Stakeholder Ontology and Mining for Improving Complex Services

Jay Ramanathan, CETI, Computer Science and Engineering, The Ohio State University, Columbus, OH, USA
Rajiv Ramnath, CETI, Computer Science and Engineering, The Ohio State University, Columbus, OH, USA

ABSTRACT

Complex service-oriented organizations (such as IT customer service or the hospital emergency) deal with many challenges due to incoming request types that we characterize as non-routine. Each such request reflects significant variations in the environment and consequently requirements, which drives discovery of processing needs. At the same time such organizations are often challenged with sharing high-cost resources and satisfying multiple stakeholders with different expectations. Performance improvement in this context is particularly challenging and requires new methods. To address this, the authors present an ontology designed for highly dynamic service organizations where traceable workflow data is difficult to obtain and there are many stakeholders. The ontology provides the contextual framework by with useful knowledge can be successfully extracted from mined performance data obtained from scattered sources. Specifically the service ontology 1) obtains tacit knowledge as explicit in-the-micro feedback from workers performing Roles, 2) provides the structure for organizing in-the-small execution data from evolving process and instances, and 3) aggregates process instances metrics into a performance and decision-making facility to align to in-the-large goals of stakeholders. Using actual customer service requests they illustrate the benefits of the ontology for relating aggregated goals to feedback from individual roles of workers. The authors also illustrate the benefits in terms of identifying actionable improvement targets.

Keywords: Complex Services, Information Technology, Mining, Ontology, Performance Data, Stakeholder

INTRODUCTION

Complex knowledge-intensive processes are challenging to improve. This is because the improvements of a single service alone will not necessarily improve the overall complex system. A good example of a complex system is the emergency admittance in a hospital. In this case the patient’s condition and requirements are not known. Hence the right questions must be asked by the ‘triage’ nurse Role to identify the required knowledge assignments (i.e. a cardiac specialist) and the services that are to be delivered when the resources become available.

DOI: 10.4018/jisss.2013040105
That is, during any Interaction between Roles the need for other sub-interactions is often dynamically discovered. This example also illustrates where each knowledge worker makes decisions about the local workflow in the micro-dimension. (Here we use the term ‘dimension’ to refer to events that happen in a similar time scale and are of interest to a particular group of stakeholders.) At the same time the patient flow process in-the-small-dimension from the emergency room to the discharge also varies for each patient. Finally, at a macro-dimension the minute differences of the micro scale are not treatable as important, but broadly stated as “all patients are attended by the same organizations in a predetermined manner to deliver effective health care services”.

Thus complex systems, due to their creative nature, are also challenging to manage at a macro scale because they fundamentally encourage participants to apply their own evolving personal expertise at the micro scale to augment shared and more static organizational process knowledge. However as we shall see, the micro dimensions affect the macro dimension. Often this traceability is non-existent as this information is in different silo applications. While the static workflow provides the structure for traceability that is a great source of performance information for decision-making, we cannot look to traditional workflow models to provide this for non-routine service requests. These processes are not statically determined and they make up complex systems that differ from production/static workflows in many ways as discussed next. Our overall goal is to improve the performance of knowledge-intensive processes that arise in the context of non-routine service requests and requirements. In general, meeting service requirements encompass end-to-end LCM (Life Cycle Management) type processes that reflect challenges that exist in many organizations such as the Software Systems and Engineering, Health Care Emergency, Customer Service Center, Repairs, Design Engineering, and Process Planning. We will illustrate our methods to improve complex IT organizations that handle numerous service requests. However, to illustrate some key points, we start with an accessible example.

- **Uncertainty in Requirements and Execution**: Non-routine services in general require a significant amount of human expertise and flexibility largely because the processing required depends on the challenges of the particular request and its knowledge requirements. Focusing on non-routine service request events and context, this also means that they involve dynamic discovery and are knowledge-intensive and thus not well suited to static process specifications. Routine requests on the other hand can be predicted thus, in that predictable context we can have pre-designed workflows, data flows, transition guards, role assignments, and the like based on the static characteristics of the process and the organization. Specifications and examples are documented by significant bodies like the W3C, Workflow Coalition and other initiatives. Such static-designed workflows also can optimize the assignment of resources to achieve cost effective quality on a repeatable basis. The rules are extracted by process designers from what is known about the type of product, the individual process steps to produce it, the organization’s culture, etc. making the process a valuable representation of organizational knowledge at a point in time. The rules in such definitions are often represented in a formal model such as a petri net and are the best practices and knowledge of the organization.

However, to address complex systems we propose a new multi-dimensional non-deterministic ontology to capture the flows of knowledge that are dynamic and distributed across organizations and systems (Ramanathan, 2005). We will use the term Adaptive Complex Environment (ACE) to refer to this and we will illustrate its value in performance management.
Behavioural Intention to Use Mobile Entertainment Services among Bangladeshi Students
[www.igi-global.com/article/behavioural-intention-to-use-mobile-entertainment-services-among-bangladeshi-students/150521?camid=4v1a](www.igi-global.com/article/behavioural-intention-to-use-mobile-entertainment-services-among-bangladeshi-students/150521?camid=4v1a)

Dependability Modeling
[www.igi-global.com/chapter/dependability-modeling/55513?camid=4v1a](www.igi-global.com/chapter/dependability-modeling/55513?camid=4v1a)