MEASURING SAFETY IN AVIATION - DEVELOPING METRICS FOR SAFETY MANAGEMENT SYSTEMS

SMICG
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AUAS IS THE BIGGEST INSTITUTE OF TERTIARY EDUCATION IN THE NETHERLANDS

- Amsterdam University of Applied Sciences
  - 43,000 students
  - 80 bachelor and master programmes
  - seven schools
- Aviation Academy is part of the School of Technology.
  - 4 year BSc program
  - 425 new students each year
  - A total of 1300 students
  - MSc in development
  - Several PhD candidates
AVIATION ACADEMY - MISSION

• The Aviation Academy was created to serve the European aviation industry. Our mission is to provide the current and next generation of professionals with the skills they need to meet the international aviation challenges of the next 10 to 15 years.

• Goal is to become one of the top Aviation institutions in Europe at the level of Universities of Applied Sciences
2014: WINNER OF THE DUTCH EXCELLENCE IN AVIATION EDUCATION AWARD
AVIATION ACADEMY: MAIN THEMES ARE ON OPERATIONAL READINESS
AVIATION ACADEMY: ACTIVITIES

Young Students

Professionals and Aviation Industry

- B.Sc. Degree Aviation (Operations & Engineering) including honours tracks

- Conferences, workshops, round table sessions, network events

- Applied Research on Safety & Human Factors, MRO, New Repair Methodologies and Airport & Airspace Capacity

- Alumni network (in development)

- Professional Masters (M.Sc degree, in development)

- Masterclasses and courses

Young Professionals, Internships, industry involvement in curriculum
BACKGROUND & OBJECTIVE OF THE PROJECT
Measuring Safety Performance Guidelines for Service Providers

Executive Summary

The objective of this paper is to provide guidelines for the definition and implementation of a set of safety performance indicators as part of your safety management system.

This document proposes an approach to safety performance measurement aiming at increasing your company's potential for effective safety management that considers systemic and operational issues. Effective safety performance measurement will be decisive in driving your safety management system towards excellence.

Throughout this document:
- Any reference to the term "service provider" is intended to cover providers of aviation products and services.
- Any reference to "regulations" is intended to mean your core activities being regulated through aviation safety regulations and
- Any reference to "regulations" is used in this broad sense, to cover all those functions and responsibilities as relevant for the management of aviation safety.


Figure 1: Components of safety performance
WE HAVE CLUSTERED ALL SAFETY METRICS INTO TWO CATEGORIES

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<tr>
<th>Safety Process Metrics</th>
<th>Safety Outcome Metrics</th>
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<td>Proactive indicators</td>
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</table>
RESEARCH RATIONALE AND BACKGROUND

• What is the relation between safety process metrics and safety outcomes?
  • None
  • Necessary but not sufficient
  • Necessary & sufficient

  Performance based oversight assumes that process metrics are necessary but not sufficient

• SMEs lack the benefit of large amount of safety-related data for monitoring safety indicators
• Large companies: Availability of safety-related data, but there is a need for more valid leading indicators
RESEARCH OBJECTIVE

• To generate new and better ‘leading’ indicators for safety, based on
  • State-of-the-art safety theories
  • Robust empirical data
that support the further improvement of safety metrics for:
  • SMEs by countering the lack of data
  • Large companies by generating valid leading indicators
  • Regulatory oversight by generating valid performance-based metrics
RESEARCH FRAMEWORK (1)

• Operational
• Processes
• Organizational
• Safety culture?

What constitutes the bottom threshold of an occurrence?

Literature not aligned:
- a result of safety management (outcome indicator), or
- a reflection and indication of how well safety management is performed (process indicator)

• Accidents
• (Severe) Incidents
• Occurrences
• Safety culture?
RESEARCH FRAMEWORK (2)

- Empirical
- Credible Reasoning
  - Single (root) cause models
  - Epidemiological (multiple cause) models

Are these valid models in complex socio-technical systems?

Scarce
RESEARCH FRAMEWORK (3)

Process Metrics ➔ Safety Outcomes

New Safety Metrics ➔
- Systemic models
- Systemic (STAMP, FRAM, ..)
- “Resilience”
RESEARCH FRAMEWORK (4)

- Process Metrics
- Safety Outcomes
- New Safety Metrics
- Alternative Safety Outcomes
  - Safety II
  - ...
METHODOLOGY

Phase 1: Literature review of Safety Metrics
Phase 2: Validation of existing Safety Metrics
Phase 3: Alternative Process Metrics
Phase 4: Alternative Safety Outcome Metrics
Phase 5: Web-based Dashboard
CURRENT PARTNERS
EXPECTED RESULTS & APPLICATION
EXPECTED RESULTS: NEW SAFETY METRICS THAT BETTER SUPPORT THE IMPROVEMENT OF SAFETY

- Process Metrics
- Safety Outcomes
- New Safety Metrics
- Alternative Safety Outcomes
APPLICATION

- We aim to:
  - Create a web-based dashboard to support the implementation of advanced safety metrics
  - Create guidance material for authorities, SME’s and large companies
CALL TO ACTION

www.hva.nl/techniek
WE WELCOME FURTHER PARTICIPANTS!

- Requirement: willingness to share safety data after signing a NDA
- Benefits:
  - direct input into project
  - first insight into deliverables
  - better understanding of results
- Contact Robert J. de Boer, professor of Aviation Engineering
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