

Advantages of a Full Integration between Agents and Workflows

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Abstract. This poster describes the notion of a *full* integration of agents and workflows. It differentiates the term from the more common *partial* integrations already well documented and researched. Finally, the advantages of a full integration are discussed.

Multi-agent systems feature a very structure-centric perspective on a software system. Agents are the main modelling abstraction, and other aspects are always seen in relation to them. Workflow systems on the other hand feature a very behaviour-centric perspective. The main abstraction here are the workflows/processes, which incorporate the data/information about other aspects. An integration of the two concepts agent and workflow can offer many advantages. These advantages represent the first outcomes in our current research on modelling systems and are the main result presented in this poster.

It is possible to differentiate between two kinds of integrations: partial and full. In a partial integration one of the concepts is used to enhance the other one. This includes agent-based workflow management systems (WFMS) and workflow-based agent management systems. Partial integrations feature only one of the two concepts main abstraction. This main abstraction may be enhanced and enriched in a number of ways, but still remains, at its core, either an agent or a workflow. This limits the potential benefits in a partial integration.

A full integration between agents and workflows aims to address that limit. In contrast to partial integrations it features both agents *and* workflows incorporated into one main modelling unit. This unit can serve as agent, workflow, or a hybrid between the two and can dynamically change its role during runtime. We call these hybrids that provide all the functionality agents and workflows would usually provide, including communication and user interaction facilities, entities. Using entities enables a system modeller to dynamically switch and mix structural and behavioural aspects of a system. This allows for a new integrated perspective on the system during development.

There are numerous examples of partial integrations. Agent-based WFMS are, for example, presented in [1,2]. A workflow-based agent management system is discussed in [3]. All of these make use of both concepts to provide an enhanced modelling experience. They still only offer extended classical workflow or agent functionality and do not feature the possibilities of a full integration. To the best of our knowledge there are no examples of full integrations.

A full integration between agents and workflows exhibits a number of advantages to the system modeller. These assume an efficient and comprehensive implementation of a full integration system (see last paragraphs for outlook).

Abstraction The abstraction of the individual concepts into one unified entity enables a freedom to work with dynamic and hybrid constructs. Entities can operate as agents, workflows, or something in between. They can dynamically adapt to the requirements before, acting as an agent at one point and processing like a workflow at another. Entities naturally and directly incorporate any and all mechanisms, facilities, and properties of agents and workflows. Consequently, providing these characteristics in dynamic ways becomes far easier.

Flexibility Allowing a modeller to use agents and workflows on the same abstraction level, allows to model a system along the two dimensions *structure* and *behaviour*. Classically, only one of these dimensions was in the foreground, while modelling aspects of the other was heavily biased by the original dimension. This two-dimensional modelling enables a modeller to utilise the dynamic interaction between agents and workflows on a conceptual level.

Simplicity A full integration offers the combined capabilities of agents and workflows. It does so by providing simple-to-use and predefined constructs (entities) which allow a modeller to make full use of the strengths of agents **and** workflows. The entities in themselves can be used similarly to agents and workflows, but possess a larger spectrum of capabilities.

Expressiveness A full integration cannot necessarily express more than the classical paradigms. However, in the classical paradigms complex helper constructs might be necessary to implement more complicated structures available directly in a full integration. This means that a full integration is capable of expressing more constructs in a natural and simple way.

Enrichment The enrichment aspect, the main advantage of partial integration, is also applicable in a full integration. In fact, it is even more emphasised, since an entity can be improved from both its agent and workflow side.

Concerning future work the provision of a comprehensive implementation of a full integration is the main focus. Currently, the work is centred on establishing a working prototype as proof-of-concept. In conclusion, a full integration offers many beneficial advantages in comparison to classical systems. When extensively and efficiently implemented, it is a powerful tool for a system modeller to use.

References

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