

An Indian-Australian research partnership

A Semantic Centric methodology for Designing Service Oriented Software Systems for Sustainable Manufacturing

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The problem

Specific research issues include the following:

- Application of the principles of model engineering to process engineering: As the software life cycle involves a sequence of model transformations in the model driven engineering approach, it is essential to represent this by a precise process [Bezivin and Breton, 2004].
- Derivation of a business process ontology for environmentally sustainable manufacturing enterprises and evolving the service-oriented architecture into a service-oriented enterprise [Sanchez-Ruiz and Hansen, 2005; Brown and Carpenter, 2004].
- Development of Testable Service Oriented Business Applications & libraries, and: registration of services in a business service directory; dynamically discovering and dynamic binding of services; and management of future changes within the agile enterprise.
- Ensuring trust in correctness when dealing with global partners and services composed using their services
- Ensuring reliability when composing services from these partners who are outside the control of the system and the provision of dependability of services at run-time [Fitzgerald et al., 2004, Tsai et al.2005].

The project

The proposal aims at researching and developing methodologies for designing testable service-oriented software systems for environmentally sustainable manufacturing. The proposal links the concept of *Design for Testing* of software systems to the concept of *Design for Environment* to reduce the environmental impact of manufactured products and the processes associated with such products. Linking these two design concepts emerging from the two disciplines of software engineering and environmental management [Ramakrishnan and Ramakrishnan, 2006], the proposal deals with the delivery of environmental knowledge via software services to end users in manufacturing companies. While the focus of the methodology to be developed in the project will be environmentally sustainable manufacturing, the method will be generic enough for modelling and validation of software services that are needed for other application areas and many industry sectors.

Expected outcomes

- Software Services Engineering theory - development of a new method for modelling and validating software as dependable, adaptable and trustable service by focussing on testability issues in designing service-oriented systems and evaluating the design by designing a test bed for software services.
- Business process modelling and ontology creation in an environmentally sustainable manufacturing domain for the reduction of global warming impact of automotive component manufacturing using light metals as a case study.
- A test bed that supports the method and demonstrates innovative services for intra-enterprise services and inter-enterprises in environmentally sustainable manufacturing

- Empirical evaluation of software services developed for automotive component manufactured using light metals (e.g. Aluminium or Magnesium) with a domain expert from CSIRO/Monash providing the domain knowledge for a case study.