# WMC

## 5th International Workshop on Mixed Criticality Systems

at the IEEE Real-Time Systems Symposium (RTSS 2017)
Paris, France
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https://cps-research-group.github.io/WMC2017/

## KEYNOTE PRESENTATION

**TITLE:** **Challenges in Applying Mixed-Criticality Systems to Aircraft Engine Control Systems**

## ABSTRACT

Rolls-Royce have been successfully using scheduling research from the University of York for the last 15 years for the highest criticality aircraft engine control systems which are DAL-A according to the aviation authorities' standards. This research work resulted in a framework for non-preemptively scheduling single criticality systems with complex precedence relations using the fixed priority approach. The framework spanned task attribute assignment, schedulability analysis including of the overheads, and a predictable scheduler designed to minimise the overheads. For various technical and commercial reasons, Rolls-Royce now wish to move to preemptive fixed priority scheduling as part of developing mixed-criticality systems. In this talk, the original baseline scheduling approach will be described, then the different motivations (to those originally introduced by Vestal or talked about in the current literature) for moving to mixed-criticality scheduling will be described before finally talking about the challenges of using mixed-criticality scheduling will be illustrated through real examples. The talk will concentrate on the different options for the making the overheads lightweight and transforming the existing software into tasks so that the system can be schedulable. It will conclude with a set of research challenges that the community may like to consider.

## BIOGRAPHIES

Iain Bate is a senior lecturer in Real-Time Systems at the Computer Science Department, University of York. His PhD work has scheduled all Rolls-Royce aircraft engines developed in the last 15 years. His research interests include scheduling and timing analysis, design and analysis of safety-critical systems, and engineering of complex systems of systems including Wireless Sensor Networks. He is the Editor-in-Chief of the Journal of Systems Architecture.

Stephen Law is a Principal Software Engineer at Rolls-Royce Control Systems in Birmingham. He is also studying a PhD with the University of York looking at the application of advanced real time research, in an industrial context. At Rolls-Royce Stephen is currently leading a Research & Technology team working on the SECT-AIR project looking at the architecture, tooling and development processes for future controls and monitoring systems at Rolls-Royce.