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Modelling Patterns for Systems of Systems Architectures

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Abstract

This briefing presents an initial report on modelling patterns and architectures for system of systems (SoSs) and their constituent systems (CSs). Fundamental architectural principles for systems and SoSs and relevant work published so far are discussed and summarised. We introduce an initial set of architectural patterns suitable for SoS design, illustrating each pattern with an SoS example and identifying how it meet some basic SoS aims. Finally, we summarise our plans for developing these ideas in the future.

Biography

Dr. Claire Ingram earned her PhD at Newcastle University in 2011 with a thesis that involved developing new metrics to investigate whether early project data can be used to predict later change-proneness. She has worked on DESTECs, an EU-funded project which produced new tools and techniques to support collaborative, cross-disciplinary development of fault-tolerant embedded systems. She has also contributed to COMPASS, a project which developed model-based techniques for systems of systems (SoS) engineering, where she worked on modeling efforts as well as roadmapping. Currently she works on projects in SoS engineering as well as in cyber-physical systems (CPS) engineering, including the EU project, CPSE Labs, that provides support for innovators around Europe. Her research interests span empirical software engineering, software metrics, architectural modeling and SoS engineering as well as cross-disciplinary development methods.

Dr. Richard Payne obtained his PhD in 2012 at Newcastle University, with a thesis examining formal verification of policies defined using a reconfiguration policy language (RPL) for the governance of resilient component-based systems. Richard worked on the UK Ministry of Defence funded SSEI project, investigating the use of contract-based interface specification in system of systems architectural models. He worked on the EU-funded COMPASS project, specifically studying architectural modelling, fault modelling and tool development for SoSs. Richard is currently working on several SoS and cyber-physical system projects, including the EU H2020 INTO-CPS project which is aiming to produce a model-based tool chain for CPS design and development. His research interests include system architectural modelling, architectural reconfiguration, the pragmatic application of formal modelling, and systems of systems engineering.