

A Proposal Metaprocesses as Software Assets in the Telehealth Domain

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Abstract— The main purpose of this research is to develop and implement a metamodel process (Metaprocess) that serves as a repository to be reused in TeleHealth domain specific processes, being therefore identified as a useful tool for the development of agile and efficient applications. The work will be well justified as it will allow the efficiency validation of metaprocesses use and its reuse in the early stages of software application development in the field of Telemedicine. The intent is to provide a response to the research question regarding how to enhance reusability during the early stages of software development through the use of Meta-processes as software assets, in the particular domain of Tele-Health. This question stems from evidence that even through the great boom of business process system specifications and business process services, these systems have a great number of problems such as the lack of formal standards and appropriate specification metamodels in the business processes logic to meet their rules and specifics domains. Likewise, the existence of multiple work schemes and Metaprocesses representations do not consider the planned reuse of software assets in the early stages of development and formalization schemes that enable its validation for different domains.

Keywords- Metaprocess; Software Assets; Telehealth.

I. INTRODUCTION

The utilization of meta-processes as software assets that can be used in early stages of software development according to [6] [9] and [26], requires methods and models of formalization and validation that take into account the supported development process, as the intent is to develop them into frames of reference that facilitate the agile construction of software through the use of metamodels without departing from the knowledge of domain specific rules that need to be systematically arranged.

In recent years, meta-process, software assets and reuse have become increasingly popular as an inexpensive and

promising means for software development methods. However, without creating a new set of issues and trade-offs. The performance and resource management of software development are becoming a very crucial phase for future generation of applications.

Now, in the framework for the development of this work, progress has been made on the bibliographical review and comparative analysis on the use of Metaprocesses as software assets, resulting in the development of a first article on thematic literature review. Lastly, progress has been made in the Metaprocesses conceptual review and software assets, as well as in the knowledge of the chosen Telehealth domain, particularly information regarding the study of protocols and guidelines for cardiovascular risk programs.

First, Section 2 describes the conceptual background about business process, software assets, business metaprocess, business process modeling and process models automation. Section 3 explains the background research about principal topics in the work and Section 4 presents our work in progress with some results so far.

II. CONCEPTUAL BACKGROUND

In this section, we provide the relevant definitions for the state of the art research in the context of business processes and metaprocesses as software assets and provide a better understanding of the research problem.

A. Business Processes

As outlined in [1], [2] [3] [4] and [5], a business process can be defined as an organizational entity that exists depending on the occurrence of events to accomplish a specific purpose, it is governed by rules that allow the control and monitoring of the activities that shape it, the latter are assigned resources and roles to help meet the corporate objective for which they are defined.

B. Software Assets

In [6] [7] [8], software assets are software components that meet the following criteria: a) They are a collection of artifacts to provide a solution to a problem b) They may be used and reused in different contexts c) They can be extended and customized in several places.

C. Business Metaprocesses

Rolland et al. [9] proposes that business metaprocesses can be defined as process models that serve as benchmarks to be instantiated in different domains.

D. Business Process Modeling

Basu et al. [10] show that the business processes are usually represented as flows or flow charts or activity charts, sometimes as nodes or rules for execution of tasks or activities.

E. Process Models Automation

In [11] [12], a business process system is designed as a generic type of software supported by design techniques focused on operational business processes management, it is known by the requirements that must support the process and it is represented by a graphical scheme.

III. BACKGROUND RESEARCH

Some research studies on business process modeling techniques show us the impact they have had on the construction of business metamodells as representational frameworks and business process building models for their use and implementation at the organizational level.

Along these lines, the approaches described in the work of [13], [14] [15] and [16] present to us how modeling techniques utilize a wide variety of symbolic and representational constructors to model integrated work systems at the conceptual level. While each technique uses a unique method for proposing what it believes to be the essential elements of an integrated work system, many of the concepts used in these techniques are very common: goals, roles, actors (or agents), activities (process tasks), interactions (or conversations), workflow, resources, information and resource interdependencies are primarily based on the concept of interaction or exchange. However, these common elements give us the fundamental components of the proposal and construction of Metaprocesses as frameworks grounded in the use of business process models to instantiate in different domains.

Moreover, the techniques described in [17], [18] and [19] demonstrate that the proposed business process modeling, if indeed they propose common work schemes for business process modeling, exclusively of the platforms used and oriented to specific domains, they mostly lack from mechanisms of validation and transformation of models originating from the definition of business rules to the construction of domain-specific metamodells, that contribute to the construction of metaprocesses, which is

also accompanied by the absence of formalisms to propose strategies and domain model validation to ensure consistency between the model and its domain without losing the level of reference to be achieved using metaprocesses. The proposals presented by [17], [18] and [19] focus specifically on the following aspects: [17] recognizes the importance of developing software based on software product lines, whose cornerstone should be the reutilization of previously developed components or software assets that can be instantiated for different domains, although the research conceptually structures the development framework and software evolution towards a more adaptive, reusable and agile process, it does not deliver a schematic framework that allow us to address the problem of reusability at the early stages and especially validation as the key to verify the quality of the software. Meanwhile, [18], as it well indicates that a suitable scheme of work in our case could be (MDE) model-driven engineering, focusing our attention primarily on the use and validation of models, combining the concepts of domain specific languages and models transformation engines to completely cover the life cycle of a software system, it does not go any further than the construction and transformation of application models independently of the platform used; therefore not addressing the issue of validation or the reuse in an appropriate scheme of quality assurance software during the early stages. Finally, [19] along with the above mentioned and including the proposal of [18] on the use of BPMN as a standard notation for modeling construction, it ends up proposing the use of design patterns through language definition of software architectures or ADLs mixed with the use of attribute based architecture styles (ABAS) and ISO quality schemes to ensure software quality of the end product, it primarily focuses in the final stages of construction and ignores the issues of software evolution and quality assurance from the early stages, it also lacks clear verification, validation and reuse mechanisms that would allow the proposed patterns to be software construction metaprocesses.

In addition to the above mentioned and reviewing the contributions of [20], [21] [22] [23], [24] and [25] we see how business process modeling proposals for specific domains such as Metaprocesses, mostly lack from clear validation and formalization mechanisms independently from the use of standards and tools for the representation of multiple domains, leaving aside the principle of models reusability and expression thereof.

Finkelstein et al. [26] show some methodologies of software development focused on processes as: EPOS: Expert System for Program and System Development [27], SOCCA: Specifications of Coordinated and Cooperative Activities [28], MERLIN: Supporting Cooperation in Software Development Through a Knowledge-Based Environment [29], OIKOS: Constructing Process-Centred SDEs [30], ALF: A Framework for Building Process – Centred Software Engineering Environments [31], ADELE-TEMPO: An Environment to Support Process Modeling and

Enaction [32], SPADE: An Environment for Software Process Analysis, Design, and Enactment [33], PEACE: Goal –Oriented Logic – Based Formalism for Process Modeling [34], E³: Object – Oriented Software Process Model Design [35], PADM: Towards a Tool Process Modeling System [36]. Once the methodologies have been verified, it could be concluded that the EPOS, PWI and PEACE methodologies are the most well rounded methodologies, in terms of the factors such as software process modeling approach, process modeling languages, use of metaprocess and engines. And evaluating elements such as purpose, core component types, modeling core component types, languages, property modeling language, tools as support of software process models, analysis and design process modeling, customization, instantiation and evolution, support for rendering, internal representations and process engine architecture.

Given the above, it is necessary that the proposal to be developed on methodologies and processes as software assets gather the earlier results, in the sense that it must meet primarily but not exclusive to the most relevant parameters presented in the studied methodologies, meaning it should be focused on their implementation and interaction with computerized and human agents, considering the existing relations and entities, having fundamentally a formal and object-oriented component, being expressive and representative, easy to interpret and compiled, also allowing a syntactic definition of the models, presenting a method, allowing through its concepts and mechanisms pave the way to go from a generic model to a model adapted to a specific domain and presenting meta-activities that allow its instantiation, as well as being fundamentally deterministic, that it cannot be affected by the human agents intervention, preserving consistency and allows to easily identify inconsistencies, it also should allow the use of external tools to be integrated and keep the model objects consistency, likewise allow the internal representation of software process modeling and allow the use of several engines for process management.

IV. RESEARCH

The main purpose of this research is to present a strategy by which Meta-processes are developed into Software Assets in the Tele-Health domain. The intent is to provide a response to the research question regarding, How to enhance reusability during the early stages of software development through the use of Meta-processes as software assets in the particular domain of Tele-Health? This question stems from evidence that even through the great boom of business process system specifications and business process services, these systems have a great number of problems such as the lack of formal standards and appropriate specification metamodels in the business processes logic to meet their rules and specifics domains. Likewise, the existence of multiple work schemes and Metaprocesses representations do not consider the planned reuse of software assets in the early stages of development and formalization schemes that enable its validation for different domains.

This research has a social impact in terms about: Health crisis-solutions for resource optimization, possible reduction of medical errors and ease at notational level. And scientific impact in: Reuse in early stages, metaprocess instantiation in different domains and oriented software development models.

This research has specific objectives as: Consider proposals for use of Metaprocess as assets and reuse software in early stages. Conceptualize on the use of Metaprocess methodologies as software assets and its reuse in early stages. Identify the components of telehealth processes for the construction of a Metaprocess. Define the Metaprocess in the context of model driven software development in the field of telehealth and Validate the applicability of the proposed Metaprocess in the reusability of the components in the specific domain of Telehealth. Now, in the framework of the proposed strategic solution for the development of this research, progress has been made on the bibliographical review and comparative analysis on the use of Metaprocesses as software assets, resulting in the development of a first article on thematic literature review. Progress has been continuously made in the review of some aspects related to the Metaprocesses domain; therefore, presenting a first draft of conceptual scheme based on the metamodel of the proposed metaprocess.

Lastly, progress has been made in the Metaprocesses conceptual review and software assets, as well as in the knowledge of the chosen Telehealth domain, particularly information regarding the study of protocols and guidelines for cardiovascular risk programs. While there are existing medical protocols and guidelines for patient care, our research have allowed us to evidence the absence of standard protocols to triage patients with cardiovascular risk; therefore, the metaprocesses proposal along with its respective metamodels allow from its instantiation and personalization, according to the patients characteristics, adapt to the requirements and needs thus contributing to reduce medical errors that may occur in this first phase of telecare.

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