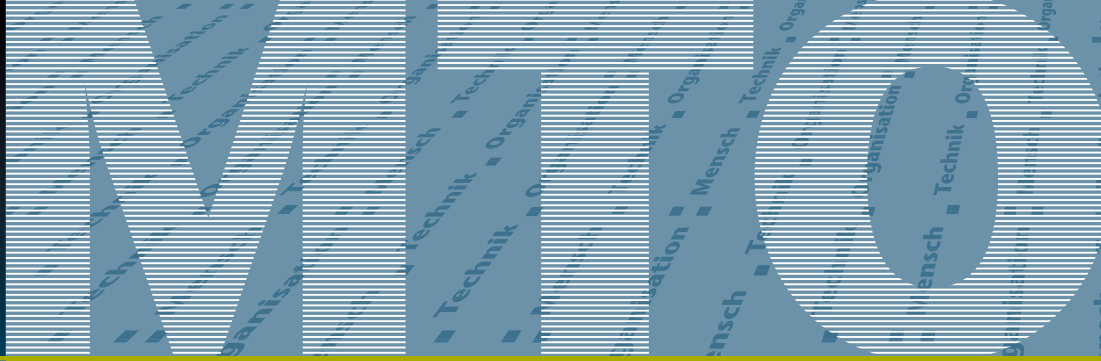

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Generalized Guidelines for a Safety-II-based Tool: Measure Evaluation and Effectiveness Assessment

Toni Wäfler, Rahel Gugerli, Giulio Nisoli

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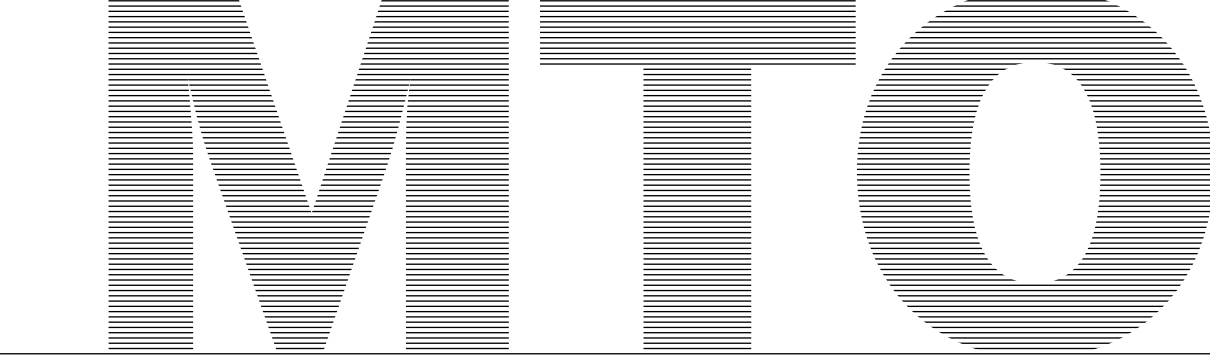

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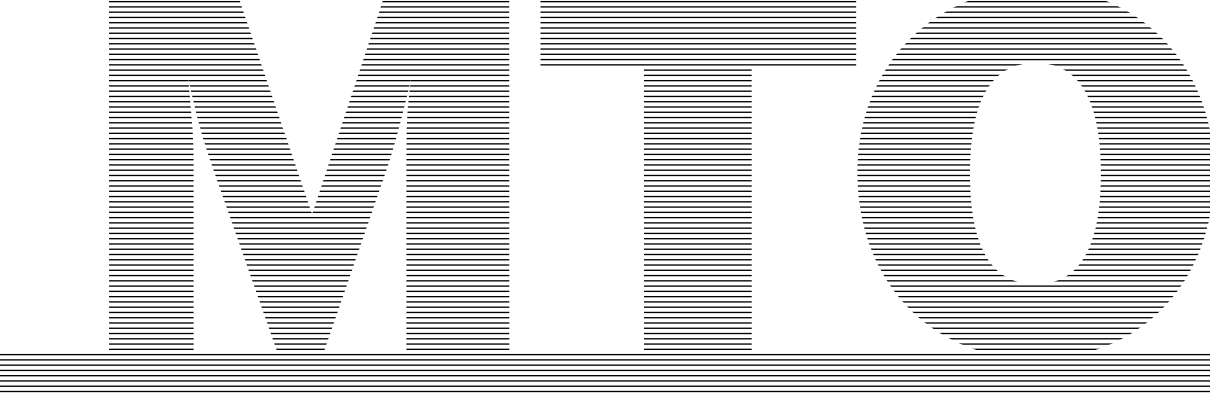

**Toni Wäfler, Rahel Gugerli,
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Preface

We all aim for safe processes. However, providing safety is a complex endeavour. What is it that makes a process safe? And what is the contribution of humans? It is very common to consider humans a risk factor which is prone to errors. "Human failure", therefore, is an explanation we often read in accident reports. As a consequence, we implement sophisticated safety management systems (SMS) in order to identify and to prevent potential "human failure". We implement safety measures to ensure that humans do not fail: procedures, standards, automation and the like. Over the last decades, these SMS provided an impressive increase of safety.

In safety science this approach is labelled "Safety-I" and it starts to be questioned. A main criticism is that humans do not show failures only. On the contrary, often they actively contribute to safety, sometimes even by deviating from a procedure. Hence, humans are not to be regarded only as a "risk factor"; rather, they usually are a "safety factor". In traditional investigations we cannot see this, as we normally only investigate when an adverse event happened – an occurrence, an incident or even an accident. There is no investigation when everything stays safe and, therefore, the human contribution to safety often remains hidden.

From the "Safety-II" perspective humans are considered to be a "safety factor" as well. One of the essential human contributions to safety is their ability to adjust behavior to the given situation. It is this human adaptability that makes for system resilience. However, adaptability requires scope of action and this is where Safety-I and Safety-II contradict each other. While the former restricts freedom of action by standardisation and the like, the latter requires room for manoeuvring.

Due to this contradiction, integrating the Safety-II perspective into SMS that are traditionally Safety-I based is difficult. This challenge was the main objective of our project. Two methods have resulted that – as we think – contribute to the quality of SMS by integrating Safety-II into SMS without jeopardising the Safety-I approach.

Our research was financed by the Swiss Federal Office of Civil Aviation (FOCA) as a part of the SFLV-funding. We are very grateful for that. Especially we would like to thank Ryan Hunninghause for his support. It is important to us to do applied research which is possible only with the support of the industry. We received fundamental support from Tony Haerry, Beat Kistler and Zeljko Raisic who were representing our main industrial partner. Together with them fur-

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November 2020

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Contents

1 Introduction

Within the project "Safety-II in Safety Management" a *Safety-II based Tool* has been developed. The project was promoted and financially supported by FOCA and realized in close cooperation with industry. The Safety-II based Tool is designed against the theoretical background of Safety-II and fulfils a large number of requirements identified in interviews with safety experts from the following nine organizations in aviation: Air Zermatt, Helvetic Airways AG, REGA, Skyguide, SR Technics, Swiss Air Force, Swiss International Air Lines Ltd., Zimex Aviation Ltd. and Zurich Airport AG. This booklet summarizes the findings of this project and provides the Safety-II based Tool for the Swiss aviation industry.

The booklet is structured as follows: Chapter 2 describes Safety Management Systems (SMS) and how the Safety-II based Tool complements existing Safety-I based SMS. In chapter 3 Safety-I and Safety-II are characterized. Chapter 4 gives a description of the theoretical background of the Measure Evaluation Tool (MET). Chapter 5 contains the MET and chapter 6 guidelines for its implementation. In chapter 7 the theoretical foundation of the Effectiveness Assessment Tool (EAT) is presented. The EAT itself can be found in chapter 8 and its implementation guidelines in chapter 9.

2 Safety Management Systems (SMS)

The following chapters describe SMS from a generalized point of view and present where the Safety-II based Tool is functional.

2.1 Pillars of SMS

SMS consist of four pillars. These are policy, risk management, safety assurance and safety promotion. The Federal Office of Civil Aviation (FOCA) refers to these four pillars in its Safety Management System Assessment Guide (File Record: BAZL / 201-00002). According to FOCA, this document is used by FOCA-inspectors for initial assessment or ongoing surveillance and oversight of SMS being implemented within the Swiss aviation industry. In the following sections, the four pillars are described (referring to Stolzer, Halford & Goglia, 2008, who describe generic SMS):

Policy

An SMS contains guidelines and processes. These describe, among other things, responsibilities and authority to make decisions.