

A SET OF UNIFORM AND NOVEL AVIATION SAFETY METRICS

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CREATING TOMORROW

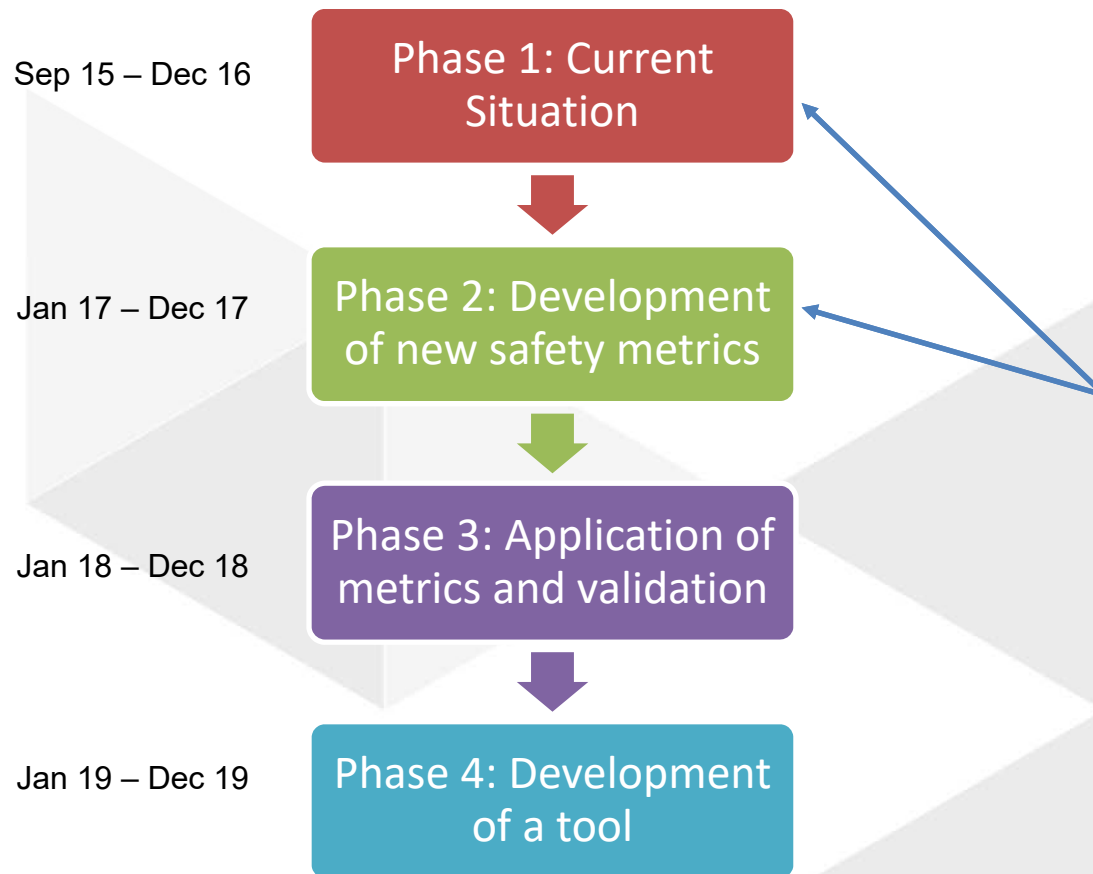




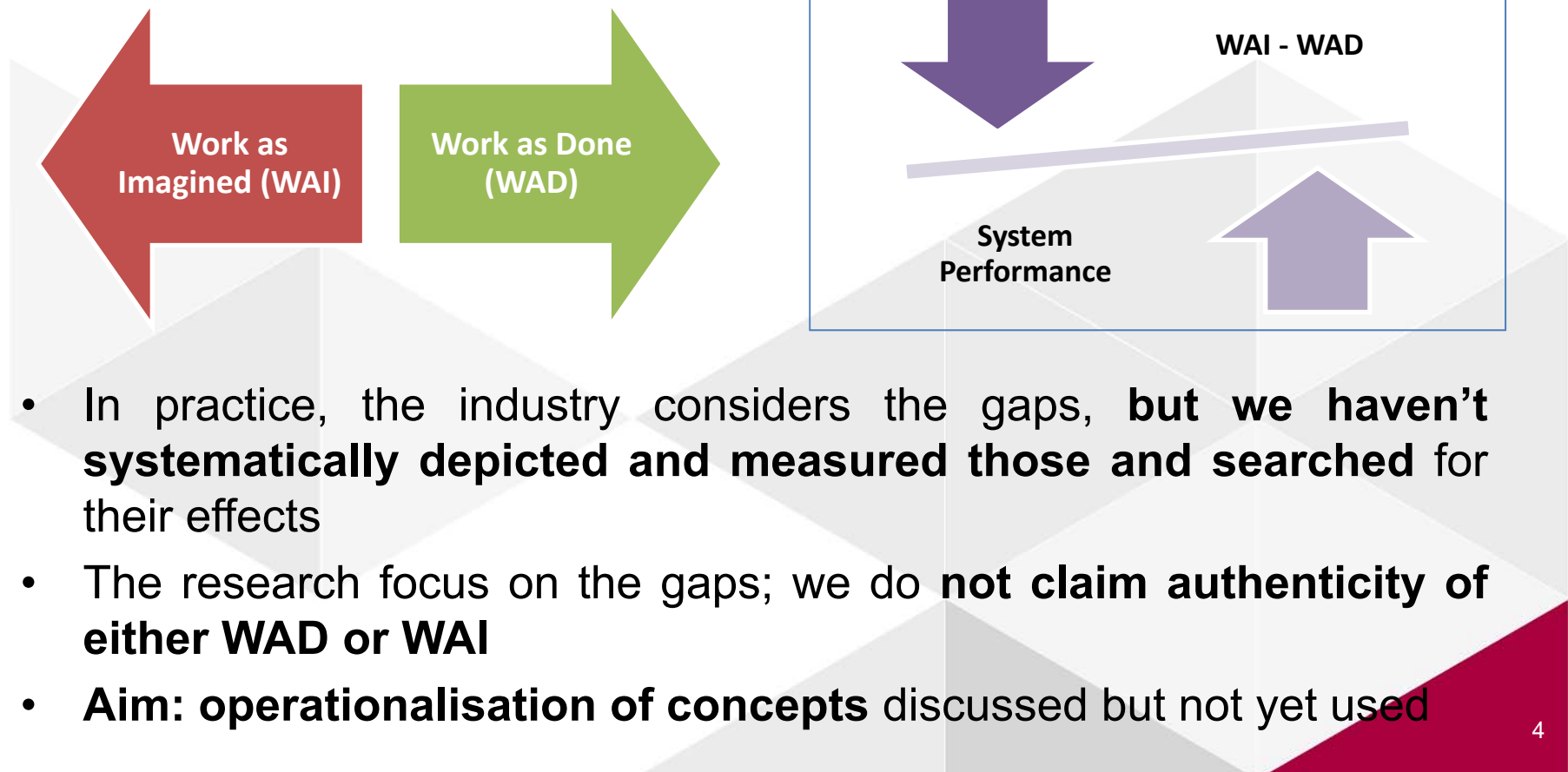
CHALLENGES FOR AVIATION COMPANIES

- **Small – Medium Enterprises:** lack of adequate safety/operational data to monitor safety
- **Large companies:** operational/safety data available, but they need leading metrics of better quality
- **How to move** from compliance-based to performance-based monitoring?

RESEARCH PROJECT



THE PRINCIPAL CONCEPT



- In practice, the industry considers the gaps, **but we haven't systematically depicted and measured those and searched for their effects**
- The research focus on the gaps; we do **not claim authenticity of either WAD or WAI**
- **Aim: operationalisation of concepts** discussed but not yet used

SMS ASSESSMENT: CURRENT TOOLS

- Main tools currently used:
 - SMICG: Safety Management System Evaluation Tool
 - Eurocontol: Effectiveness of Safety Management
- First collaborative attempts to evaluate SMS, but
 - include vague measurement scales
 - SMS is assessed by auditors, not the users
 - evaluate individual SMS activities -> no visible systemic approach

SMS ASSESSMENT: CURRENT TOOLS

- EASA recently launched the Management System Assessment Tool
 - is based on the SMICG approach
 - each assessment topic includes several sub-topics (i.e. multi-barrelled questions)
 - the implementation and effectiveness of SMS parts are often assessed in a similar manner

GENERAL REMARKS ON CURRENT SMS ASSESSMENT TOOLS

- Tool development
 - Current tools have been developed mainly through brainstorming and experience
 - We need a systematic manner to analyse SMS and derive requirements (i.e. checking points) by embedding gained experience
- SMS dimensions:
 - Design and implementation: do not consider the timeliness of SMS processes and mutual dependencies
 - Suitability: no guidance provided
 - Effectiveness: general guidance without specific set of questions and targeted employees population
- Not customizable to size and complexity of company
- No quantified SMS assessment results



AVAC-SMS TOOL

SMS Maturity ::

Institutionalisation + Capability + Effectiveness



Design

Implementation

Time and process dependencies



Proxy for suitability of SMS



Effect of SMS on daily tasks

AVAC-SMS: CUSTOMIZATION TO SIZE AND COMPLEXITY OF COMPANY

	Number of assessment points (deskwork): SMS institutionalisation		
Survey questions to staff: 1. SMS capability (managers/safety personnel) 2. SMS effectiveness (employees)	149	48	16
<u>Questions at the level of SMS elements</u> 1. 72 Capability questions 2. 36 Effectiveness questions	<u>Option SE</u>	<u>Option EE</u>	<u>Option CE</u>
<u>Questions at the level of SMS components</u> 1. 24 Capability questions 2. 12 Effectiveness questions	<u>Option SC</u>	<u>Option EC</u>	<u>Option CC</u>
<u>Questions about the whole SMS</u> 1. 6 Capability questions 2. 3 Effectiveness questions	<u>Option SS</u>	<u>Option ES</u>	<u>Option CS</u>

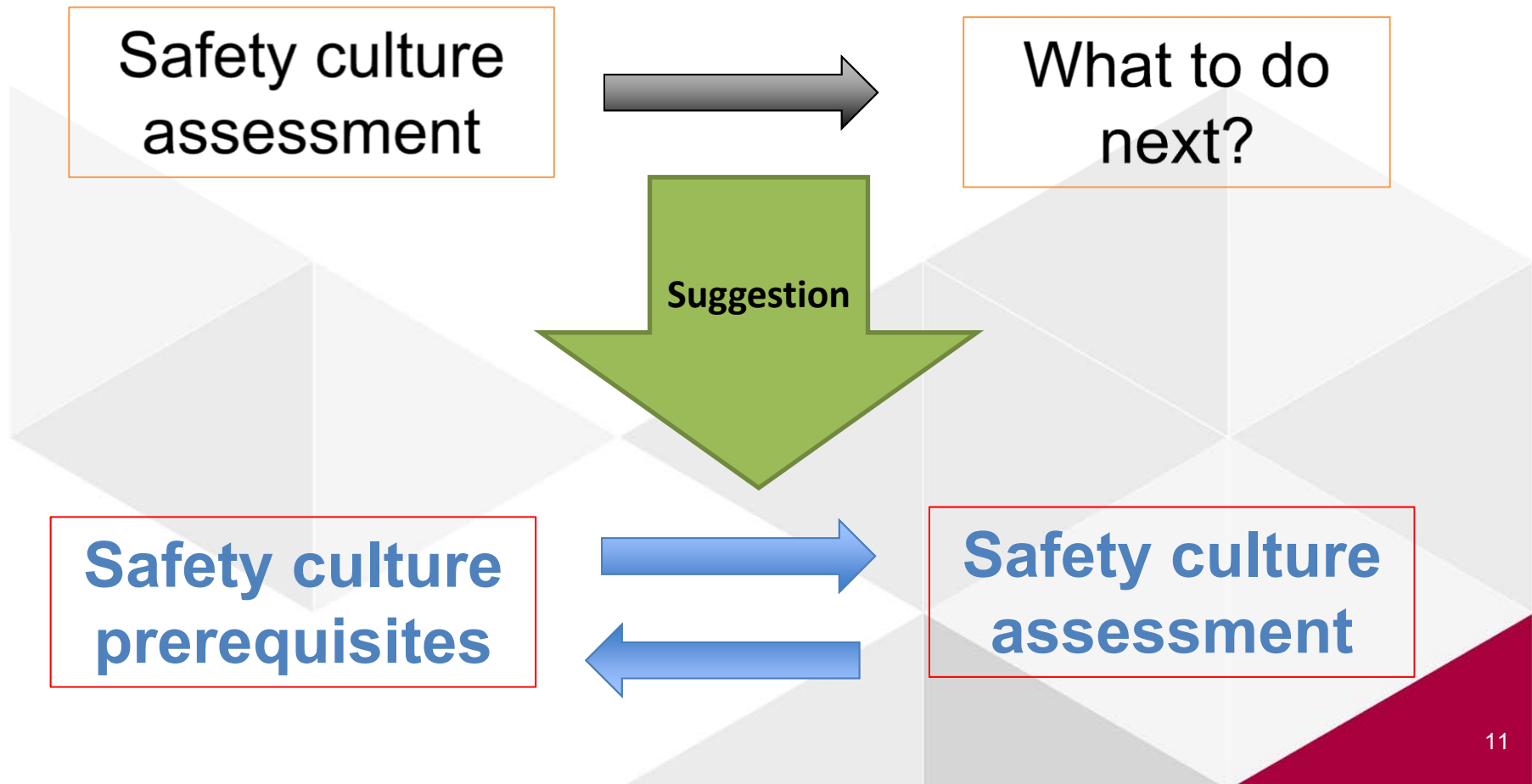
Every option concludes to quantified results for each dimension assessed as well as the whole SMS

AVAC-SMS: TIME INVESTMENT FOR DATA COLLECTION

SMS assessment part	Survey participants	Maximum estimated time investment (depending on the assessment level to be chosen).
Institutionalisation	Safety department	4 hours
Capability	Managers and safety personnel who implement the SMS	0.5 hours
Effectiveness	End-users who are the final target of the SMS activities	20 minutes

The lower the detail of SMS assessment, the less the detail of the information collected

SAFETY CULTURE: OVERALL APPROACH





AVAC-SCP TOOL

Safety Culture Prerequisites ::

Documentation, Implementation, Perception



57 questions



57 questions



10 questions

The tool concludes to quantified results for each dimension assessed

RISK CONTROL EFFECTIVENESS: CURRENT SITUATION

- Service providers define and implement risk control measures in order to prevent hazards developing into accident
- A risk control measure can be a procedure, education and training, a piece of equipment etc.
- ICAO describes the effectiveness of a risk control measure as “the extent to which the risk control measure reduces or eliminates the safety risks”
- There is no guidance on how to measure the effectiveness of a risk control measure.

RISK CONTROL EFFECTIVENESS: INTERPRETATION

- The effectiveness of a risk control measure provides information on
 - how many times the risk control measure is addressed in tackling a particular hazard or risk
 - how many of these times the risk control measure performs according to the desired outcome of the specific risk control measure.

RISK CONTROL EFFECTIVENESS: INDICATORS

$$1 - \frac{\sum \text{failures of control when challenged}}{\sum \text{occasions control was challenged}}$$

$$1 - \frac{\sum \text{failures of control when tested}}{\sum \text{occasions the control was tested}}$$

$$1 - \frac{\sum(\text{unwanted events after a control was implemented}) \text{ per unit of time}}{\sum(\text{unwanted events before a control was implemented}) \text{ per unit of time}}$$

These metrics are listed in preferential order with the most preferred on top.

The research team has compiled detailed guidelines how to implement the particular metrics.

IN A NUTSHELL ...

- The new metrics
 - have been designed with the support of partners from companies, authorities and universities.
 - result in quantitative results.
 - can be addressed to any organisational level.
- Companies can get a better understanding of their SMS/controls performance and safety culture prerequisites.
- The quantified results allow benchmarking of systems and their evaluation over time: from compliance-based to performance-based evaluations.
- The specific metrics can complement current safety metrics, and support safety improvements.

ARE YOU INTERESTED IN APPLYING THE METRICS?

- We will run surveys in March-April 2018.
- The SMS self-assessment and Safety Culture Prerequisites tools will be:
 - administered through online questionnaires
 - distributed by the safety department as preferred
- We will also need some numerical data (not content) from 2017 (e.g., number of mandatory reports and audit findings).
- Confidentiality of any data to be collected (NDA).
- Reception of individual reports:
 - current level of the company (and internal benchmarking if wanted)
 - benchmarking against the rest of the partners

ADDITIONAL BENEFITS

- Acknowledgement of the participation of the organisation in the project reports, papers, presentations etc.
- Upload of the organisation's logo on the project website (www.amsterdamuas.com/asm).
- Reduced fees for the Aviation Academy events and master classes scheduled in Amsterdam in 2018 (see <http://www.amsterdamuas.com/aviation/events/events.html>).
- Free-of-cost assessment of 5 internal safety investigation reports against state-of-the-art safety thinking and approaches.

12-16 MAR



MASTER CLASS RISK ASSESSMENT

Workshop | 12-16 Mar

Have you ever been surprised by complexity? Results that were not predictable due to interactions that you hadn't identified? More importantly: do you want to improve your system and become better prepared next time? ...

25-29 JUN



MASTER CLASS IN ADVANCED SAFETY MANAGEMENT

Workshop | 25-29 Jun

Have you already planned and implemented a Safety Management System (SMS)? Excellent! But have you also recognized that safety is more than simply documenting and executing SMS processes? Are you currently planning ...

21-25 JAN 2019



MASTER CLASS HUMAN FACTORS & SAFETY

Workshop | 21-25 Jan 2019 | 09:00

The Aviation Academy of the Amsterdam University of Applied Sciences is proud to present a master class on Human Factors and Safety by Professor Sidney Dekker in collaboration with staff from our institution. In this ...

THE RESEARCH TEAM



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Thank you!

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