EVALUATING AND SELECTING SOFTWARE TESTING TOOLS: A CASE STUDY

Ramona Ramli, Roslan Ismail, Abdul Rahim Ahmad
College of Information Technology
Universiti Tenaga Nasional
Jalan IKRAM-UNITEN, 43000 Kajang, Selangor
{ramona, roslan, abdraham} @uniten.edu.my

Abstract—Over the years, various types of software testing tools are available, either proprietary or open source. Selection of testing tools need to be done thoroughly to ensure their effectiveness, efficiency and benefits gained from it’s usage. There is a need from the industry to have a framework that can be used as a guideline to evaluate and select a suitable testing tool. To the best of our knowledge, research on building the framework is still lacking. Thus, this paper embark on a study to propose a framework for evaluating and selecting an appropriate testing tool within the Malaysian context. This study will use mixed method approach that combines both qualitative and quantitative aspects. For quantitative study, a survey will be undertaken. Validation of the framework will be done through qualitative study by involving a focus group. By developing the framework, it is envisaged that selection process of tools will be improved, helping in reducing the time to choose the appropriate tools.

Keywords—automated testing tools, selection, evaluation, software testing

I. INTRODUCTION

The recent past has seen a variety of software testing tools available in the market to support different activities performed during the test process. The usage of tools allow towards improvement of the efficiency and effectiveness of testing activities[1]. However, the question that still exists is how to determine if the tools work best for certain project or company. Some tools might work best for certain situations and some might not. Introducing inappropriate tools will cause frustration, since it involves financial investment and great commitment from the company. At the same time, the tools are needed to increase productivity and improve the quality of software.

The decision on selecting the appropriate tools can be tedious. An employee may spend their working time up to few weeks for surveying, comparing and producing analysis of the tools[2]. Among the challenges faced are various requirements that needs to be considered in order to fulfill the team expectations. A few factors has been proposed to be taken into consideration such as various testing activities adopted by the company[1], vendor’s information [3], the functionality and non-functionality of the tool [2][4], the quality such as usability, effectiveness and efficiency[5], objective criteria [3][6] and the tester’s itself [7].

Although there are several studies that has been conducted in this area, there is still no clear guidelines [7] proposed. There is still lacking of empirical studies to be used as the evidence on its applicability. Therefore, an investigation needs to be conducted to identify the factors that contributes in evaluating and selecting the testing tools, more importantly during the stage of facilitating the decision making and research effort, an evaluation framework and general guidelines are needed to simplify the activities.

Few studies have been conducted on this area. However, to the best of our knowledge, there is no specific research that has been conducted on evaluation and selection of software testing tools in Malaysia.

II. PROBLEM STATEMENT, BACKGROUND AND STATEMENT

The following are some problems face in selecting testing tools. The first is there is a lack of framework /guidelines / empirical research. Farooq [5], highlights the need of systematic guidelines and criteria to compare and evaluate testing tools due to increasing numbers of testing tools available in the market. Khoria [8] suggested appropriate tools that needs to be chosen based on the organization’s need. He proposed that the evaluation of tools should be done on the basis of certain metrics. Illes [4] opined that performing evaluation of testing tools is very time-consuming. Pre-selection process that are based on vendor’s information also plays an important role. A survey need to be done to investigate the commonly used tools. From the survey, state-of-the- art in testing tools can be derived to identify the gaps between market and scientific challenges.

Poston [2] proposed an evaluation criteria that considers the company’s criteria. However, this evaluation criteria is not suitable for the pre-selection of testing tools. Extensive laboratory test are required in determining the evaluation criteria.
In order to allow project manager to choose the appropriate tools for a system or component under test, Michael et al [6] proposed that a suite of objective metrics is needed for the evaluation and selection purposes.

Most of the study conducted is not done in Malaysia. Therefore there is a need to conduct a study by taking into consideration the differences in testing prices that exist with other countries in term of tools usage and practice. Survey conducted by Ahmad et al [9] found that majority organization in Malaysia did not use tool to support monitoring of their software development.

III. RESEARCH QUESTIONS

The main aim of this study is to propose a framework for Malaysian ICT Industry to guide them when evaluating and selecting appropriate software testing tools and to enhance the decision making in the tools adoption. In order to fulfill the stated aim, several objectives have been identified:

1. To propose a framework which encompasses the detail of the related Malaysian ICT Industry characteristics and measurable factors which are needed in order to evaluate and select appropriate testing tool.
2. To design the framework.
3. To gather evidences to support or reject the framework.

A few research questions have been identified in order to achieve each of the listed objectives:

RQ1: What is the practice in selecting software testing tools by Malaysian ICT Industry?
RQ2: What are the factors considered for evaluating and selecting the software testing tools?
RQ3: How to evaluate the validity of the framework?

We will also study the existing research works in detail to find out the proposed frameworks and guidelines. This will help us to build the foundation our framework.

IV. RELATED WORKS

In her master’s thesis, Bordelon [10] developed a metric suite that facilitates the evaluation of automated testing tool. The evaluation focuses on the usability and effectiveness of a tool. Three tools were selected to be evaluated using the metric and the strength and weakness for each were identified. Among the proposed evaluation metrics are: features, debugging help, automated progress, supports for the testing process, usability, and requirements. The metrics has not yet been implemented in the industrial case studies.

Vos [7], [11] highlighted the industry’s need for a guideline to compare software testing techniques and tools. He proposed a methodological framework used to evaluate testing techniques or tools that can be applied in various case studies. Three case studies were conducted to investigate the applicability of the framework. Each of the case studies evaluates and compares testing techniques with its related automated tool. The implementation of the case studies is measured from their effectiveness, efficiency and user satisfaction. He suggested more case studies in different context and environment. Internal evaluation using the proposed framework is recommended to be conducted before contacting the tool vendor.

Kuver [12] proposed a guideline for testing tools selection. Each tool will be scored from the scale of 1 to 5 to indicate the benefits or downsides gained from using a test tool. This study focuses on organization’s perspective only, in term of return on investment (ROI). Technical factors such as project type, knowledge of tester and the effectiveness is not considered.

A review on existing research work conducted by Farooq [5] focused on the procedures and criteria for tools evaluation. The list of combined subjective and objective criteria as the parameter in the tool evaluation is suggested. Based on their observation, they identified steps to be applied in the tools selection. However, there is no empirical evidence.

Illies et al [4] presented a systematic approach for the evaluation criteria of testing tools. The ISO/IEC 9126 quality model with addition of vendor qualification is used as the base to determine the quality criteria. Task and Object-oriented Requirements Engineering (TORE) methodology was used to analyze the test process, in order to identify the functional criteria. The applicability of the criteria is measured in initial evaluation of three capture and replay tool. The applicability of the criteria in conducting testing tools survey and classification framework is still needs to be conducted.

Michael et al [13] proposed a suite of objective metrics to measure tool characteristics by using Poston’s study [2] as the base of case study. This metric can be used to evaluate and select the appropriate automated testing tools. However there is still a need to measure the effectiveness of the metrics.

Tiitinen [14] conducted a survey to investigate the use of software testing tools in Finland. Some recommendations are proposed to be applied during the selection process of testing tools based on the survey’s result. A similar study needs to be conducted in order to investigate the suitability of the recommendations for other countries.
The proposed research methodology is illustrated in Figure 1. The initial work starts with literature review activity. This activity has four purposes which are firstly, to obtain the state-of-the-art information on the tools evaluation and selection. Secondly, is to identify the factors that influenced the evaluation and selection of activities proposed by previous literatures. The third purpose is to develop an initial framework based on the literature, and finally to formulate research hypotheses based on the initial framework.

The next activity focused on the development of questionnaire based on the identified hypotheses which will be distributed among respondents who are related to the Malaysian ICT Industry. The objectives of the questionnaire are:

1. To investigate the practice of selecting software testing tools by Malaysian ICT Industry.
2. To identify the factors considered for evaluating and selecting the software testing tools.

Data analysis will be done to identify the parameter values along with their characteristics and measurable parameters. As a result, the initial framework will be enhanced using the findings of this stage.

The framework will be validated to ensure the identified parameters are supporting the framework. Final framework validation will be done through discussion with selected focus group and experts.

There is currently a need for frameworks in evaluating and selecting testing tools. Therefore, one of the expected contributions of this study is to develop the framework to evaluate and select an appropriate testing tool.

This study aims at developing a framework to evaluate and selects an appropriate testing tool. To implement the research, we need to investigate the practices of selecting testing tools in Malaysia. By conducting a survey, we will identify the factors that are always considered by companies for the tools selection process. Existing framework will be compared with the results collected to develop the proposed framework. Framework validation will be conducted through focus group discussions and case studies.

REFERENCES

