# Engage: Engineering Service Modes with WS-Engineer and Dino

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**Abstract.** In this demonstration[1] we present an approach to engineering service brokering requirements and capabilities using the concepts of Service Modes. The demonstration illustrates building service modes in UML2 with Rational Software Modeller, transforming modes in WS-Engineer and generating artefacts for runtime service brokering.

## 1 The Service Modes Approach

A mode, in the context of service engineering, aims to provide an easily accessible mechanism for developing adaptive service brokering requirements. Service modes are an abstraction of a set of services that collaborate to achieve a task or sub-tasks. A *Service Modes Architecture* consists of specifying the service components, their configuration and behaviour required or provided, and their interface specifications. We developed and apply a UML Service Modes Profile [1] to identify various elements of the service configuration elements for service brokering, and reuse this in the approach to identify required and provided services in modes. A service modes model consists of a number of mode packages, which themselves contain collaborations with configurations of service components and their requirements or capabilities. If a service component is specified as required, it identifies the service component for service discovery. Alternatively, if a service component is specified as provided, it identifies the service component as *offered* in service discovery. Additionally, service component bindings may reference binding constraints, offering non-functional requirements or capabilities (such as expected response times for the service specified).

We also provide transformations from service mode models to service brokering requirements and capability specifications (initially for a specific service broker *Dino* from University College London). The transformations generate documents which are deployed on to a runtime broker. Thus, at runtime the requirements documents are used by service clients to create a new brokering session and trigger discovery of required services. Capabilities may also be registered with the service broker, which offers provided services and adds service capability to discoverable services.

[1] Sponsored by the EU funded project SENSORIA (IST-2005-016004).

L. Baresi, C.-H. Chi, and J. Suzuki (Eds.): ICSOC-ServiceWave 2009, LNCS 5900, pp. 641–642, 2009.

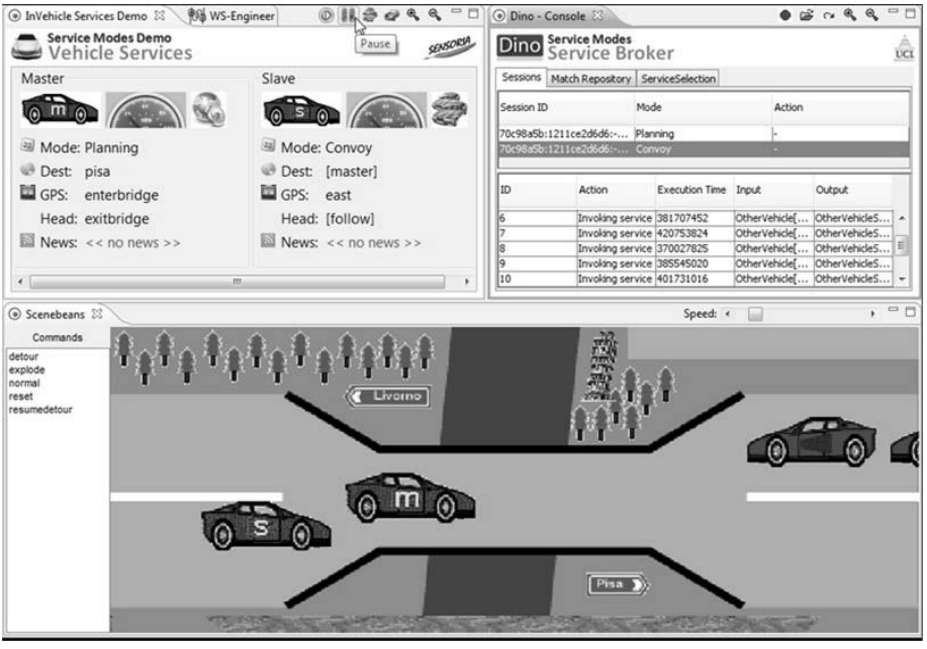


**Fig. 1.** Demonstration of In-Vehicle Service Modes

## 2 The Demonstration

The demonstration illustrates service modes for an In-Vehicle Services Architecture. The scenarios used as requirements for this example consider two vehicles in different roles, namely a Master role (planning mode) and a Slave role (convoy and detour modes). The demonstration takes place in three core stages. Firstly, a service mode model for several modes of an In-Vehicle Services Architecture is described. The audience is taken through a series of mode packages illustrating both the approach of constructing service configuration specifications using the UML Modes profile and those elements which are referenced to the core UML model. More specifically, service brokering requirements and capabilities are highlighted. The second stage takes this model and mechanically transforms the model modes to service brokering runtime documents. The audience is taken through these documents, their structure and how this links to elements of both the model and runtime requirements. Finally, the generated documents are used directly for a runtime example of brokering in a simulation (as a vehicle animation illustrated in Figure 1) of the In-Vehicle Services scenario.

## References

1. Foster, H., Mukhija, A., Uchitel, S., Rosenblum, D.S.: A Model-Driven Approach to Dynamic and Adaptive Service Brokering using Modes. In: Bouguettaya, A., Krueger, I., Margaria, T. (eds.) ICSOC 2008. LNCS, vol. 5364, pp. 558–564. Springer, Heidelberg (2008)