Towards Adoption and Use of i* to Support Enterprise Architecture in Organizational Settings: a Position Paper

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Abstract. The i* modeling framework has over the last decade received much attention amongst research groups worldwide. However, despite the proliferation of i* research, there has been little work to-date to exploring the adoption and use of i* in enterprise organizational settings. This paper discusses some key challenges for using i* in an enterprise to support the modeling and analysis of distributed decision-making during the design and evolution of an enterprise architecture in an organizational setting, and proposes a research agenda to address such challenges in order to facilitate the adoption and use of i* in enterprise organizations.

Keywords: Enterprise Architecture, Decision-orientation, Agent-orientation, Goal-orientation, distributed decision-making

1. Introduction

The i* modeling framework has over the last decade received much attention amongst research groups worldwide. However, despite the branching out of i* research into various domains, there has been little work to-date on exploring the adoption and use of i* to support stakeholder and designers involved in distributed decision-making in general and during the design and evolution of an enterprise architecture in an organizational setting in particular. Yet, the i* modeling framework appears particularly well suited to support enterprise architectural decision-making in organizations, which requires dealing with the interests and needs and decision-making of various business and technical stakeholders and designers holding different responsibilities in organizational setting. For example, using intentional actors and goal concepts supports representing and analyzing the different organizational stakeholders and designers, their interests and decision-making, and their organizational interdependence, while they aim to achieve respective goals.

However, supporting distributed decision-making during enterprise architectural design and evolution in an organizational setting raises various modeling and methodological challenges. For example, it is common for large organizations to operate hundreds if not thousands of business applications to support their business processes and strategy, with different teams maintaining and evolving different

enterprise applications in the organization [1]. Various decisions that individual teams more or less independently make could potentially affect whether the enterprise organization as a whole is hindered or helped in achieving short term and/or longer term goals [1, 2]. At the same time various management stakeholders and enterprise-wide architects aim to promote enterprise wide business and technical goals and choices across the organization, negotiating decisions, the adoption of decisions as well as dealing within decision compliance in the organization [3, 4]. Decision making must thus be coordinated across teams and across managerial levels [5].

Furthermore, in large organizations decision-making authority is by necessity distributed [6, 7]. Different organizational participants, each contributing distinct knowledge and skills, are given authority and autonomy to make decisions. A key challenge is to allow for autonomous decision-making in various organizational localities, while ensuring the overall consistency of decision-making within the enterprise organization [8].

Challenges also emerge from the various different knowledge domains organizational participants work in and the different levels and scope of details associated with participants' individual vantage points. For example, strategic management stakeholders are often interested in the enterprise as a whole and the broader market place, while business architects' main interests are business structures and processes. Enterprise wide architects' main focus is on the enterprise application landscape, while individual enterprise application architects look at individual capabilities and services provided to the enterprise. While each such organizational participants have distinct responsibilities and purposes in mind, alignment across such diverse domains and vantage points during decision-making is essential to the success of the enterprise.

Finally, there are also challenges related to the adoption of novel methods and related tool support. Introducing new methods and tools to relevant stakeholders and designers in enterprise organizations is usually a difficult task. Organizational participants often have limited time and budget available for learning and exploring novel modeling and analysis techniques.

Furthermore, usually there are many different enterprise tools in use in an enterprise organization to support the development and deployment of business strategies, processes and applications. Tools that support the various organizational participants need to be integrated with an i* decision modeling and management tool to support the systematic linking of decision-making to artifact creation, change and evolution. Tool support also needs to be tailored to the needs of various different tool users, each with a different vantage point on decision-making. For example, a management stakeholder would likely have a different stake in decision-making than enterprise architects, each needing different kinds of features and views on decision-making in the organization.

2. Objectives of the research

The overall objective of this research is to study the adoption and use of the i* modeling framework in an enterprise organizational setting to support dealing with

distributed decision-making during enterprise architectural design and evolution. To this end this research aims to explore:

a) in what way the i* decision modeling and analysis approach could be adapted to meet the needs of different types of organizational participants in an enterprise organizational setting while individually, collectively and/or collaboratively performing decision tasks;
b) what additional modeling and analysis features could be identified to support distributed decision-making tasks in an enterprise organizational setting; including support for dealing with decision-making at different organizational levels of abstraction, such as the enterprise business level, the business processes level, the enterprise architecture level, the enterprise application level, and enterprise component level, as well as the IT infrastructure level [9];
c) what individual and collaborative tools to offer to organizational participants to support i* modeling and analysis in an enterprise setting, including how different stakeholders and designers with different technical skills could be supported, as well as the integration of tool support into the existing modeling and analysis tool set used by stakeholders in the enterprise organization;
d) how to deal with in an integrated manner with qualitative and quantitative goals and goal reasoning often employed in enterprise organizational settings;
e) how to ease the adoption and use of the notation, method and tool; this involves exploring user interaction with the notation, method and tools in general and usability of the modeling notation and language and tool support in particular.

The aforementioned research objectives are quite broad and should rather be seen as outlining a research agenda that involves different research strands, each focusing on a different aspect of the problem of facilitating the adoption and use of the i* modeling framework to support enterprise architectural design within an enterprise organizational setting.

3. Scientific contributions

While much work has been done on exploring different areas in which the i* modeling framework can be applied to advantage, little work to-date has focused on the application and use the i* modeling framework to support distributed reasoning and decision-making in enterprises in general and during enterprise architectural decision-making in an enterprise organizational setting in particular [8, 10]. More specifically, little work has been done on exploring the use of intentional actor and goals to represent and analyze design reasoning and decision-making of different organizational participants in enterprise organizations who hold different

organizational responsibilities, and pursue conflicting and/or synergistic business or system goals.

This research can also be seen as contribution to the body of works related to Enterprise Architecture [1, 3], which deals with the continuous and iterative improvement of existing and planned IT support for an organization to support the organizations business processes, goals and strategies [1]. Current works on Enterprise Architecture mainly focus on the artifacts produced and evolved during enterprise architectural efforts. Little work has looked at the intentional and organizational decision-making dimension that occurs during architectural and architectural relevant decision-making [10, 11].

4. Ongoing and future work

Some initial work has been done in applying i* within an enterprise organizational setting. One work explored the use of i* to support understanding stakeholders decision-making viewpoints during an enterprise-wide architectural evolution effort towards service-orientation, while another work looked a tactical change in a product during an enterprise wide architectural evolution effort [8, 10, 12]. During these works some possible extensions to i* have been identified such as intentional viewpoint concept to support representing and reasoning about alternative argumentations put forward by architectural designers, who have overlapping areas of responsibilities in the organization; as well as the linking of i* models to models of business and architectural design artifacts produced as a result of decision-making.

During this initial research work, the need for a broader investigation into the adoption and use of i* in enterprise organizations, as outlined in Section 2, was identified.

Feedback on the use of i* in an enterprise organization for example indicated the need to tailor i* models, and in particular strategic rationale models, to the specific needs of stakeholders and designers in the organization. Some designers require a deeper understanding of the design issues and argumentation at hand and thus need detailed rationale models; while other designers only need brief reminders of rationales for choices to continue committing to them. For such purpose a simplified version of a rationale model is already sufficient. Managerial stakeholders in enterprise organizations were only interested in governance aspects – in what way architectural choices downstream support (or hinder) short term or longer termed organizational goals. For such managers a higher level "dashboard" offering a (real time) views on goal achievement in the organization, including qualitative goals, would be appropriate.

Feedback also indicated the essential need for adequate tool support to facilitate the adoption and use of i* in an enterprise organizational setting. This research therefore includes in its future research effort the exploration and development of adequate tool support to facilitate the adoption of i* modeling and analysis approach within an enterprise organizational setting.

Developing tools that practitioners can use is in particular important since without adequate tool support that is to a sufficient extend integrated with already existing

enterprise tools, it is difficult to encourage organizational participants to adopt and use on their own a novel modeling approach. Having adequate tool that practitioners derive value from and are willing to use, would also be a useful vehicle to study the adoption and use of i* in an enterprise, and to derive additional modeling and analysis requirements. Such an intertwined approach would be consistent with the action research approach [13], a participatory research approach where researchers and study participants are jointly engaged in problems solving (i.e. such as to improve the organizational distributed decision-making capability) through iterative learning cycles and knowledge creation.

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