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On the definition and design-time analysis of process performance indicators*

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Summary of the contribution

Nowadays, organisations face the challenge not only to effectively and efficiently perform their business processes, but also to improve them to adapt to new requirements imposed by a continuously changing market. A key aspect to identify the improvement points is to conduct a performance management, which involves appropriately defining PPIs (Process Performance Indicators).

After a thorough review of the literature related (e.g. [1–3]) and a study of the current picture in different real organisations, we conclude that there not exists any proposal that allows the definition of PPIs in a way that is unambiguous and highly expressive, understandable by technical and non-technical users and traceable with the business process (BP). Furthermore, it is also increasingly important to provide these PPI definitions with support to automated analysis allowing to extract implicit information from them and their relationships with the BP. This information can assist process analysts in the definition and evolution of PPIs, as well as in the evaluation and optimization of the BPs associated.

In this paper we address this challenge by providing a twofold contribution. On the one hand, we present the PPINOT metamodel of which a preliminary version was introduced at [4]. On the other hand we provide an automatic semantic mapping from the metamodel to Description Logics (DLs) that allows the implementation of design-time analysis operations to identify the relationships between PPIs and BP elements, in such a way that DL reasoners' facilities can be leveraged. This design-time analysis provide information about the business process elements that may have an influence on a PPI and the BP elements that must be measured to calculate the PPIs.

The main benefits of our contribution can be summarised as follows:

Unambiguity and expressiveness. The PPINOT metamodel allows the definition of all of the PPIs found in the literature review and has been tested

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in several real scenarios so that it can provide a solid basis for defining PPIs in any organisation.

Understandability by non-technical users. PPINOT metamodel is at the same level of abstraction than business processes rather than at a more technical level such as information systems logs, hence it is easier to understand by process managers and employees.

Automated design-time support. A set of design-time analysis operations have been provided. They extract information from the relationships between PPIs and BP elements, and are automated by the aforementioned semantic mapping to DL.

Traceability with BPs. A PPI defined using the PPINOT metamodel can always be traced back to the BP elements used in its definition, allowing so the implementation of a tool that automatically instruments an open source BPMS to compute the PPI values, or of the analysis operations introduced above.

Independence of the BP language. Though a binding to use it with BPMN is described in this paper, PPINOT metamodel can be used with any BP modelling language.

To validate the usefulness of the PPINOT metamodel, we have developed a software tool called the PPINOT tool suite that uses the PPINOT metamodel at its core to offer: (1) two complementary tools to define PPIs, namely a graphical editor to define them together with their corresponding BPs and a templates-based editor that uses natural language patterns [5] to allow a textual definition of PPIs; (2) a design-time analyser of PPIs that implements the introduced design-time analysis operations; (3) a PPI instrumenter that gathers the required information to compute their values, and (4) a reporter that shows these values. Furthermore, we have applied our proposal in several real scenarios, namely: the IT Department of the Andalusian Health Service, the Information and Communication Service of the University of Seville, and the Consejería de Justicia y Administración Pública of the Andalusian Local Government.

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