

A Practical Approach to Designing Web Applications Based on Web Developers' Opinion

Samer Barakat, Hanady Al-zagheer
Management Information Systems Department
Applied Science Private University
Amman, Jordan
{Quality@Asu.edu.jo}



ABSTRACT: *We in this research have developed a design for web applications using a few case tools which aim at producing an incremental design. To do this exercise we basically took a set of samples which consists of several domain people including system developers, web experts and others. These population is drawn from many organizations who work on the development paradigm. We ultimately found that the case principles have good impact on design of the web applications. The results ensure the improvement of the quality of the designs and functionality. This is found to be an effective designing of web applications.*

Keywords: CASE Tools, Web Applications, Web Engineering, Web Development

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1. Introduction

Introduction

The script languages have good impact on the web applications and useful to the web developers who intend to use the languages. These products have been able to create a new intuitive and collaborative experience to the users of web applications (Manolescu, I., et al. 2005). Not only did sites become more dynamic, but also it made it possible for users to interact, share information and store all kind of information and multimedia items online (Rossi, G., et al. 2007).

While testing the web applications we found it as a multi-step process which needs to improve the user interface components, the processes, the business workflow, the business components, the service agents, the data access components and the web application database in addition to designing security and deployment measures (Gómez, J., et al. 2001).

Web applications are designed in a layered approach and the web engineering approach has many CASE tools to help developers perform this complex task. Most web application developers rely on the UML – Unified Modeling Language to design web applications (Zimmerman, D.E., et al. 2002).

Web engineering CASE tools do provide developers with the means to achieve flexibility and integration in their final release. OO-H process provides a viable approach to systematic development (Gómez, J., et al. 2001).

Although CASE Tools has existed before the introduction of the internet, research shows that most of web based applications has not been developed using a structured, systematic, quality assurance process (McMurtrey, M. E., et al. 2002).

Historical review indicate that the use of computer aided software engineering tools in the development of web applications is debatable (LeDoux, L.C., et al. 2005). However, what we try to show in this paper is the Influence CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications.

We shall start by proposing a research model showing the effect of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications (Lepore, D. F., et al. 2012). We shall then test the model statistically based on the results of a questionnaire to reach a conclusion.

2. CASE Tools

The term CASE Tools is short of Computer Aided Software Engineering tools that are used to help software developers and systems analysts in their development efforts. CASE tools support several design activities in the system development life cycle (Lepore, D. F., et al. 2012).

CASE tools range from tools used in the early stages of planning such as project management tools going through the main development of the system including, system functionality design, database design, data dictionary, coding, versioning, testing and implementation (Schmidt, D. C. 2006).

Applications developed using CASE tools are of high quality since they have moved through a detailed and trusted process that guarantees software integrity and good quality (Livari, J. 1996).

Systems integration and installation can become an easy task by using CASE tools. They allow for robust systems development and maintenance throughout the entire systems development life cycle – SDLC (Schmidt, D. C. 2006).

All stages of the SDLC are supported by CASE Tools. They support structured analysis and design methods in addition to object oriented analysis and design methods (Damm, C., et al. 2000). There are tools that support the structured approach such as OpenModelSphere and DBdesigner, and tools that support the UML approach such as rational rose.

In structured systems approach CASE tools can help design the Context Diagram and the Data Flow Diagrams (Schmidt, D. C. 2006). In designing database, it can be used in the creation of Entity Relationship Models, testing the components of the model, including the Entities, Relations, and data flow. It can be used to construct a conceptual model, a logical model and transferring it into a physical database dependent design called and Entity Relationship Diagram - ERD. Additionally, they aid in the generations of the Data Dictionary which can be used by programmers as a reference tool (Livari, J. 1996).

CASE tools also help generate the SQL code that can be imported into the database management system to be executed as an SQL query which shall result in building all the entities, attributes, primary and foreign keys and set the relations between them in the database based on the original model (Livari, J. 1996).. It can also generate classes for use in object oriented programming languages such as VC++ and VJ++ and Visual Basic.

User documentation and system documentation is another field that we can employ CASE tools to help reduce the time needed to generate these documents.

CASE tools are classified as Upper CASE Tools, Lower CASE Tools and Integrated CASE Tools (Post, G. V., et al. 1999). The Upper CASE tools support the systems analysis and design tasks. The Lower CASE tools support coding, versioning and

testing tasks (Post, G. V., et al.1999). Integrated tools support both upper tasks and lower tasks. Case tools has several characteristics that web application developer enjoy, include flexibility, integration, and a quality control. CASE tool are flexiblesince programmers can change and update their designs within the comfort of their development environments (Mobrand, K.A., et al. 2002). CASE tools are integrated and can support all development stages. changes at any stage, are reflected in the design, the code and documentation. CASE tools automat testing for systems achieving the desired requirements and this by itself guarantees software quality.

3. Web Applications Design

Web applications are applications that has evolved after the introduction of the Internet technology which made client server applications a thing of the past. This implies that the web application resides on the server and users can access the application using any web browser available on a desktop, laptop or web enabled machine (Knublauch, H., et al. 2004).

We application must work inside a container such as a web browser which issued the HTTP request to the server through a unique URL. The URL points to the application main page on the server (Adkisson, H.P. 2002). When the request is received by the server its runs the application script and returned the HTML version of the web application page to be displayed on the user machine (Pastor, O., et al. 2001).

All this could not have happened without the server side scripting technology. The web application is usually designed to have several layers (Knublauch, H., et al. 2004). Usually it's a three layers' approach comprised of presentation, business and the data layers.

Web application design and development is a fairly complex job, and by using CASE Tools the web designers and developers can reduce the amount of complexity by handling each task separately resulting in the design of a high quality, secure and robust web application (Rossi, G., et al. 2007).

4. Importance of this Research

This research is important since it attempts to identify the Influence of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications. Web application developers, software project managers and designers, shall appreciate the importance of using CASE Tools in the SDLC of any web application project.

4.1 Research Problem

The research problem shows that the web application developers do not take into consideration the use of CASE Tools in the design of their web applications. There is also the need to consider CASE Tools traits in the development and design of web application. The literature review identified three dimensions that shall be used as a basis for building the research model. These dimensions are: Flexibility, Integration and Quality Assurance.

4.2 Research Objectives

The research aims at proposing a model that measures the effect of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications.

The following model builds for the research argument by studying the influence of the independent variables of Case Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications.

4.3 The Proposed Model

4.4 Research Hypotheses

Ho: There is no significant moderate effect of CASE Tools Traits (Flexibility, Integration, and Quality Assurance) on the successful design of web applications at level ($\alpha \leq 0.05$).

Based on the above we derived the following sub-hypotheses:

Hoa: There is no significant moderate effect of the Flexibility trait of CASE Tools on the successful design of web applications

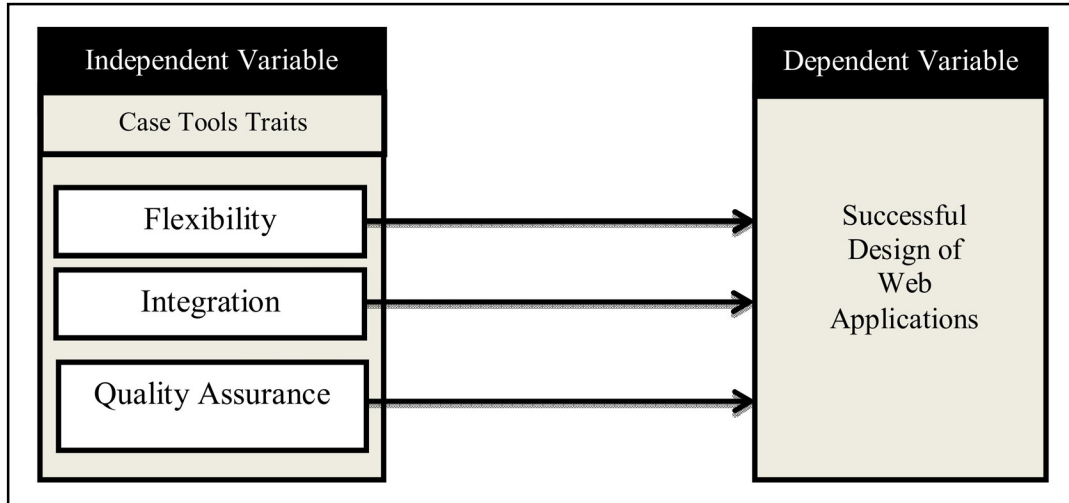


Figure 1. Research Model

at level ($\alpha \leq 0.05$).

Hob: There is no significant moderate effect of the Integration trait of CASE Tools on the successful design of web applications at level ($\alpha \leq 0.05$).

Hoc: There is no significant moderate effect of the Quality Assurance trait of CASE Tools on the successful design of web applications at level ($\alpha \leq 0.05$).

4.5 Methodology of the Research

4.5.1 Sample and Population

The research population is made up of systems analysts, database designers, web application developers and systems administrators working at 17 website development companies in Jordan. A total of 173 valid questionnaires were used out of 371 distributed (Sekaran, 2006). The number of returned questionnaires was 189, the difference of 16 questionnaires were discarded since they were incomplete.

4.5.2 Measures and Data Collection

The research was conducting based on the literature review, related websites and the results of the questionnaire that was distributed on web development companies in Jordan.

5. Results and Discussion

Multiple regression statistical testing tested the responses from the questionnaire and the following results were achieved:

Ho: There is no significant moderate effect of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications at level ($\alpha \leq 0.05$).

Table (1) shows the effect of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications. The regression model achieve a higher degree of fit, as reflected by (R) and (R²) value (0.572) , (0.327), which asserted that (32.7%) of the explained variation in Successful Design of Web Applications can be accounted for CASE Tools Traits (Flexibility, Integration and Quality Assurance). Additionally, the regression results in Table (1) for the Flexibility shows a slope value of (0.567); (0.532) and (0.468) for the regression line. This suggested that for a one-unit increase in CASE Tools Traits (Flexibility, Integration and Quality Assurance) can significantly predict a (56.7%); (53.2%) and (46.8%) increase in Successful Design of Web Applications. As well as Table (1) shows that the analysis of variance of the fitted regression equation is significant with F value of (90.137). This is an indication that the model is a good one. Since the p-value is less than (0.05), it shows a statistically significant relationship between the variables at (0.95) confidence level.

The results also indicate that CASE Tools Traits (Flexibility, Integration and Quality Assurance) has an effect on Successful Design of Web Applications with a coefficient of (0.567); (0.532) and (0.46.8). Thus, CASE Tools Traits (Flexibility, Integration and Quality Assurance) actually affected on Successful Design of Web Applications. This further supported the hypothesis: CASE Tools Traits (Flexibility, Integration and Quality Assurance) has an effect on Successful Design of Web Applications at level ($\alpha \leq 0.05$).

DependentVariable	β		Sig^*
	Flexibility	0.567	0.000
Integration	0.532	0.001	
Quality Assurance	0.468	0.000	
Successful Design of Web Applications	R	0.572	
	R2	0.327	
	F	90.137	
	Sig*	0.000	

Table 1. Multiple Regression Analysis - Influence of CASE Tools Traits (Flexibility, Integration and Quality Assurance) on the Successful Design of Web Applications

6. Conclusions

Based on the results and discussions above, we conclude that Flexibility trait had the largest influence on Successful Design of Web Applications with a beta of 0.567 at a significance level of 0.000. This indicates that 56.7 of the variation in Successful Design of Web Applications is based on the Flexibility of use. Integration had the second largest influence Beta number of 0.532 and at last the Quality Assurance had an influence of Beta score at 0.468 at significance level of 0.000.

Given these results we conclude that since web application development process is complex and expensive web developers and designers must take into consideration the use of CASE Tools to help them in the different stages of Design of a successful Web Application. CASE tools provide flexibility, Integration and Assures Quality in the development of complex web applications.

References

- [1] Adkisson, H. P. (2002). Identifying de-facto standards for e-commerce Web sites. *In: Proceedings of the IEEE International Professional Communication Conference*, 22-45.
- [2] Brambilla, M. (2006). Generation of WebML Web Application Models from Business Process Specifications. *Demo at ICWE2006*, ACM Press, p. 85-86.
- [3] Damm, C., Hansen, K., Thomsen, M., Tyrsted, M. (2000). Creative object-oriented modelling: support for intuition, flexibility, and collaboration in CASE tools. *ECOOP 2000—Object-Oriented Programming*, 27-43.
- [4] Gómez, J., Cachero, C., Pastor, O. (2001). On Conceptual Modeling of Device-Independent Web Applications: Towards a Web-Engineering Approach. *IEEE Multimedia* 8 (2) 26–39.
- [5] Knublauch, H., Ferguson, R. W., Noy, N. F., Musen, M. A. (2004, November). The Protégé OWL plugin: An open development environment for semantic web applications. *In: International Semantic Web Conference* (Vol. 3298, p. 229-243).
- [6] LeDoux, L. C., Connor, E., Tullis, T. (2005). Extreme makeover: UI edition, measuring the benefits of user-centered design. *Proceedings of the Usability Professionals Association Conference*.
- [7] Lepore, D. F., Colombi, J. (2012). Expedited Systems Engineering for Rapid Capability and Urgent Needs (No. SERC-2012-TR-034). *Systems Engineering Research Center Hoboken NJ*.

- [8] Livari, J. (1996). Why are CASE tools not used?. *Communications of the ACM*, 39 (10) 94-103.
- [9] Manolescu, I., Brambilla, M., Ceri, S., Comai, S., Fraternali, P. (2005). Model-Driven Design and Deployment of Service-Enabled Web Applications. *ACM TOIT*, 5 (3) (August) p. 439-479.
- [10] McMurtrey, M. E., Grover, V., Teng, J. T., Lightner, N. J. (2002). Job satisfaction of information technology workers: The impact of career orientation and task automation in a CASE environment. *Journal of Management Information Systems*, 19 (2) 273-302.
- [11] Mobrand, K. A., Spyridakis, J. H. (2002). A web-based study of user performance with enhanced local navigational cues. *Proceedings of the IEEE International Professional Communication Conference*, 500-508.
- [12] Pastor, O., Abrahao, S., Fons, J. (2001). An object-oriented approach to automate web applications development. *Electronic Commerce and Web Technologies*, 16-28.
- [13] Post, G. V., Kagan, A., Keim, R. T. (1999). A structural equation evaluation of CASE tools attributes. *Journal of Management Information Systems*, 15 (4) 215-234.
- [14] Rossi, G., Pastor, Ó., Schwabe, D., Olsina, L. (Eds.). (2007). *Web engineering: modelling and implementing web applications*. Springer Science & Business Media.
- [15] Sekaran, U. (2006) *Research Methods For Business: A Skill Building Approach*, 4Th Ed
- [16] Schmidt, D. C. (2006). Model-driven engineering. *Computer-IEEE Computer Society-*, 39 (2), 25.
- [17] Zimmerman, D. E., Akerelrea, C. A., Buller, D. B., Hau, B., LeBlanc, M. (2002). Integrating usability testing into the development of a 5-a-day nutrition Web site for at-risk populations in the American Southwest. *Journal of Health Psychology*.