SPI Models: What Characteristics are Required for Small Software Development Companies?

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Abstract. There is a need for small indigenous software companies to improve their software process. Consequently, much has been written highlighting the deficiencies in the more popular Software Process Improvement (SPI) models where the small company is concerned. However, there has been little discussion about the characteristics that should be included in SPI models to make them useful for the small company. In this paper, the author proposes an SPI model for use in small software development companies. The eight characteristics that were required to exist in the model are examined and reasons for their successful inclusion presented.

Keywords: business goals, flexible model, quality function deployment, return on investment, small companies, software process, software process improvement

1. Introduction

There is a need for small indigenous software companies to improve their software process. It has been recognised that the Irish Software Sector is valuable to the Irish economy, and that it continues to grow and should contribute further to the economy in the future. Sales from the Irish Software Sector increased at approximately 25% faster than international software markets from 1991–1995, and the growth in software sector employment during 1995–1999 would indicate that this trend has continued (McIver Consulting, 1998). However, due to the nature of software products and the growth in the use of the Internet, country markets are faced with increasing global competition. While there continues to be growth in traditional software producing countries such as the United States of America and the United Kingdom, other countries such as India, Israel, the Philippines, and the Eastern European countries have demonstrated that they have an educated staff available to work in the software sector for lower wages. In Ireland, therefore, software companies need to stay very competitive.

One way to do this is to ensure that the software produced and the process by which it is produced is of higher quality than other countries. Small software companies are even more vulnerable because they are perceived as not being able to produce this level of quality. This is evidenced in a quote from the customer of a company involved in this study, when the company requested a delay in software installation due to the illness of a team member:

CS expressed concern over Software Solutions’s inability to ‘turn up the burner’ recognising that this was an inherent risk when dealing with small suppliers.
While one wonders if this perception is justified considering the well-publicised projects which have not been implemented on time nor with the quality required by the customer, this is indeed the reality for many small companies. Therefore, the small Irish indigenous software sector must not only be aware of software process improvement, but must become involved in it. The views of Combelles and DeMarco (1998), should not be taken lightly: “the issues Software Process Improvement raises are important, if not vital, to the future of your organizations.” Much has been written highlighting the deficiencies in the more popular SPI models where the small company is concerned, for examples see Buchman et al., 1995; Geyres et al., 1997; Horvat et al., 2000; and Zahran, 1998.

As a step to overcoming these difficulties, the author, during her research into the software process of small software development companies, developed an improvement model, the Software Process Matrix (SPM), which could be used effectively by them. This model was based on Quality Function Deployment (QFD), used self-assessment within the organizations and was required to demonstrate the following particular characteristics:

- Relate to the company’s business goals.
- Focus on the most important software processes.
- Give maximum value for money.
- Propose improvements which have maximum effect in as short a time as possible.
- Provide fast return on investment.
- Be process-oriented.
- Relate to other software models.
- Be flexible and easy-to-use.

2. What is the software process matrix?

The SPM, which displays the required characteristics as listed above, was developed during this research project. The SPM can be used to establish an improvement strategy based on QFD. QFD has been defined as a “way to assure the design quality while the product is still in the design stage” (Akao, 1990), and as a “quality system focused on delivering products and services that satisfy customers” (Mazur, 1994). Used mainly in manufacturing; its use has spread more recently to services and software development. Originating in Japan, QFD is now used in many countries worldwide.

2.1. What is QFD?

In order to collect and maintain the voice of the customer throughout the production life-cycle, QFD usually uses a series of matrices which convert the customer’s voice into a final product. Different models are available for use, and according to Cohen (1995), the model adapted by the American Standards Institute (Four-phase model) and containing four matrices (Hauser and Clausing, 1988), is “probably the