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Synchronous quality function deployment (QFD) over world wide web

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Abstract

Quality function deployment (QFD) is one of the formal techniques for effective product development. Its main purpose is to listen to the voice of the customer and deploy it down the stream of product development with minimum loss or distortion. It achieves this purpose by using a series of matrices. QFD is a team tool. However, most of computerized QFD systems are standalone and therefore offer limited support for teamwork. This paper proposes to employ the world wide web (WWW, web) technology to provide QFD services on the Internet/Intranets. The synchronized collaboration between team members distributed geographically and over time is particularly emphasized in this development. The resulting web-based QFD system requires no installation or maintenance on the client side but offers remote and simultaneous accesses and therefore supports better teamwork. © 2002 Elsevier Science Ltd. All rights reserved.

Keywords: Quality function deployment; Internet/Intranet; Web-based; Synchronized design tools

1. Introduction

Over the last two decades or so, good design practices have been formalized into a suite of techniques and methods—design tools (Aranjo, Benedetto, Campello, Segre, & Wright, 1996; Gill, 1990; Huang, 1996; Norell, 1993). Examples include quality function deployment (QFD), functional analysis (as used in value analysis), failure mode and effect analysis (FMEA), fault tree analysis (FTA), design for manufacture and assembly (DFMA), and morphological chart analysis. On one hand, these methods are capable in problem analysis. On the other hand, they both require and nurture effective teamwork. However, members of a product development project team may well be distributed geographically and over time. Therefore, there are practical difficulties for them to come together to carry out analyses using

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these design tools. The standalone computerized design tools (Reinders, 1995) can help a little in this respect.

The web technology has been proposed to deploy computerized design tools such as FMEA over the Internet or corporate Intranets (Huang, Mak, & Nie, 1998). Web-based design tools overcome many of the limitations that standalone systems suffer from. Team members can simultaneously access the system anywhere and any time from web browsers on the Internet. However, our previous developments did not consider the synchronization of the clients who are working on the same project. Therefore, decisions made by different clients may well be inconsistent and there are no mechanisms for tracking and resolving the conflicts. This paper focuses on the synchronization of team activities within a web-based design tool such as QFD.

Because of limited space here, the implementation process and factors considered during the implementation are not repeated. Interested readers are encouraged to read our previous work (Huang & Mak, 2001; Huang, Lee, & Mak, 2002).

2. System development

A number of activities must be conducted when carrying out QFD. Some of the typical activities are listed as follows:

- Analyzing customer requirements.
- Identifying design features.
- Establishing interactions between customer requirements and design features.
- Carrying out competitive benchmarking in technical and/or market terms.
- Analyzing the results and deriving implications.

A roadmap is usually used to guide the analyst through these steps and record the results obtained. This roadmap is the QFD worksheet. After decades of formalization, the QFD worksheet is now well established in terms of its format and procedure, although variations still exist for good reasons.

There are two choices for implementing the worksheets as the user interface of a computerized QFD system. One is to implement all the earlier functions in one worksheet just as paper-based QFD. That is, a single worksheet is used for all the activities and includes all the details. The structure and contents of the resulting worksheet is very complicated. In addition, it is very difficult to fit all these details in the limited space of the screen.

The other choice is to implement one form or screen for one QFD function. In this approach, several forms are involved. One advantage of this approach is that the user has a very specific focus at any time and the downloading time for each form may be short. One disadvantage is that it is difficult for the user to have an overall picture of the analysis. Individual functions must be integrated to form the entire system on a modular basis.

Both methods of integration have been tried. One is to implement these components within one form but separated on multiple tab pages. The other method is to implement these components as independent forms that are called from one central start-up form. It is difficult for us as system designers to appreciate their advantages and limitations. In the final analysis, the end practitioner users must decide.