

Integrating Safety Analysis into Model-Based Systems Engineering for Aircraft Systems: A Literature Review and Methodology Proposal

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Abstract. Model-Based Systems Engineering (MBSE) has become increasingly popular within the aircraft industry in recent years. However, this model-based approach presents a challenge as traditional safety analysis practices are unable to keep up, resulting in inconsistency between the system and safety domains. This paper proposes a methodology tailored towards aircraft systems that addresses this issue by integrating safety analysis into MBSE. This is achieved by extending the Systems Modeling Language (SysML) profile to account for safety data in the system model and utilizing an Application Programming Interface (API) to automate the generation of safety analysis artefacts. The proposed methodology also allows for requirements management integration to increase the efficiency of the system development process.

Biography

Kimberly Lai (University of Toronto)

Kimberly is a Master's student at the University of Toronto and is currently conducting research in Model-Based Systems Engineering and Safety Analysis. She holds a Bachelors degree in Engineering Science, majoring in Aerospace Engineering from the University of Toronto and has experience with implementing MBSE at Safran Landing Systems. The first iteration of this paper was written as part of her undergraduate thesis under the supervision of Dr. Olechowski.

Thomas Robert (Safran Landing Systems)

Thomas is a Systems Architect and MBSE Deployment Lead at Safran Landing Systems, developing integrated landing gear systems for business, commercial and military aircraft. He has more than 10 years of experience in systems engineering on highly integrated and complex systems, for aerospace and railway projects, with a specialization in operational deployment of MBSE process, methods and tools. He holds Bachelor and Master degrees in Mechanical Engineering from the University of Poitiers and INSA Rouen Normandie.

David Shindman (Safran Landing Systems)

David is a Systems Architect and Senior Expert at Safran Landing Systems, developing integrated landing gear systems for business, commercial and military aircraft. He has over 30 years of experience in aviation including management of systems engineering and airworthiness. He has also developed automatic train control systems for rapid transit. He holds Bachelor and Master degrees in Aerospace Engineering from the University of Toronto and a Diploma in Fluid Dynamics from the von Karman Institute for Fluid Dynamics.

Alison Olechowski (University of Toronto)

Dr. Alison Olechowski is an Assistant Professor in the Department of Mechanical & Industrial Engineering and the Troost Institute for Leadership Education in Engineering (ILead) at the University of Toronto. Dr. Olechowski and her team study the processes and tools that teams of engineers use in industry as they design innovative new products. She has studied engineering products and projects in the automotive, electronics, aerospace, medical device and oil & gas industries.