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Research

Dynamic process modeling for BPR: A computerized simulation approach[1]

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Abstract

Business Process Redesign (BPR) projects are considered to be high risk due to their high management complexity, enterprise-wide impact, and steep project cost. This paper describes a technique that should reduce that risk by developing a systematic process redesign method that we call Dynamic Process Modeling (DPM). It integrates customer-oriented process modeling with computerized visual process simulation to promote better understanding of the required process and determine its performance through simulation of the proposed redesign alternatives prior to selection and implementation. We compare DPM with four other implementation-level process modeling methods using eight criteria to demonstrate its effectiveness in a real-world hospital BPR case. © 1997 Elsevier Science B.V.

Keywords: Dynamic process modeling; Customer-oriented process model; Performance evaluation; Visual simulation; Business process redesign

1. Introduction

Business organizations in the 1990s are facing an ever-increasing uncertainty and unprecedented volatility of the external environment. Increased competition has led many organizations to the "fundamental rethinking and radical redesign of their age-old business processes" called Business Process Redesign (BPR) [4], or Business Reengineering (BR) [10]. Such efforts tend to be complex, have larger enterprise-wide impact, and steeper project cost than the traditional IS development projects today. Despite isolated success stories at several firms [12], many organizations have encountered serious problems during their BPR implementations with widely mixed results [8, 9]. So BPR should always be considered a high-risk project from the firm's perspective.

In this paper, we try to show how to reduce the risk of BPR projects by two means: process modeling and computerized simulation. The first is a technique for understanding, representing, and, when necessary, redesigning the fundamental business processes. Lack of a disciplined method to model business processes has been a problem in many BPR efforts [2]. An ideal process modeling method for BPR would provide a

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simple but expressive modeling mechanism that reflects the customer orientation and cross-functional nature of BPR [3]. One such method, the Event–Process Chain (EPC) modeling method [14], was extended here. By sacrificing the conceptual-level clarity and readability of the EPC model, the Extended EPC (EEPC) model can represent the more detailed implementation-level process dynamics by supporting additional modeling elements.

Despite the massive resource investment and its enterprise-wide impact, many firms have been quick to 'drastically redesign' their major business processes without a thorough analysis of the impact of the change. All too often, instead of 'dramatic performance improvement' they end up with impractical and irrevocable process change that is hard to justify. Computerized process simulation may help to resolve such a problem. By simulating the expected performance of the proposed alternatives, it will be possible to choose the best [15, 20, 22].

Finally, by integrating EEPC modeling and computerized process simulation techniques with performance-based guidelines, an innovative BPR methodology called Dynamic Process Modeling (DPM) is introduced and a real-world hospital case used as an illustration.

2. The dynamic process modeling method

DPM has three components, as shown in Figure 1. We use the EEPC model for process representation, simulation, and work analysis [18, 19, 21].

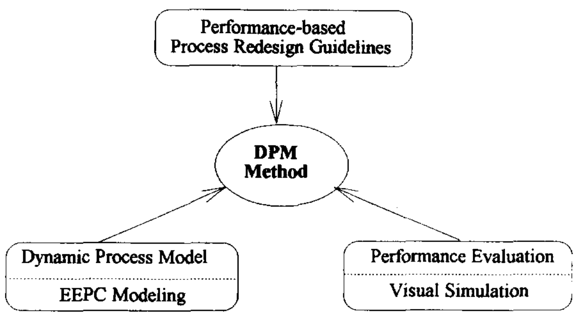

Fig. 1. DPM method components.

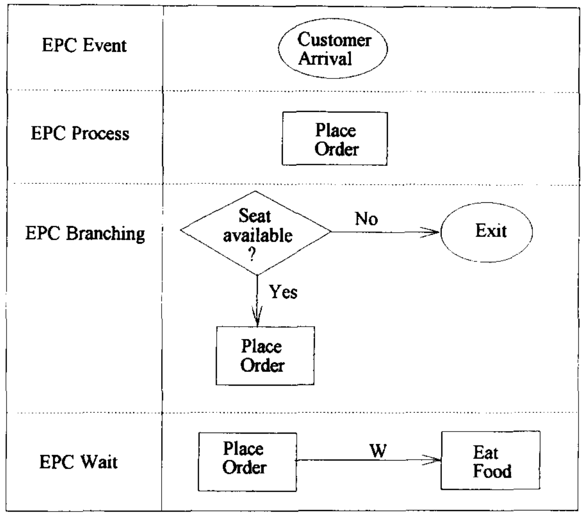

Fig. 2. Examples of EPC constructs.

2.1. Event–process chain(EPC) model

EPC modeling originates from the idea of the event-transaction diagram, which is a graphical formalism used to model the dynamic portion of an organization's global information schema [13]. By adopting a strong customer perspective, EPC modeling supports BPR in identifying and redesigning critical business processes at the conceptual level. By hiding all customer-independent internal processing activities, it facilitates the identification of process bottlenecks that result in lengthy process cycle time and a subsequent loss of customer satisfaction.

An EPC diagram has four constructs: event, process, branching, and wait. Figure 2 gives examples of these constructs, which are drawn in two dimensions, with place dimension vertically and time dimension horizontally. These are the dimensions that should comprise the core context for BPR, where processes are frequently spread over functional boundaries and cycle time measurement is often a crucial part of the process redesign.

2.2. Extended EPC(EEPC) model

An EEPC has five elements, as shown in Table 1 – Event, Process, Branching, Flow, and Wait. EVENT is a change important to the customer; that is, any person