

Software Size Measurement using COSMIC

Functional Size Measurement

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Abstract - Software sizing is used to estimate the size of a software application or component in order to be able to implement other software project management activities. Measurement of software size from user requirements is crucial for the estimation of the developmental time and effort. A function point is a unit of measurement to express the amount of business functionality. Functional size measurement (FSM) is an important component of a software project, as it provides information for estimating the effort required to develop the measured software. Five FSM methods that are certified by the International Organization for Standardization (ISO): IFPUG [2], Mk II [3], COSMIC [6], NESMA [4], and FISMA [5]. For the estimation, Function points are useful in the business application software domain and problematic in the real-time software domain. One of the international standards for FSM is the (Common Software Measurement International Consortium) COSMIC FSM. COSMIC FSM method was designed to be applied both to the business application software domain and to the real-time software domain. COSMIC are useful for functionality-based estimation, specifically for real-time and embedded software. In this proposal, COSMIC method tends to use in Petri net by producing modeling rules, mapping rules for real-time software domain.

I. INTRODUCTION

The functional size of software is an important input for planning, buying, developing, improving, and maintaining software systems [1]. In particular, it provides valuable information for estimating the effort required to develop the measured software. Based on that estimation, software managers can successfully plan resources and estimate costs for the software project. Several methods have been proposed for FSM, one of which is the COSMIC FSM method [6, 9] that can be used to measure the functional size of software application. COSMIC was designed to be applied in various functional domains such as business application domain and real-time domain. COSMIC FSM method develops the user view of functional requirements. It early predicts the functional complexity of software throughout the software development lifecycle. Software sizing is used to estimate the size of a software application or component. There are several recognized standards and/or public specifications for sizing software based on Function Point. To measure the functional size of software applications, five FSM methods have been recognized as standards: IFPUG [2], Mk II [3], COSMIC [6], NESMA [4], and FISMA [5]. One of the international standards for FSM is the COSMIC FSM method.

II. RESEARCH AIMS

The research aims are:

- To measure the size of software in real-time software system using Petri net and COSMIC method.

- To propose the modeling rules and mapping rules for specification from Petri net to measure the COSMIC method.

III. RESEARCH BACKGROUND

COSMIC defines the principles, rules and a process for measuring a standard functional size of a piece of software. It uses a continuous size scale with no upper bound. Functional size is independent of the technology used for developing and implementing the software. It can be estimate from statements of requirements early in the life of a project. COSMIC Measurement consists of three phases:

- Setting the Measurement Strategy
- Mapping the Functional User Requirement's (or 'FUR') of the software to be measured to the COSMIC concepts
- Measuring the resulting COSMIC model of the FUR

A Business Process Model (BPM) is commonly a diagram representing a sequence of activities. Business process models (BP models) are designed to be useful for documenting, communicating, or improving organizational business processes. Software engineers and business analysts also use BP models to gather the software and system requirements during the development process. As a result, a BP model may also be a valuable source of information for FSM. A standard Business Process Model and Notation (BPMN) will provide businesses with the capability of understanding their internal business procedures in a graphical notation and will give organizations the ability to communicate these procedures in a standard manner. Furthermore, the graphical notation will facilitate the understanding of the performance collaborations and business transactions between the organizations.

AGILE is a methodology that promotes continuous iteration of development and testing throughout the software development life cycle of the project. Both development and testing activities are concurrent. User Stories (US) are typically expressing functional user requirements (FUR).

Petri net is a mathematical language for the description of distributed concurrent systems. Petri Net (PN) is a graphical tool for the formal description of the flow of activities in complex systems. A Petri net is a particular kind of bipartite directed graphs. It consists of places, transitions and directed arcs. Directed arcs connect places to transitions or transitions to places.

C. Monsalve, A. Abran and A. April [7] analyzed the use of BPMN for FSM in the Business Application (BA)

domain, presented notation-independent guidelines for the BA domain, analyzed the possibility of using Qualigram to perform FSM in the real-time domain. For measurement purpose, the availability and quality of the input are required in FSM. By using the BPMN for modeling the specifications of the Course-Registration System and for deriving the modeling rules for FSM, and identifying the rules for mapping the COSMIC concepts to the modeling constructs of BPMN. After constructing the mapping rules, the total number of data movements (Entries, Exit, Reads and Writes) summed over all functional process of a piece of software for counting one 'Cosmic Function Point' ('CFP').

J. Desharnais, B. Kocaturk, L. Buglione[8] proposed the measuring the size of stories in terms of COSMIC Function Points (CFP) as well as the quality of the related documentation. After measuring User Stories (US) with COSMIC and evaluating the quality of the related documentation, the size will be used to obtain the effort in hours. The quality of the documentation helps to verify the accuracy of the measurement.

A. Problem Definition

Now, there is not constructing the modeling rules and mapping rules from the specification of the Petri net to be measured using COSMIC method for the software size of the real-time software systems.

B. Originality

Petri net is not still using with COSMIC for the functional size of the real-time software systems. Construct the modeling rules and mapping rules from specification of the Petri net to measure the size of the real-time software systems by using COSMIC method. The mapping rules must be between the COSMIC concepts and the modeling constructs of Petri net.

C. Expected Impacts

Petri net tool is to represent the kind of specification for type of real-time software systems. Modeling rules and Mapping rules are general rules for every type of real-time software systems to be measured using COSMIC FSM method to estimate the size of software.

IV. CONCLUSIONS

COSMIC method is used to identify the quality of documentation for the measurement purposes. With the modeling rules and the mapping rules, BP model can be used successfully for FSM in business application domain and real-time domain. Functional size of an Agile User Stories can be easily measured using a COSMIC FSM method. COSMIC method can be used in Agile User Stories and BPMN for measuring the software size. So, Constructing the modeling rules and mapping rules from Petri net to be measured using COSMIC method for the size of the real-time software system.

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