Chapter 5
Systems Development Process Improvement Using Principles from Organization Development

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ABSTRACT

A large part of the time used on information systems is used on application maintenance. Whereas parts of this work are non-productive, other activities are small value-creating projects, and it is important to use the time for application maintenance on such activities. This chapter presents the introduction of an application management methodology using techniques from organization development. Often process improvement is run in a top-down manner. A case study has been performed to assess the effectiveness of a bottom-up organization development technique for an application management unit. The different parts of the organization have been successful in reaching the first “mature” process maturity level (level 2). More importantly, other goals on decreased time used on addressing critical errors and more time used for value-added projects have been reached. Although good results have been achieved, further process improvement is believed to need to take a more top-down approach.

INTRODUCTION

Over the last 35 years, one has regularly investigated how IT-systems are developed and used. In (Lientz & Swanson, 1978), results from a 1977 survey on distribution of work on IT in organizations where published. Somewhat surprisingly at that time, one found that almost half of the time was used on maintenance (i.e. changing systems that were already in production).

Maintenance has traditionally been divided into three types: corrective, adaptive and perfective (IEEE, 1991) inspired by, e.g. Swanson (1976). Maintenance is defined as the process of modifying a software system after delivery to production.

1. Corrective maintenance is performed to correct faults in hardware and software.
2. Adaptive maintenance is performed to make the computer program usable in a changed environment

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3. Perfective maintenance is performed to improve the performance, maintainability, or other attributes of a computer program. Perfective maintenance has been divided into enhancive maintenance (Chapin, 2000) and non-functional perfective maintenance. Enhancive maintenance implies changes and additions to the functionality offered to the users by the system which is also included as part of perfective maintenance (Lientz & Swanson, 1978). Non-functional perfective maintenance includes improvements to the quality and other features being important for the developer and maintainer of the system, such as modifiability. Non-functional perfective maintenance thus includes what is often termed preventive maintenance, but also such things as improving the performance and security of the system.

In addition to the temporal distinction between development and maintenance, we have earlier introduced the concepts application portfolio evolution and application portfolio upkeep (Davidsen & Krogstie, 2010) (originally called functional development and functional maintenance (Krogstie, 1995)).

1. Application portfolio evolution: Development or maintenance where changes in the application increase the functionality provided by the total application systems portfolio of the organization. This includes:
   a. Development of new systems that support new areas
   b. Enhancive maintenance

2. Application portfolio upkeep: Work made to keep up the functionality provided by the information system portfolio of the organization. This includes:
   c. Corrective maintenance
   d. Adaptive maintenance
   e. Non-functional perfective maintenance
   f. Development of replacement systems

Some writers provide more detailed overview of maintenance tasks (Chapin et al, 2001; Jones, 2006)). Jones (2006) has in total 21 categories, also including user-support as part of maintenance; an area looked upon as belonging to ‘other work’ in most other investigations.

We have done similar investigations as the one done by Lientz & Swanson in 1993 (Krogstie & Sølvberg, 1994), 1998 (Holgeid, Krogstie, & Sjøberg, 2000), 2003 (Krogstie, Jahr, & Sjøberg, 2006), 2008 (Davidsen & Krogstie, 2010) and 2013 (Veld & Krogstie, 2014). Whereas large technological changes can be observed for the underlying system development tools and platform, some areas has been remarkably stable. As illustrated in Table 1, the split of the time use for development vs. maintenance has been in favor of maintenance, i.e. more activities are done on maintenance than on development. (As a percentage of the time used on IT, less time is used for both development and maintenance, since most of the time used by IT-departments these days are on user-support and systems operations). From our last investigation we see that the amount of maintenance among the respondents is even higher than before and also that the amount of application portfolio upkeep increases (i.e. the amount of time to keep the functional coverage of the systems in operation). Over the last 20 years the percentage of so-called new systems that are in fact replacement systems, being installed basically to replace an old system, has stayed above 50%, rising slowly towards 60%.

Looking at the level of enhancive maintenance typically done as small IT-projects providing new releases of systems already in production as illustrated in Table 2, this has steadily decreased from 50% to around 30% of the time used for maintenance.