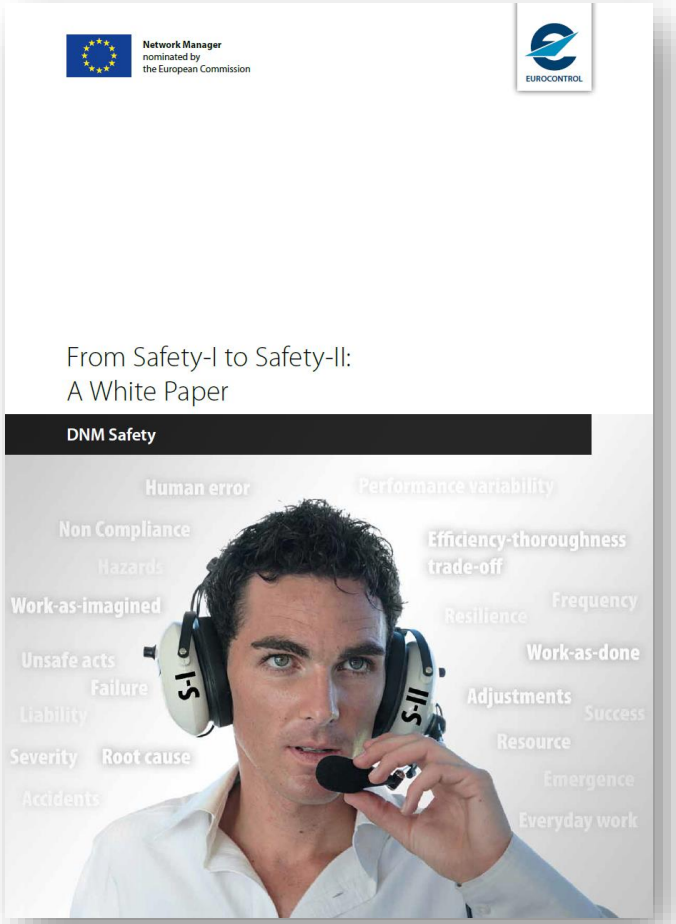
Inspector, RAIB

10 November 2021

Safety-I and Safety-II

http://www.skybrary.aero/bookshelf/books/2437.pdf





From Safety-I to Safety-II

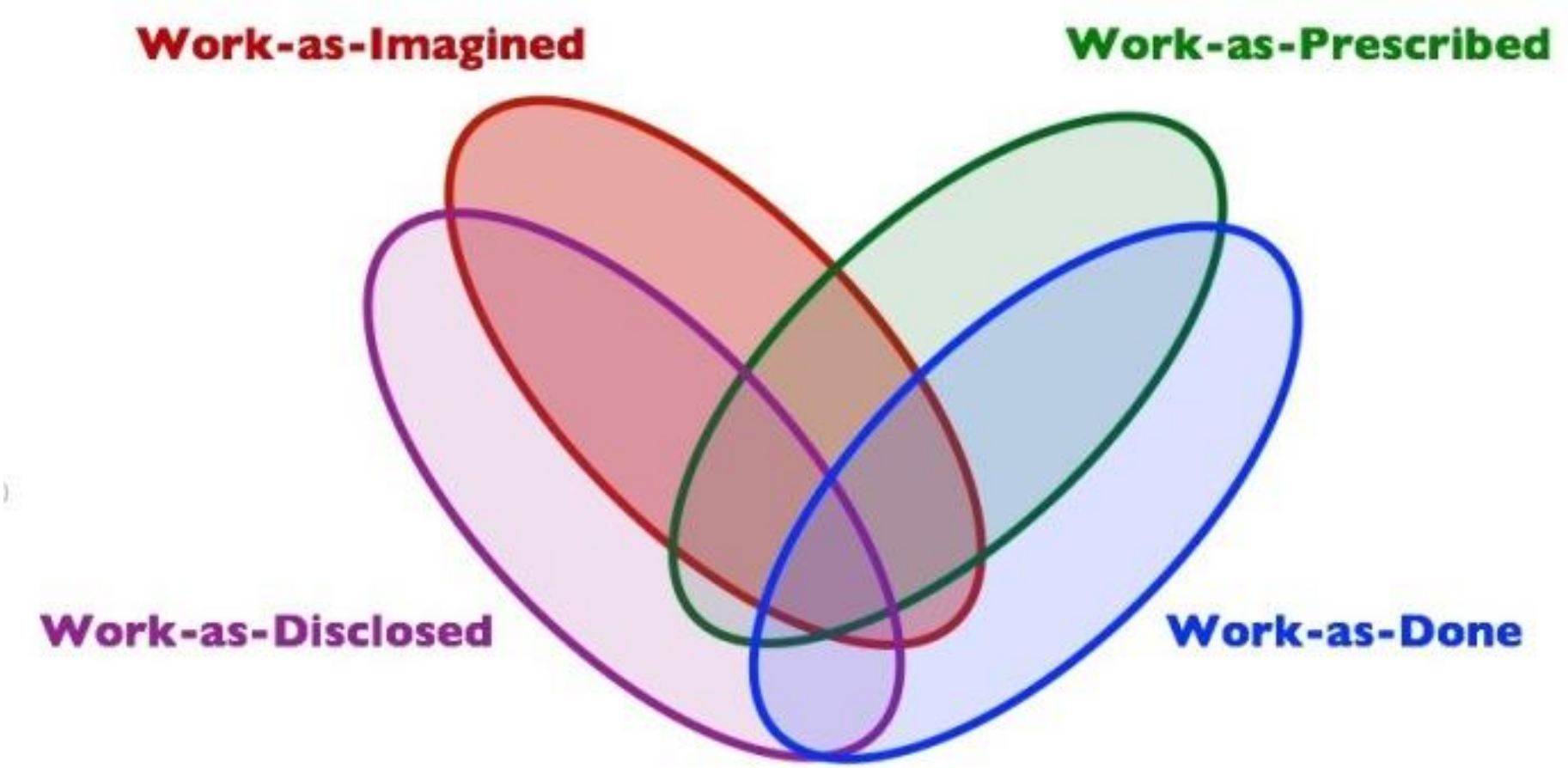
- Safety-I:
  - Safety as the absence of accidents or incidents
  - Humans as a liability or hazard
  - Accident investigation to identify (and eliminate) causes
- Safety-II:
  - Based on the premise that human performance practically always goes right…
  - …because people adjust their work to the conditions
  - So the challenge is to understand these adjustments (ie, why things go right)

Criticisms of Safety-I

- Linear accident models / root cause analyses do not cope with complex systems
- Incidents seen as a malfunction or failure somewhere in the system
  - Leads to ‘find and fix’ approach
- Disproportionate focus and effort (ie, investigations) on the rare events (accidents / incidents) – not mirrored in the (much more common) normal events
- Need to look at work-as-done rather than work-as-imagined
  - ‘When something goes wrong, begin by understanding how it otherwise usually goes right’

Work-as-imagined vs. work-as-done

https://humanisticsystems.com/2016/12/05/the-varieties-of-human-work/



Performance variability

- Is essential in complex systems
  - Humans are a necessary resource for flexibility and resilience
  - Humans are often left in a system to deal with the parts that designers / engineers couldn't automate
- Is the reason why things go right (and wrong)
- 'Trying to achieve safety by constraining performance variability will inevitably affect the ability to achieve desired outcomes as well and therefore be counterproductive.'

Adaptability

https://www.youtube.com/watch?v=0VkejRjA1nA

Safety-II

- '…is the system's ability to succeed under varying conditions, so that the number of intended and acceptable outcomes … is as high as possible.'
- Performance variability should not be interpreted negatively (eg, 'deviations', 'violations', 'non-compliance')
- *Safety-I and Safety-II are seen as complementary – but Safety-II brings a new mindset and practice*
  - Look for what goes right – not just people following procedure, but the adjustments they make in response to the demands of the situation
  - Moves away from consequence-driven investigation to learning-driven investigation

Pause for thought

- The criticism that Safety-I focuses on linear models / root cause analysis is not always justified
- How to resource investigating everyday performance?
- How do we know when variability is adaptive and when it is maladaptive?
  - Is it adaptation or just ‘getting away with it’?
  - Current lack of methods to support Safety-II

Take home messages

- Watch your language - move away from ‘human error’ / ‘violations’ and towards more neutral terms of performance or decision making
  - Continue to consider ‘why did this person behave in this way at this time?’
- Don’t necessarily rely on procedures to fix things
  - Look for systems-level (underlying) solutions
- Safety-II doesn’t mean that we stop investigating accidents (but it might change our approach to doing so – look for positive lessons)
  - ‘…we cannot make sure things go right just by preventing them from going wrong. We also need to know how they go right … instead of searching for specific causes that only explain the failure’

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