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IS DEVELOPMENT PROJECT TOOLS, METHODOLOGIES, AND LANGUAGES REVISITED: AN EXPLORATORY ASSESSMENT

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Abstract

This study examines information systems (IS) project developers and analysts' usage and familiarity with IS methodologies, development tools, and languages. It is research-in-progress that outlines the background for the study, presents the basis for inclusion of various methodologies, tools, and languages in the study, and describes the way in which data will be collected. The latter includes a description of the sampling frame and a pilot study to refine the survey instrument.

Keywords: Development tools, programming languages, development methodologies

Introduction

Because of today's rapidly changing business environment and the continually evolving nature of information technology, corporate information systems (IS) must be completed more quickly, more efficiently, and at a lower cost than ever before (Willcocks and Sykes, 2000). Electronic marketplaces and the increasingly integrated nature of information systems are placing increased pressure on IS staff to make IS development projects more flexible, more cost effective, and more standardized across applications (Zheng, et al., 2000). Choosing the right IS development tools are becoming increasingly more difficult because of the growing number from which to choose, and firms often find themselves overwhelmed by all the options (Hoffer, et al., 2001). As a result, IS development is becoming increasingly less standardized, leading to different levels of system quality and cost (McNurlin and Sprague, 1998; Yourdon, 2000). Because of the substantial investment firms make in IS technology, they want to make choices about IS development that will be as effective in three to five years as they are now (Dewan, et al., 1998; Weiss, 2001). Identifying practices of other organizations is one way firms can ensure that they have a project application development environment that enables them to compete effectively (O'Dell and Grayson, 1998). The primary objective of this study is to examine which development methodologies, tools, and languages are the most widely used in IS development projects. One research question of the overall study is what are the trends in usage of IS development tools, methodologies, and languages. Another is what are the implications of the trends in these artifacts for IS managers. For example, this study identifies projected trends in language usage for the next five years. This has implications for IS managers in terms of training programs and skill sets required of existing employees and new hires. It also has implications for planning of future projects.

Background

Managing the processes and resources of an IS development project requires rigor and structure (Karon, 1996). Developers have used a variety of development methodologies, tools, and languages to help govern these projects. The traditional waterfall or life-cycle methodologies break the total system development project into a series of phases that are logically and sequentially tied together However, many firms have found that the traditional waterfall methods (e.g., Systems Development Life Cycle or SDLC) do not allow for the rapid, low cost development required today (Heichler and Cafasso, 1995; Keen, 1998; Wallace, 1999; Hoffer, et al., 2001). This has led them to search for ways to enhance the productivity of IS development projects, and many have adopted newer methodologies that retain the principles of the traditional methodologies, while increasing productivity (Karon, 1996). For example, Rapid Application Development (RAD) dramatically reduces the time and cost associated with development by

compressing the steps of the traditional waterfall methods (King, 1996; Martin, 1991; Malcolm, 2002). Other methods, such as Joint Application Development (JAD) and Rapid Prototyping, allow firms to retain waterfall methods, yet increase the efficiency of one or more steps of those traditional methods (Matthews, 1995; Cooprider & Henderson, 1992).

Development tools and languages have also evolved to improve productivity such as visual development suites, object oriented design tools, and web-based development tools (March, et al., 2000; Orenstein, 1999; Wieringa, 1998). For example, Visual Basic (VB) became one of the most widely used development tools/languages in the 1990's, and as a result many applications today are VB based (Orenstein, 1999). Many developers are currently making the transition to VB.Net, as Microsoft phases out the popular VB 6.0 (Hayes, 2002; Krill, 2003). Object oriented design is used to facilitate a different approach to data and process management (Hayes, 1996; Lattanzi & Henry, 1998). C++ is a language that has risen in popularity for object oriented design (Karges, 2002), and Java has evolved in response to the call for open systems and portable applications to increase development productivity (Montalbano, 2002; Morejon, 2002; Yager, 2002; Zeichick, 2003). Java and Visual Basic have been predicted to be the most important languages in future development efforts (Orenstein, 1999). Other tools/languages have evolved in response to requirements of web related application development such as XML and HTML (Hapgood, 2000; Gilerson, 2002).

However, developers have not abandoned traditional development tools and languages, but instead are looking for ways to merge the old with the new (Niccolai, 2003; Winsberg and Richards, 1994; Ulrich, 2001). For example, COBOL is still a fairly popular language (Swanson and Dans, 2000). Part of this is because of the 1997 changes in COBOL to make it compatible with newer languages such as VB, C and C++ (Karges, 2002). COBOL 2002 also offers XML and dynamic HTML support (Karges, 2002). In addition, at least one enterprise resource planning package is largely based in COBOL and requires a COBOL compiler to use (Hiney, 2002). Furthermore, firms are increasingly revisiting automated development aides such as CASE tool packages to help increase the efficiency of the development process through the use of an integrated set of analysis, design, and development tools (Jones, et al., 1999; Banker and Kauffman, 1991; Chen and Norman, 1992; Iivari, 1996).

Many developers also still rely on traditional modeling tools such as ERDs or DFDs (Winsberg and Richards, 1994; Jenkins, 1995). Other modeling tools such as data dictionaries enable developers to represent standards in a formal and unambiguous way and help prevent different interpretations (Kelly, et al., 2000; Apicella, 2000). Experience with designing, modifying, a working with data models is one of the key skills in the database management environment (Watson, 2002).

Methodology

We plan to conduct an on-line survey of information systems analysts and developers. The sample will be drawn from a rented database in which members have listed themselves as either IS analysts or developers obtained from Cahners Publications, a widely recognized publisher of IS practitioner journals. To help ensure content validity and reliability, the survey was derived from one conducted and validated by one of the authors in 1993 (Jones and Arnett, 1993). Survey items were added based on current literature and the authors' own knowledge of methodologies, languages, and tools used today. However, to further help ensure content validity, we will conduct a pilot study of a smaller subset of the sample database, in which we will ask for feedback on anything that may have been omitted. Guided by the 1993 study, the survey is broken into five parts: familiarity with development tools; use of these tools; use of methodologies; current use of programming languages; and predicted future use of programming languages.

The development tools included many items from the 1993 study. Tools were dropped if over 60% of respondents in the 1993 study indicated that they did not use them (disagreed or strongly disagreed that they used them). Three other changes were made in the tools section. In the earlier study, prototyping was included as a tool, and methodologies were not assessed. However, prototyping is actually a methodology rather than a tool (Hoffer, et al., 2001). Thus, it was moved to the methodology section in the new study. In the earlier study, 4GLs were included in the tools section. However, 4GLs have begun to lose their identity as a group, and it is more valuable to examine specific languages (Hapgood, 2000), so the 4GL item was dropped from the tools section. The 1993 study also assessed CASE tools separately in each stage of the SDLC. Because we do not assume an SDLC methodology in this study, CASE tools were moved into a single item in the tools section. Finally, we included new items that either were not available or not widely used in the 1993 study.

Both current and predicted use of languages is assessed. COBOL, RPG, and C were kept from the 1993 study because they were the most widely predicted to be used in the future (Arnett and Jones, 1993). Use of Basic was also widely predicted, but in light of upgrades in the Basic programming environment, Basic was changed to Visual Basic in the current survey. Newer languages were chosen based on popularity as discussed in the background section above. The methodologies section is new in this study,

and those chosen are based on the more commonly used as discussed in the background section above. Means and standard deviations are used to conduct a preliminary assessment of use, to assess the content validity of the instrument, and to guide revisions of the instrument.

Contributions of the Study

This study should make several contributions to the practice of IS development. First, it will provide IS practitioners an integrated set of information about which tools, methodologies, and languages are currently being used. It will also provide information about which languages are predicted to be used in the next several years. Practitioners can use this information to help frame their own decisions about which development tools, methodologies, and languages to use. They can also make more informed decisions about which of these they may want to obtain more information about or more training on. IS mangers can use the information to not only make decisions about usage, but perhaps to justify purchases or policy decisions about future development environments.

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