



# Measuring safety in aviation newsletter

AMSTERDAM UNIVERSITY OF APPLIED SCIENCES (AUAS) – AVIATION ACADEMY

SEPTEMBER 2016

## Status & next step of the project

by Nektarios Karanikas

Dear partners,

On behalf of our research and project teams, I am glad to introduce this 2<sup>nd</sup> edition of our newsletter, which is linked to the RAAK PRO project but also serves as a platform for sharing safety and human factors news among all project partners.

### What we did so far

Following the release of the report about the existing safety metrics in aviation, we proceeded to surveys across our 13 company partners. The surveys aimed at (1) recording what, how and why companies do around safety metrics and, (2) collecting data in order to evaluate whether consistent correlations exist amongst Safety Management System (SMS) metrics and safety outcomes, under the assumption of their linear relationship.

In overall, the results were enlightening and revealed what types of metrics companies use and whether those metrics are based on predefined quality criteria, how risk assessment is performed, how safety culture is seen, and what are the safety views/paradigms adopted. Most interestingly, we found only few correlations between SMS metrics and safety outcomes, those differing across companies. The report will be sent to all partners after its approval by the steering committee.

### Next steps/ milestones ahead

The most challenging part of the research project is now ahead. Following the

findings from the 1<sup>st</sup> phase (September 2015 – August 2016), the team will consider various alternatives for developing new safety metrics. We will review state-of-the-art concepts, theories and models around safety, select the ones matching the scope of the research and perform field studies at our partner companies.

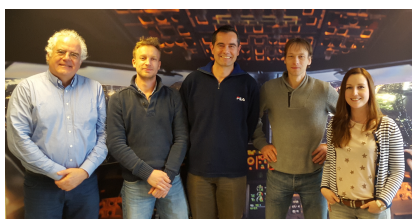
Last but not least, our project has attracted the attention of more aviation organizations and the number of our partners has been growing. In September 2015 we started with 22 organizations and now we are 26 partners on board! This is a collective success since the reputation of our current partners signals the importance of this research project.

Taking opportunity from our communication here, I would like to bring your attention to the events the Aviation Academy organizes. Please see the respective section below and visit our website for more information.

Best regards,

Nektarios Karanikas

### The RAAK PRO research team



From left to right: Robbert, Steffen, Nektarios, Alfred, Selma

### Agenda Aviation Academy 2016-2017

3-4 November – International Cross-industry Safety Conference

10-11 November – INAIR Conference 2016

9 December – International Aviation Career Fair

9-10 December – International Aviation Days Amsterdam

10 December – Aviation Knowledge and Career Day

12-16 December – Master Class Lean MRO

6-10 February – Master Class STAMP & STPA

## Activities

### EASA Working Group in SMS evaluation tool development

The Aviation Academy is the only university participating in a group of representatives from EASA, European aviation authorities and the industry with the goal to develop a cross-domain tool for the evaluation of aviation Safety Management Systems. Following a series of meeting where all parties contributed with their own views and experience, the final tools is expected to be presented until the end of 2016. We will keep you informed about the work progress.

### EASA training and consultation in STAMP/STPA

Following an invitation from EASA, Dr. Nektarios Karanikas, who is an EASA independent expert in SMS, delivered training in the System Theoretic Accident Model and Processes (STAMP) and System

Theoretic Process Analysis (STPA) to a group of EASA staff and industry partners. The training was requested after EASA decided to apply STAMP/STPA method to the All Weather Operations (AWO) project. The overall objectives of the project are (1) to introduce a European regulatory framework in the area of AWO that will ensure safety and efficiency and will be relying on a performance- and risk-based approach; and (2) to enable manufactures, air operators and aerodrome operators to take full advantage of safety and economic benefits accrued from new technologies and operational experience. The provision of training was followed by a review of the project deliverables by Nektarios, and the output of this work is expected to be available for commentary from the stakeholders until the end of 2016.

#### STAMP MIT Workshop 2016

In March 2016, Dr. Nektarios Karanikas attended the subject workshop which is annually organized by the Massachusetts Institute of Technology (MIT), Boston, USA. He presented the first part of a research regarding the use of the System Theoretic Process Analysis (STPA) method in the evaluation of SMS. The results from the first phase of the research were very well perceived by the attendants and several authorities and organizations were interested in being informed upon the completion of this research. A graduate student has undertaken an assignment to continue on this research topic; the final results will be available in the begging of 2017.

#### Ergonomics & Human Factors 2016

In April 2016, Dr. Alfred Roelen presented at the Ergonomics and Human factors Conference in Daventry, UK, the results of a study on measuring fatigue. The objective of the research was to determine if alterations in the acoustical characteristics of voice occur after moderate cumulative sleep deprivation. Eight subjects participated in the study. Sleep deprivation was obtained by prescribing four nights of reduced sleep (6 hrs instead of 8). Speech data were obtained with sociometric badges, cognitive and subjective fatigue data were also collected. Speech volume and pitch were found to be significantly different when subjects were sleep deprived. Secondary circadian effects were not observed. The results support the proposition that speech can be used to measure the fatigue state of individuals.

#### Safety Management International Collaboration Group (SMICG)

In May Dr. Robert J. de Boer had the honor to present our project on Measuring Safety in Aviation to an international forum of industry and authority representatives. The Safety Management International Collaboration Group (SM ICG) was founded by the United States Federal Aviation Administration (FAA), the European Aviation Safety Agency (EASA) and Transport Canada Civil Aviation and is a joint cooperation between many regulatory authorities for the purpose of promoting a common understanding of safety management and Safety Management System (SMS)/State Safety Program (SSP) principles and requirements, and facilitating their implementation across the international aviation community. At the end of the week-long conference, industry representatives are invited to exchange ideas. Our presentation of the project induced a number of companies to express their interest to participate, particularly from manufacturing companies.

#### Master Class Safety & Human Factors

In June, Prof. Dr. Sidney Dekker and Dr. Robert J. de Boer hosted a one week long master class on Human Factors and Safety for the third time. The audience (safety professionals from around the world and many different domains) were challenged in their safety thinking and their approach to accidents. The next edition will be in July 2017, see our website.

#### 20<sup>th</sup> Air Transport Research Seminar (ATRS)

In June 2016, Steffen Kaspers participated in the Air Transport and Research Society (ATRS) Conference held at Rhodes, Greece. At the conference over 200 presentations were given by researchers from several domains. Steffen presented the results of the literature review in combination with preliminary results of the surveys from the RAAK PRO project. The presentation was perceived well by the colleges in the audience and many of the difficulties faced by companies were recognized. Following the conference, the ATRS society invited us to publish our first RAAK PRO report. Currently, we have been finalizing the manuscript in order to send it for peer-review to a journal associated with the conference.

#### 7<sup>th</sup> International Conference on Applied Human Factors and Ergonomics (AHFE)

In July 2016, Dr. Nektarios Karanikas participated with two presentations in the conference, which took place in Orlando, USA. The 1<sup>st</sup> presentation, which is accompanied by a paper co-authored by Dr.

Robert J. de Boer and Dr. Alfred Roelen, regarded a research about the prerequisites for safety culture development, part of which was the illustration of the differences across various industry sectors. The 2<sup>nd</sup> presentation was based on the work of two graduate students of the Aviation Academy who demonstrated the disagreement amongst safety experts when assessing risks with the use of risk matrices.

#### Flight Safety Symposium 2016

In September 2016, Flight Global organized the annual Flight Safety Symposium in London, Heathrow. The event offers 3 tracks: Commercial Flights, Air Traffic Control and Engineering & Maintenance and attracts many participants, mainly from the industry. Dr. Nektarios Karanikas participated with two presentations in the engineering track. The first concerned the results of a research about a risk assessment framework for small drone flights, where the emerging safety challenges, the high diversity of drones in terms of their safety-related specifications and the low similarity of the regulatory frameworks of 56 countries were stressed out. The second presentation regarded the extent to which new safety thinking and models have been embraced by the authorities as it was found through the analysis of 217 safety investigation reports published by 4 authorities. The presentations were followed by a high interest of the audience in the topics and several questions. On top of these, the attendants were informed about the RAAK PRO project and the events the Aviation Academy organizes, and many of them requested further information. In overall, the event was a great opportunity to sense current needs of the industry, share knowledge and attract new partners.

#### Research (to be) launched at the AA

1. Continuation in the development of SMS assessment tool based on the STPA method (Student: Joey Eduards, Supervisor: Dr. Nektarios Karanikas).
2. The extent to which new safety thinking is reflected in the safety investigation reports published by the National Transport Safety Board (USA) (Student: Ahmed El Bakh, Supervisor: Dr. Alfred Roelen).
3. Development of a safety investigation handbook for general aviation (Student: Jamie Ruiters, Supervisor: Dr. Alfred Roelen).
4. Development of a tool for assessing the prerequisites for safety culture development (Student: Glenn Grolleman, Supervisor: Selma Piric).
5. A unified conceptual safety/accident model based on state-of-the-art safety literature (Student: Victor de Hoon, Supervisor: Dr. Nektarios Karanikas).

### Publications

- Karanikas, N. (2016). Critical Review of Safety Performance Metrics, *International Journal of Business Performance Management*, 17(3), pp. 266-285.
- Karanikas, N. (2016). Combining Soft System Methodology and Pareto Analysis in Assessment of Safety Management Performance: an Aviation Case, *International Journal of Business Performance Management*, 17(3), pp. 286-300.
- Karanikas, N., Soltani, P., de Boer R. J. & Roelen A.L.C. (2016). Safety Culture Development: the Gap Between Industry Guidelines and Literature, and the Differences Amongst Industry Sectors, in Arezes, P. (ed.), *Advances in Safety Management and Human Factors*, Proceedings of the AHFE 2016 International Conference on Safety Management and Human Factors, July 27-31, 2016, Walt Disney World®, Florida, USA, Springer.
- Karanikas, N & Kaspers, S. (2016). Do Experts Agree When Assessing Risks? An Empirical Study. Proceedings of the 50th ESReDA Seminar, 18-19 May 2016, Seville, Spain.

RAAK PRO  
partners



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Ministerie van Defensie



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