# System of Systems EngineeringCollaborators Information Exchange (SoSECIE)

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**A Design Method for Collaborative Systems of Systems Applied to Metropolitan Multi-Mode Transport System**

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#### Abstract

Systems of systems arise when independently owned, operated and developed systems can achieve mutual benefits by working together. In collaborative systems of systems, there is no directing entity that instructs others how and when to collaborate. Instead, the collaboration relies on independent decisions by the constituent systems to form collaborating constellations, and the benefits are emergent properties of this. In this paper, we describe a design method for engineering collaborative systems of systems. We apply the method to the design of a collaborative system of systems for mobility in a rural setting close to an urban area and to truck platooning.

#### Biographies

Pontus Svenson is a senior scientist at RISE Research Institutes of Sweden. He received a PhD in Theoretical Physics in 2001 and has a 15-year background at the Swedish Defence Research Institute (FOI), where he worked on decision support, situation awareness and data fusion, mainly for military intelligence and critical infrastructure protection. His current research is focused on systems of systems engineering, and in particular on resilience and situation awareness aspects within the transportation and critical infrastructure domains. He is the author of around 100 scientific publications and a member of INCOSE.

Frida Reichenberg is a research and development engineer at AstaZero; a full-scale independent test environment for future road safety. She has a background in both research (as a researcher at RISE Research Institutes of Sweden and The Swedish National Road and Transport Research Institute VTI) and about 12 years in the industry as a software developer. Her research focuses on systems engineering, vehicle software, simulations, C-ITS and system-of-systems.

Jakob Axelsson is professor of computer science at Mälardalen University in Sweden and senior research leader in systems-of-systems at RISE Research Institutes of Sweden. He received a PhD in computer systems in 1997, and has a background of about 15 years in industry, mainly in the automotive domain at Volvo where he was involved in research and advanced engineering in areas such as system architecture, systems engineering, and model-based development. His current research interests are focused on systems-of-systems engineering, where he is leading a number of projects in domains such as transportation and construction. He is the author of around 100 research papers. He is a member of INCOSE and has been chairman of the Swedish chapter.