Towards Strategy Patterns for Evaluating Usability

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Abstract. In this paper, we propose a holistic quality evaluation approach for usability and user experience (UX), which relies on quality views and strategy patterns. A quality view relates accordingly an entity super-category, e.g., product, system, system in use, with a quality focus such as internal quality (IQ), external quality (EQ), and quality in use (QinU). Usability and UX are higher-level characteristics that should be linked to quality views appropriately. Also quality views support 'influences' and 'depends on' relationships. With a concrete evaluation or improvement project goal, our approach selects and instantiates a suitable strategy from a set of strategy patterns.

1 Introduction

It is well known that Usability and UX are significant quality characteristics of web and mobile applications and thus their evaluations are becoming increasingly important in the mobile gadgetry industry as well. However, looking at the state-of-the-art literature we found that Usability and UX are poorly linked to target entity categories (e.g., Product, System and System in use) with quality focuses such as IQ, EQ and QinU and their quality models. A *quality view* relates accordingly an entity super-category with a quality focus. Also quality views support *influences* and *depends on* relationships between views. Moreover, a *quality model* represents the quality focus by means of a set of characteristics, sub-characteristics and attributes. Thus, Usability and UX sub-characteristics and attributes, as non-functional requirements to be evaluated are often included in quality models [5].

On the other hand, quality views and their relationships are paramount for defining measurement, evaluation (ME) and change (MEC) strategies and *strategy patterns* to be used as resources in ME/MEC projects. We define the term strategy as; "*principles, patterns, and particular domain concepts and framework that may be specified by a set of concrete processes, in addition to a set of appropriate methods and tools as core resources for achieving a project goal* " [1]. In the last decade, we have earned experience in developing specific strategies. For instance, we have developed GOCAME (*Goal-Oriented Context-Aware Measurement and Evaluation*), and SIQinU (*Strategy for Improving Quality in Use*) strategies, which were applied in several concrete evaluation and improvement projects [4, 5, 6]. Regarding the above strategy definition, both strategies share the principle of three integrated capabilities, namely: the *ME domain conceptual base and framework*, the *process perspective specifications*, and the *method*

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specifications. However, we recently have envisioned the idea of packaging the earned experience into strategy patterns.

It is recognized that patterns have had and still have significant impact in software and web engineering [3]. In a nutshell, the pattern's aim is to provide a general and reusable solution to a recurrent problem. In this sense, we have observed that strategy patterns can be applied to recurrent ME or MEC problems of any project. Therefore, the major contributions of this research are: (i) *Add a quality view component* to a ME conceptual framework, which allows instantiating quality views and quality models accordingly; (ii) *Specify strategy patterns for different quality views and project goals* such as evaluation and improvement for Usability and UX.

Following this introduction, Section 2 analyzes the quality view component and strategies. Section 3 discusses some strategy patterns and summarizes conclusions.

2 Quality Views and Strategy Patterns

In a given ME or MEC project one or more entity super-category can be chosen as, for example, System and System in use, which can be evaluated by means of the EQ and QinU focuses, respectively. The quality focus is the highest abstraction level concept of a quality model. Next, we represent the *quality view* component added to the previously developed C-INCAMI conceptual components [6].

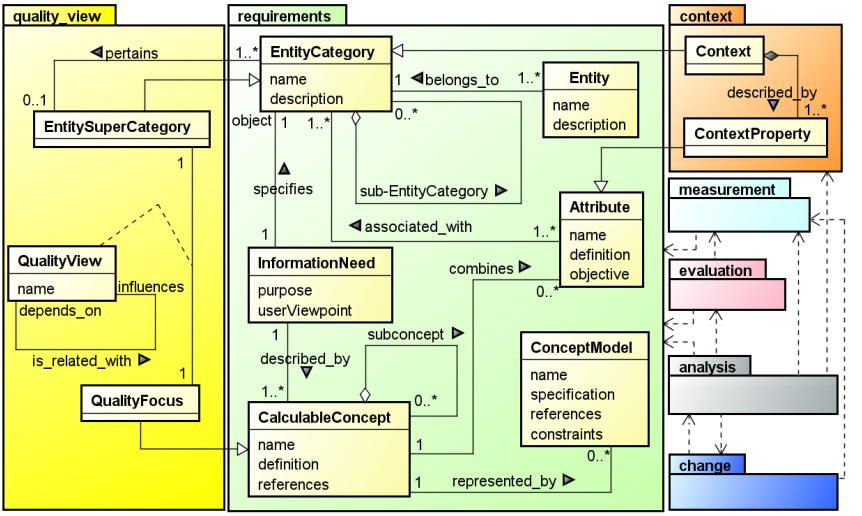

Fig. 1. C-INCAMI conceptual components enhanced with the new *quality_view* component

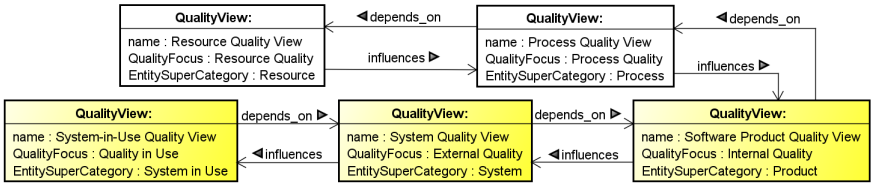

Fig. 2. An instantiation of typical quality views from the *quality_view* component

Fig. 1 shows the added *quality_view* component which allows the instantiation of quality views by means of the *QualityView* concept. Examples of concrete quality views are depicted in Fig. 2. A quality view is the association between an entity super-category (*EntitySuperCategory*) and a quality focus (*QualityFocus*). Moreover, the added component allows representing two relations between quality views. For instance, Fig. 2 shows that the System Quality view *influences* the System-in-Use Quality view and, in turn, the latter *depends on* or is determined by the former.

When evaluating Usability and UX for mobile and web entities, suitable quality views should be considered [5]. For this aim, potential views are the three yellow-colored quality views in Fig. 2, namely: Software Product, System and System-in-Use Quality views. For each quality view, and particularly for its quality focus, a quality model should be selected. A question that a reader might ask is: to which quality focus can Usability and UX characteristics be related? In short, Usability can be related to the IQ and EQ focuses, while UX to the QinU focus [2, 5].

On the other hand, the fact of modeling quality views and their relationships is crucial for the aim of selecting strategies, since they are chosen considering quality views to be evaluated according to the project goal. Each integrated strategy should support simultaneously the three principles as indicated in Section 1.

In the last decade, we developed specific strategies such as GOCAME and SIQinU, which have been employed in concrete evaluation and improvement projects. GOCAME embraces one quality view, and SIQinU two quality views. For instance, SIQinU supports the QinU/EQ/QinU evaluation and improvement cycles, starting evaluations from Task-based and/or Perception-based System-in-use entities, and their corresponding characteristics and attributes. Thus, we have employed SIQinU in the JIRA case study [4] for the most frequently used "Entering a new defect" task. SIQinU relates just the System-in-Use Quality view with the System Quality view exploring the abovementioned relationships between views.

To summarize, our *holistic quality evaluation approach* was used by means of quality views and specific strategies. However, we have recently observed that a ME or MEC strategy can be applied to recurrent problems of any ME/MEC project. Thus, we sought to develop a set of strategy patterns that offer reusable and instantiable solutions. Patterns are essentially 'experience in a can', for our case, ready to be opened and used by evaluators. We have specified a set of strategy patterns, following a specification template which includes: (1) *name*: A descriptive and unique name; (2) *alias*: Acronym or other names; (3) *intent*: Main objective for the pattern; (4) *motivation* (*problem*): Problem which solves the pattern; (5) *applicability*: Situations in which the pattern can be applied; (6) *structure* (*solution*): Generic structure and instantiable solution that the pattern offers; (7) *known uses*: References of real usage; (8) *scenario of use*: Concrete example and illustration for the instantiated pattern. For space reasons, the strategy patterns will be documented in a follow-up manuscript.

3 Final Remarks

Using our holistic approach, *ME/MEC strategies* are chosen for evaluation and improvement embracing one or more *quality views* to accomplish the project goal. To this end, we have also envisioned to design a set of strategy patterns as a way of packaging general and reusable solutions for common, recurrent problems/goals within

measurement, evaluation and change/improvement situations for specific projects. Hence, a strategy pattern, according to the project goal and the amount of involved quality views can be selected from the set of strategy patterns. For example, if the project aims at assessing just one *quality view*, i.e., to understand the current situation of an entity category with regard to the corresponding quality focus, then the GOCAME_1V strategy pattern is the suitable. The pattern intention is to provide a solution in the instantiation of a ME strategy aimed at supporting an understanding project goal when one quality view is considered. The GOCAME_1V generic process consists of six activities. Note that this pattern can be used to evaluate either IQ, or EQ, or QinU focuses considering Usability concepts.

On the other hand, if the project involves MEC goals for one *quality view* then the GOCAMEC_1V strategy pattern should be selected. Furthermore, if the project involves MEC goals for two *quality views* then the GOCAMEC_2V strategy pattern should be chosen. Recall that in Fig. 2, between two quality views, the *depends on* and *influences* relationships can be used. If we consider for a while, the System Quality and the System-in-Use Quality views, these relations embrace the hypothesis that evaluating and improving the EQ of a system is one means of improving the QinU of a system in use. Similarly, evaluating the QinU can provide feedback to improve the EQ. Thus, the GOCAMEC_2V strategy pattern embeds this hypothesis. A concrete strategy derived from this pattern is the so-called SIQinU –used in an industrial case [4]-, which supports the QinU/EQ/QinU improvement cycles. Note that the GOCAMEC_2V strategy pattern can be instantiated to two another related quality views, such as Resource and Process Quality views, taking into account for instance that a resource quality (e.g. a new integrated tool) influences the process quality (e.g. a development process), and vice versa the process quality depends on the resource quality.

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