

SODA+TuCSoN

Situated Process Engineering for Integrating Processes
from Methodologies to Infrastructures

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- 2 Background
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Scenario

- The creation of a single universally-applicable development process is a recognised **chimera**
 - Software designers tend to define **their own problem-specific process** by means of the **Method engineering** technique
 - New process can be created starting from existing process parts (**method fragments**)
- A unified meta-model and a specific AO Method Engineering technique are needed, allowing existing methodologies/ processes to be represented and integrated in a **uniform** way
- The **Software Process Engineering Metamodel (SPEM) 2.0** [Object Management Group, 2008] and the **Agent-Oriented Situational Method Engineering** [Cossentino et al., 2008] seem to be the natural candidates



Objectives

- Understanding the semantics of the infrastructures' processes
- Exploring SPEM 2.0 applicability to the AOSE methodologies and infrastructures
- Exploring the applicability of Agent-Oriented Situational Method Engineering for composing methodologies and infrastructures
- A simple case study:
 - ▶ methodology: SODA
 - ▶ infrastructure: TuCSoS



AOSE Methodologies & MAS Infrastructures: The Gap

AOSE methodologies: top-down evolution

- Most AOSE methodologies have mostly followed a **top-down evolution path**, where abstractions and metaphors (models and structures) from human organisations have been used to analyse, model and design software systems
- This is the case of methodologies like Gaia, Tropos, PASSI and SODA



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MAS infrastructure: bottom-up evolution

- Many MAS infrastructures have mostly followed a **bottom-up evolution path**, evolving out of necessity from existing programming languages and development environments, “stretching” the agent paradigm on top of more traditional paradigms and technologies
- Despite JADE, TuCSoN, TOTA, among the many others, introduce specific agent-oriented abstractions, yet, the imprint of the object-oriented paradigm is still visible—for instance, in agents taking the form of Java threads



Previous works

- [Cabri et al., 2008] and [Molesini et al., 2008] explore a mapping between methodologies' meta-models and infrastructures' meta-models
- Such investigations have paved the way towards a more precise mapping between the concepts supported by methodologies and infrastructures leading to the definition of infrastructures' meta-models
- However, this is still not enough for a software development process aimed at covering all the stages of the software lifecycle
- In fact, this approach provides only guidelines on abstractions' mapping. . .
- . . . but says nothing about the process resulting from such an integration and how to use it



Infrastructures' Process

- The presence of a specific infrastructure clearly affects the engineering process [Molesini et al., 2009]
 - There would be no need to design a function if it is already provided by the services/functionalities of the selected infrastructure
 - The methodologies processes could be influenced by the adoption of an infrastructure instead of another
 - Infrastructures represent a **key piece of the software development process**
- Infrastructures **do** have a process behind them
- ▶ it is usually 'silent' and unspecified
- To define a complete software development process, we believe that such an infrastructure process needs to come 'out of the water', so as to be first explicitly detailed, and then clearly integrated with the methodologies' process



key idea

- We mean to re-use
 - ▶ Agent-Oriented Situational Method Engineering (AO-SME) technique [Cossentino et al., 2008, Cossentino et al., 2007]
 - ▶ Software Process Engineering Meta-model (SPEM) [Object Management Group, 2008]
 - For integrating methodologies and infrastructures
- We consider methodology and infrastructure as **two fragments** to be integrated in order to obtain a new software process
- We use the integration between SODA and TuCSoN as a case study

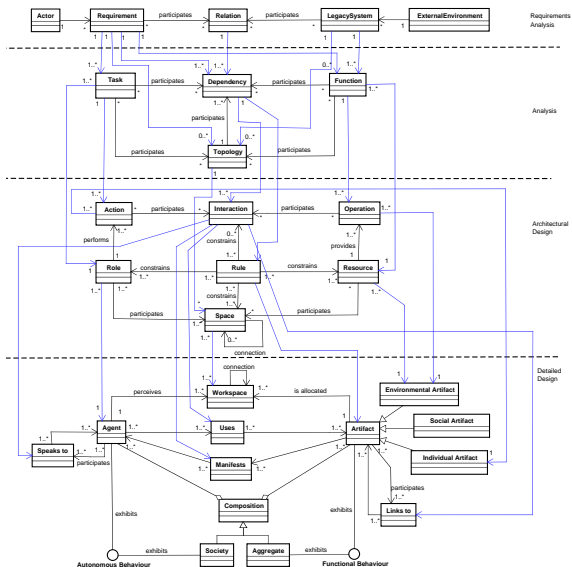


Outline

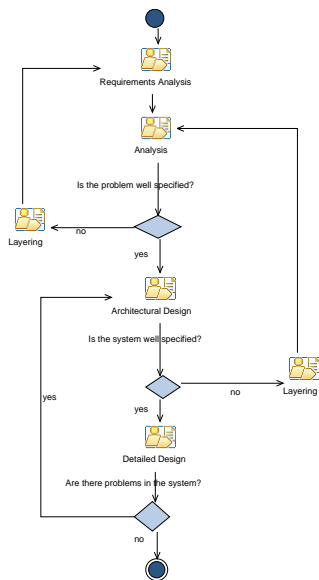
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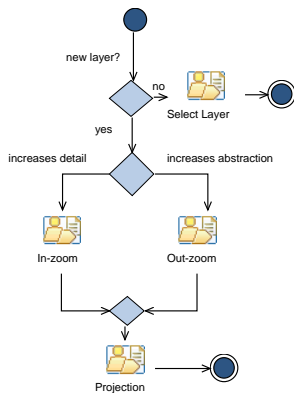
The SODA meta-model



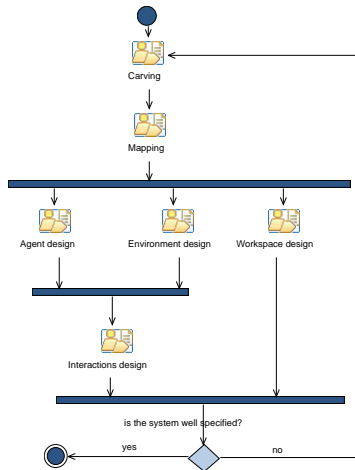
The SODA Process



Layering in SODA as a Capability Pattern



Detailed Design Process

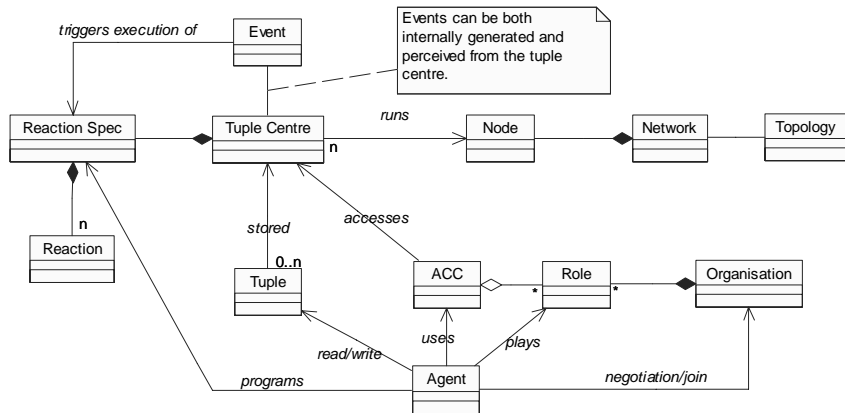


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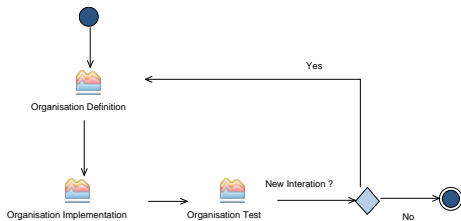
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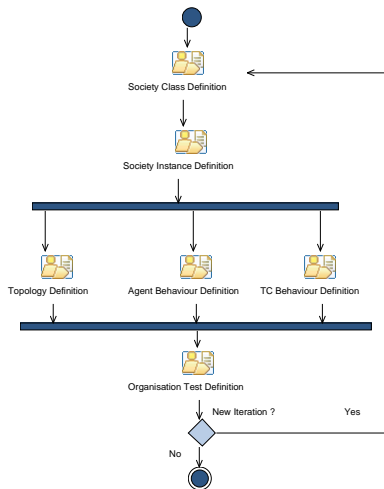
The TuCSoN meta-model



TuCSoN Process



Organisation Definition Process



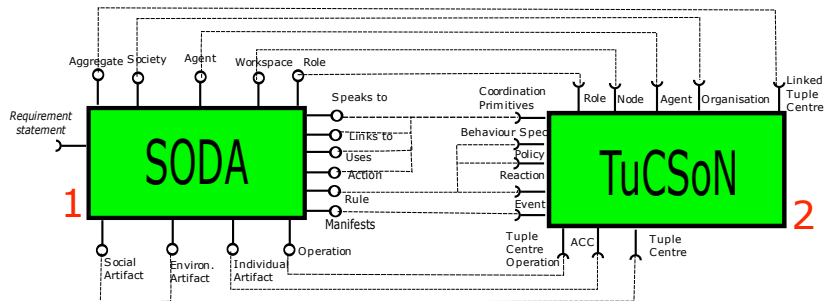
Agent-Oriented Situational Method Engineering

- Our approach is based on the composition process approach by Cossentino et al. [Cossentino et al., 2008]
 - ▶ *process analysis* → kind of process & a set of MAS Meta-model elements (MMMEs)
 - ▶ *process design* → method fragments selection and assembly
 - ▶ *process deployment* → process instantiation



Analysis outcome

- Since both SODA process and TuCSon process are iterative and incremental
- SODA+TuCSon will be iterative and incremental
- MMMEs mapping:



Key questions

- The integration between a methodology process and an infrastructure process raises a new peculiar problem:
 - ▶ the impact of the infrastructure process onto the software engineering process
- So, a process designer should be prepared to answer several key questions before facing the process integration:
 - ▶ Where does the infrastructure process intervene?
 - ▶ Does the integration change the methodology or infrastructure – and if so, how – and the format of their Workproducts?
 - ▶ ...

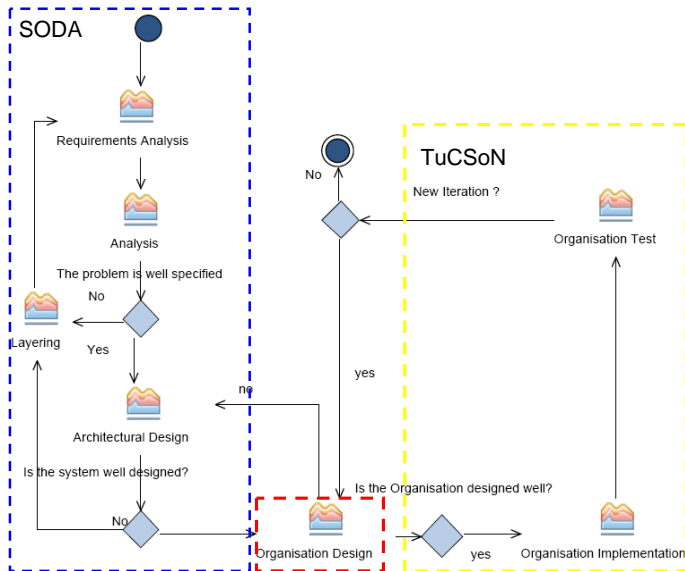


The SODA+TuCSoS integrated process

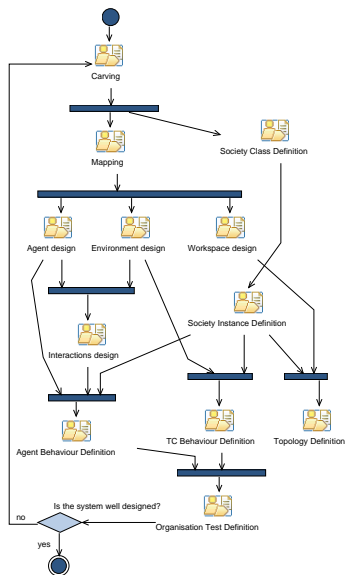
- The TuCSoS process can be naturally located at the end of the SODA process
 - ▶ SODA is neutral with respect to the implementation technologies
 - ▶ The MMMEs involved in the assembly are just either SODA abstractions that belong to the Design phase, or TuCSoS abstractions belonging to the Organisation Definition phase
 - ▶ Since neither SODA nor TuCSoS make any assumption on the nature of agents, TuCSoS does not influence the SODA process in its early stages, nor does SODA influence the TuCSoS process' late stages
- SODA does not change its nature in the integration
 - ▶ SODA Workproducts could change



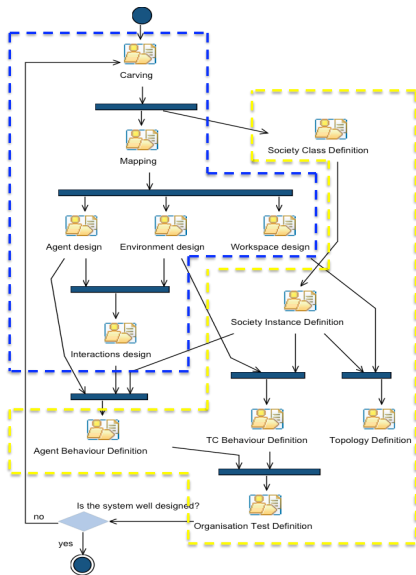
The SODA+TuCSoN integrated process



Organisation Design Process



Organisation Design Process



Conclusions

- Since this research is still in its early stage, we are well aware that our current approach opens many questions, which are only partially addressed
 - ▶ the role and the impact of the MAS infrastructures in the software engineering process
 - ▶ the meaning of a process of an infrastructure
- Future works
 - ▶ a generalisation of our study about of the methodologies and infrastructure integration
 - ▶ the improvement of the description of the TuCSoN process
 - ▶ a better understanding of the adequacy of the SME technique and of the prioritisation algorithm to evaluate whether they could cover “as they are” also the integration among methodologies and infrastructures fragments that present the new issues highlighted or they need some extension
 - ▶ we also plan to make the same experiments with other methodologies and infrastructures



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