

MANAGING WITH WEB-BASED IT IN MIND

Management thinking has traditionally preceded and quite possibly driven the adoption and use of IT in organizations. That is, management schools (of thought) that emphasize certain types of work structures usually appear earlier than the IT designed to support those work structures. This situation has undoubtedly changed with the explosion in the commercial use of the Internet, particularly the Web. The emergence of e-commerce, e-trade, e-business, and other e-'s has clearly led to creation of new organizational forms, management challenges, and related management ideas. For example, the Web has led to the development or expansion of:

- *Internet startups* whose market value vastly exceeds what traditional price/earnings standards for company market valuation stipulate, placing these companies in an advantageous competitive position right at their inception due to the initial amount of capital available to them.
- *Internet portals* where market value depends much more heavily on the number of visitors (first time or repeat) they can draw than on their revenues, profitability, or other traditional market value measures.
- *Virtual organizations* that operate with no or little physical assets and distribution channels.
- *Boundaryless organizations* in which geographical barriers to teamwork and market reach are virtually eliminated.

The examples only scratch the surface as far as the potential that this *disruptive technology*—the Inter-

A framework that ties together relevant management ideas that help organizations strategically and operationally align themselves with new Web-based IT.

net—can have on organizational structure and, in consequence, management thinking. The adoption of management ideas aligned with the collaboration potential afforded by the Internet and Web can place companies in tremendously advantageous positions within their industries, as illustrated by Dell Computer, Federal Express, E-Trade, and Amazon.com. The reasons for this are many, and range from the capacity to benefit from lower barriers to new entrants, to the ability to attract large infusions of capital at the beginning of their life cycle, to the development and continuous use of highly streamlined distribution and workflow management processes.

Today, the type of management thinking discussed here is not well defined and shaped in the form of a single management school. Nevertheless, it has been easy to find organizations trying to adapt ideas from old and existing management schools to the new environment of Web-based IT. Table 1 summarizes key management schools that emerged in the late 1900s, before the use of the Web became widespread.

Trying to adapt ideas from old and existing management schools (such as those in Table 1) to the new environment of Web-based IT has its advantages, but is difficult to implement in practice. There are two key

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reasons for this. First, some of the new Web-based IT supports new organizational forms often incompatible with one single management school. Second, the existing management schools usually propose ideas that are, at some level, contradictory, often because they were developed on the premise

Table 1. Key management schools of the 1990s.

Management school	Main figure(s)	Period	Main thesis
Total quality management	Deming, Juran	Began in the 1950s, first in Japan, reaching the U.S. in the 1980s	Organizational improvement should focus on processes, not problems, and related quality issues. Productivity improvement cannot be realized without quality improvement. Line employees and customers, not only managers, should be deeply involved in quality improvement initiatives.
Organizational learning	Revsans, Argyris, Senge	Began in the 1960s	Workers as well as managers can continuously improve the organization in which they work by freely sharing and questioning their knowledge and personal beliefs in a trusting organizational environment.
Excellence	Peters, Kanter	Began in the 1980s	Excellent organizations change continuously in order to satisfy their customers. This change is both top-down and bottom-up, that is, it is driven by managers as well as line workers.
Reengineering	Hammer, Davenport	Began in the 1990s	Organizations should radically redesign their processes from time to time in order to remain competitive. This redesign should be top-down, that is, primarily led by top managers.

that other management schools proposed ideas that did not work in practice (for example, reengineering vs. total quality management). Moreover, it is difficult to find a good match between single existing management schools and emerging Web-based IT given the tendency of business writers to focus on one or a few business ideas and propose them as a panacea. What is needed is a generic framework that ties together relevant management ideas that help organizations align themselves strategically and operationally with new Web-based IT.

It is beyond the scope of this article to propose a new management school. Given this limitation, a new management framework is proposed to help organizations benefit from modern Web-based IT. The goal is to provide some basic elements that can be used by managers and researchers as a starting point for a broader management model. As such, I focus on a particular set of activities associated with team coordination and communication in production and service delivery business processes.

A Simple Framework for Supporting Processes with Web-based IT

A great deal of my work since the late 1980s has revolved around the use of IT to support different forms of teamwork. Since 1997, several colleagues and I have been working with a number of companies in the Philadelphia metropolitan area in the analysis and redesign of their business processes, leveraging the resources provided by the Web to support new intraorganizational processes through intranets, and new interorganizational processes through extranets. Some of the companies we have worked with toward this end were Prudential Insurance, Metro One Telecommunications, Sheraton Hotels, Day & Zimmermann, Lockheed Martin, Delaware Investments, Penn Mutual, and Andersen Consulting.

After several projects, each involving different managers, consultants, and key employees, some patterns started to emerge that seemed relatively independent of characteristics of the organization, processes, or people involved. While the targeted organizations and processes had

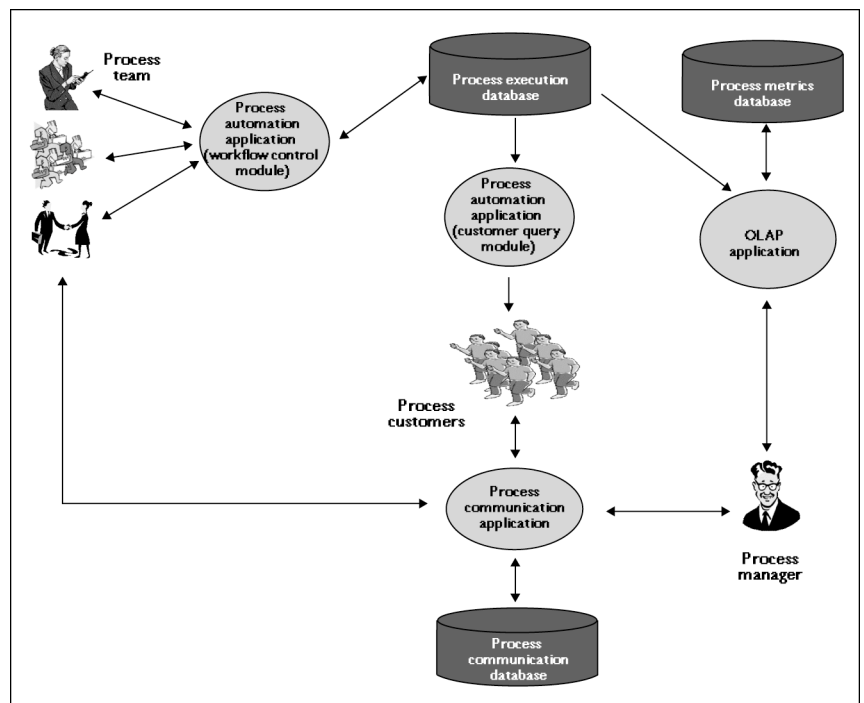


Figure 1. A generic model to implement processes enabled by Web-based IT.

their own peculiarities, we invariably arrived at a similar final result. This final result—a *new* process. (We analyzed and redesigned over 30 processes in more than 15 organizations from 1997 to 2000). The processes analyzed included marketing, sales, inventory control, production, distribution, and service delivery. Production and service delivery processes were the most frequent redesigns. Some generic features were particularly similar across redesigned processes in different companies, as illustrated in Figure 1.

A *Web-based work flow control module* is a computer application module that automates the execution of a process from beginning to end, reminding process team members of tasks that are their responsibility and allowing them to update the execution status of those tasks. This module populates a *process execution database* that stores data about process execution.

The main function of a *Web-based customer query module* is to give customer access to process execution status data. For customers requesting an external telephone line repair, for example, this module would provide information about repair status.

A *Web-based Online Analytical Processing (OLAP) application* allows the process manager to generate (and customize the generation of) process metrics periodically. Process metrics provide a simplified view of the productivity and quality of a process and can be used for continuous improvement of the processes.

A *Web-based process communication application* populates and provides access to a *process communication database*. This application supports continuous communication between the process manager, process customers, and process team, and may incorporate the following Web-based components:

- A repository of summarized process metrics and process improvement initiatives aimed at improving the outcomes of the metrics. Usually the process manager maintains this repository.
- A discussion forum that allows process customers to communicate with each other as well as with process team members and the process manager.
- A knowledge base with key data needed by process team members to execute their respective activities in the process, and by process customers so they can use outputs of the process more efficiently and effectively. In the case of a helpdesk process, for example, this knowledge base would contain equipment and software support information to be used by process customers for self-help.

A Web-based Helpdesk

One of the most common processes of IT organizations that provide technology support to parent companies is the helpdesk process. It is through the helpdesk process that internal users are enabled to do their work using IT. Helpdesk activities include new accounts creation (for example, email, proxy, dial-up, selected applications), office applications training, general hardware and software support, network cabling set up, and database hosting, among others. The helpdesk process is a key process for both the IT organization and parent company. The IT organization's budget is often defined by the quality and volume of helpdesk-related services provided to internal IT users.

A practical implementation of a helpdesk process using the Web-based IT model discussed earlier is shown in Figure 2. The relative position and shape of the main process elements is the same as in Figure 1 so the reader can easily relate generic elements with their counterparts in the implementation example shown in Figure 2.

In this practical implementation, the user interface is a Web browser and, as such, is common to all users. All applications are Web-enabled and run on Web servers (or clusters of Web servers). The communication medium between Web servers and browsers is the Internet (although it could have been an intranet or LAN supporting Web communication protocols). This configuration allows any of the process actors (such as process manager, process team members, and process customers) to use the system anywhere, anytime.

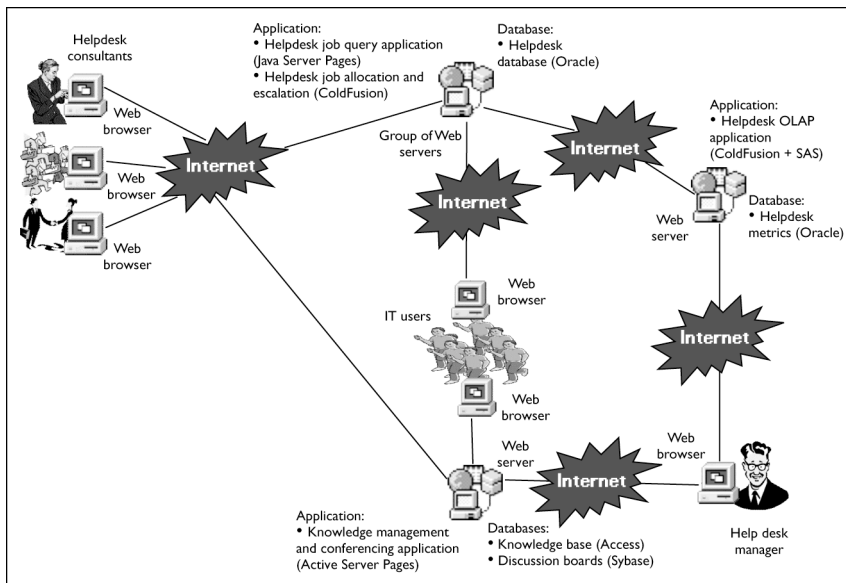
A Web-based workflow control module is implemented as a helpdesk job allocation and escalation application, developed using ColdFusion by a third-party software developer (and modeled after the popular Remedy Help Desk system). This application populates an Oracle helpdesk database that stores data about helpdesk jobs (for example, requests for support and follow-up activities).

A Web-based customer query module is implemented as a helpdesk job query application developed with Java Server Pages (or Servlets), which allows IT users to monitor the status of their helpdesk jobs. This application runs on the same group of Web servers (which could be seen as one large Web server) as the helpdesk job allocation and escalation application and performs queries against the same helpdesk database populated by that application (although without modifying the database).

A Web-based OLAP application is implemented as a helpdesk OLAP application, developed using ColdFusion and SAS (an OLAP application development

platform), that allows the helpdesk manager to generate (and customize the generation of) helpdesk quality and productivity metrics periodically. The application populates an Oracle helpdesk metrics database. Examples of metrics are number of helpdesk jobs of a certain category (for example, network troubleshooting) solved within two hours of the request for help, number of complaints by IT users, number of helpdesk jobs handled by a particular individual or group of individuals, percentage of recurring problems, and so on.

A Web-based process communication application



is implemented as a knowledge management and conferencing application, developed with Active Server Pages (standard pieces of VBScript code that run on the Web server), which populates and provides access to two databases: an Access knowledge base and a Sybase discussion board database. The application also allows the helpdesk manager to post process metrics periodically, which are converted by the application into standard HTML and shown as a series of static Web pages. This application supports continuous communication between the helpdesk manager, IT users, and the helpdesk team. It incorporates the following Web-based components:

- A discussion forum that allows IT users to communicate with each other as well as with helpdesk consultants and the helpdesk manager in a more personal and less structured way than through helpdesk jobs. This discussion forum also works as a continuous two-way information exchange forum between local IT gurus (for example, a salesperson who knows a great deal about a sales IT application and who helps his colleagues in

- the Sales Department) and helpdesk consultants.
- A knowledge base with key knowledge needed by helpdesk consultants to execute their respective activities in the process. This knowledge base is also used by selected IT users (the local IT gurus) for self-help.

Links with Different Management Schools and Related Ideas

It is important to stress that the process redesign initiatives that led to variations of the generic model discussed here were guided by a common methodology called “MetaProi,” which stands for Meta-process for Process Improvement [9]. In spite of this, it is still remarkable that the model shown in Figure 1 emerged from process redesign efforts involving different people in different companies. After all, senior management and consultants were involved, and they agreed the new processes were either optimal or close to optimal. This convergence is also an indication of the existence of underlying management ideas likely to surface if awareness about current Web-based IT potential exists. Further inspection also suggests that even

Figure 2. A Web-based helpdesk implementation of the generic Web-based IT model.

though these management ideas, which surfaced in process redesign discussions, are not tied to a single management school, they are obviously aligned with several schools (as shown in Table 2).

The “Process feature(s)” column in Table 2 describes features of the generic process model that are highly dependent on IT, particularly in the last two rows (repository, discussion forum, and knowledge base). Those features would not have been present if senior management was not willing to implement the management ideas described in the first column of Table 2, which in turn became more popular with the emergence of four contemporary management schools: total quality management, organizational learning, excellence, and reengineering. Still, one cannot convincingly argue that management thinking is driving the use of the technology. Not only do these four management schools differ significantly from each other, they also have a different following (for example, organizational learning proponents often suggest their management school as

a softer and more people-oriented alternative to reengineering). It is more likely that modern Web-based IT forces the adoption of management ideas that do not have a single and coherent source.

The idea that IT should drive organizational design has been proposed by many business thinkers, including reengineering coinventor Tom Davenport [4]. In fact, this was one of the early areas of disagreement between him and other proponents of reengineering led by Hammer and Champy [8]. Yet, letting IT define how processes are structured shifts a great deal of the responsibility on how to manage organiza-

underlying this new management school is that of virtual communities of process team members, users and managers, brought together in creative ways through the use of Web-based IT. Such virtual communities should, among other things, promote collaboration between customers and suppliers by allowing them to communicate and share information and knowledge independently of traditional time and distance constraints. **C**

Table 2.
Management ideas, related schools, and process features.

Management idea	Management schools	Process feature(s)
Direct management control on teams should be reduced to a minimum. Process-level control should be automated as much as possible.	Excellence, Reengineering.	Workflow control automation.
Customers should have instant access to process execution status.	Total quality management, reengineering.	Automated customer query support.
Process metrics should be periodically analyzed and used to incrementally improve processes.	Total quality management.	OLAP-based process metrics generation.
Customers should be allowed access to process performance data and related process improvement initiatives, and asked for their advice on how to improve processes.	Excellence, total quality management, organization learning.	Process metrics and improvement initiatives repository, discussion forum.
Customers should be given full and decentralized access to process-related data so they can solve some process-related problems themselves.	Reengineering, organizational learning.	Process knowledge base.

tions to software developers and systems integrators, who arguably do not know the processes of the organizations they serve as well as their (internal or external) customers do. Moreover, software developers and system integrators need to sell their products and services to many organizations in order to maximize their profits, which is bound to decrease potential competitive advantages for their corporate customers. After all, if you have the same processes and enabling technologies as your competition, how can you possibly get ahead of them?

Creating Virtual Communities

From a practical perspective, the generic process model discussed here can be seen as an archetype process that can be used as a template for the design of optimal business processes. After all, it is based on a number of process redesign efforts that led to the same high-level result. Using it may save organizations precious time and resources that would otherwise be wasted reinventing the wheel.

From a more philosophical perspective, the process model can be seen as a first step in the direction of a new management school. This new school's principles should guide the selection and implementation of Web-based IT to enable optimal processes, rather than the other way around. One of the key concepts

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