

Development of Operational Architecture for the Automated Driving Minibus Undergoing Demonstration Testing in Shiojiri City

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As automated driving technologies expand beyond private passenger vehicles into public transportation and logistics, their value must be considered not only at the vehicle level but also within broader social and operational contexts. These trends require the automotive industry to shift its perspective from product-centered value creation toward service-oriented and system-level value within Mobility as a Service (MaaS) and regional digital transformation.

JCOSE Automotive WG Sub-WG#4 worked on the challenges of understanding and structuring the operational context of automated driving services through a case study of the Shiojiri City automated driving minibus project, which is positioned as a component of the city's local digital transformation strategy requiring consideration of a wider range of stakeholders, lifecycle stages, and external systems.

Initially, qualitative context analyses were conducted using whiteboard-based approaches inspired by SysML®, focusing on lifecycle stages, stakeholder identification, stakeholder needs analysis using PESTEL, task allocation between humans and automated systems, and interactions with external systems. While this approach helped clarify the diversity of stakeholders and task boundaries, it also revealed limitations in managing scale, complexity, and shared understanding.

To address these limitations, an experimental application of Unified Architecture Framework® (UAF) was performed to develop structured and organized understanding on the operational context without prematurely constraining technical solutions. The results indicate that the application of UAF is effective but must be carefully scoped and tailored.

This study demonstrates the value of systems engineering in supporting informed decision-making and successful social implementation of the automated driving minibus service as a component of Shiojiri city.

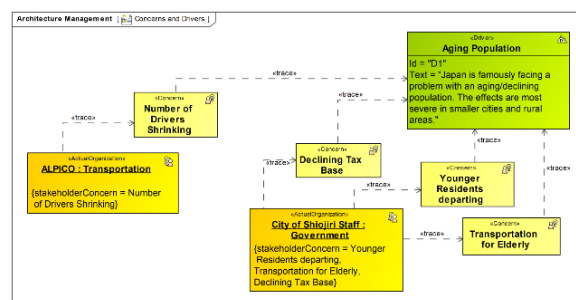


Fig. 1 Visualization of concerns and stakeholders

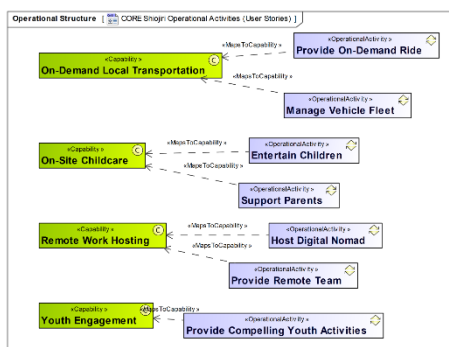


Fig. 3 Capabilities and activities contributing to solutions

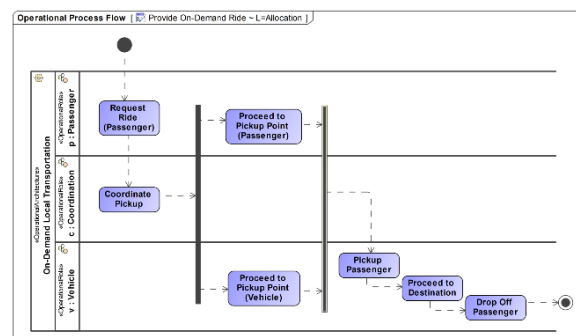


Fig. 2 Basic elements and allocation of on demand public transformation service