Abstract. Developing complex systems is generally simplified if designer is guided by method from Software Engineering. However a single engineering process is often not enough to cover all the possible requirements due to different levels of expertise and systems to design. Currently, Agent Oriented Software Engineering methods aim at providing an adaptive engineering process. The method processes have been broken up into different parts called fragments, enabling the mix of different engineering processes’ parts to get better adequacy between the system to be done and the process. But some difficulties still remain concerning the expertise needed to compose these fragments when the amount of fragments prevents the composition to be done by hand. This paper presents an Adaptive Multi-Agent Systems (AMAS) to deal with a new paradigm of automated fragments combining. This process is made from both the characteristics of users and system and the known fragments. Thanks to their information, agents of the AMAS self-organise and design a tailored method process. The developed system is described and then usual tests are depicted.

1 Introduction

Software reuse is generally considered as one of the most effective ways of increasing productivity and improving quality of software. To make software reuse happens, however, there is a change in the way engineers develop software: software is currently developed for reuse and with reuse. Component-based software engineering [1] is a software engineering paradigm in which applications are developed by integrating existing components. Reuse of software engineering is becoming more and more important in a variety of aspects of software engineering.

In the same way, in Agent-Oriented Software Engineering (AOSE), a lot of different methods, each with its advantages and its drawbacks [2], Methods have to deal with these characteristics and capabilities of agents or systems. An attempt is to benefit from different methods by combining their particular features. For example, attempts have been made to combine requirements analysis in TROPOS and self-adaptation in ADELFE [3].

Coming from Situational Method Engineering, decomposing processes into pieces has interested the AOSE community because of the expected benefits of flexibility. The aim is to adapt the process to the characteristics of the business
problem and to the level of expertise of engineer teams by proposing to assemble pieces of methods, named fragments, of various processes. In a first step, several teams have to split up methods into fragments and provide a precise description of them (ADELFE[4], INGENIAS [5], PASSI [6], TROPOS [7] ...). Two main results have been obtained from this step: (i) a means to precisely compare the different methods and (ii) a potential repository of fragments that will serve the community to compose new processes [8]. This kind of work is mainly done in the Foundation for Intelligent Physical Agents (FIPA) context.

Currently some propositions to combine fragments have been already made, but they are mainly based on the know-how of the method engineer. In this paper, we propose a first step forward an automatic way to design a method process based on MAS technology. The process is constructed by combining fragments "on the fly" to be adapted to the specific situations of the projects at hand. The new process is based on both fragment compatibility and user characteristics. In order to respond to this need, the presented work details the use of an Adaptive Multi-Agent Systems (AMAS) which relies the cooperation of its agents to work together, making this approach especially suited to deal with highly dynamic systems such as the design of an interactive and adaptive Software Engineering Process (SEP) [4]. In this work, an AMAS is built by modelling fragments as autonomous entities.

This paper is organized as follows. First, section 2 explain the aim of this system. Then, section 3 introduces the system of Self-Combining fRagments (SCoRe) and details the behaviour of the involved agents as well as their interactions. Section 4 focuses on some usual tests and explain the results obtained. Finally, section 5 describes related works before concluding in section 6.

2 Why Such a System?

Request of Tailored Method. While the demand for specific, complex and varied system continues to grow, current methods in the MAS domain remain limited and sometimes not well adapted. For example, in order to propose a simulation-based process for the development of MASs which incorporates a simulation phase for the prototyping of the MAS being developed and for functional and non-functional validation, PASSIM was obtained by integrating method fragments from the PASSI for carrying out the analysis, design and coding phases, and the Distilled State Charts (DSC)-based simulation method for supporting the simulation phase [9]. The need for well-defined guidelines that will make the development process more efficient and more effective has become crucial. Currently, there is no single methodology that can be uniquely pointed as "the best". Until now methodology adjustments to the specific requirements and constraints are mixed in "local" adaptations and modifications. In order to succeed in creating good situational methodologies, i.e., methodologies that best fit given situations, fragment representation and cataloguing are very important.

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