CHAPTER

1

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The Internet Is a Fabulous Invention, But...

"Oh, what a tangled web we weave …"
—Sir Walter Scott

Imagine a spaceship hovering over planet Earth. Inside is a friendly alien using special instruments to gaze at the Internet—the World Wide Web (WWW). From space, the WWW "appears as a swirling sphere of light . . . as a global efflorescence . . . the radiant chrysalis from which will spring a new global economy" [1]. The alien travels forward a little in time to glimpse what the WWW will become. It sees that the "Internet is not merely a radiance of connections; it is a mesh of constant invention. . . . The Net is a seine of collaborative production . . . it has fallen into the hands of a billion learners and value creators. . . . The Internet is a network of networks of learning curves and melodies seeking their points of harmonic resonance. It triumphs by proliferating the slopes of learning, the songs of searching, the quests

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of curiosity that are at the heart of wealth creation" [1]. The alien is happy with what it sees, and flies away.

I adore the WWW! As a consumer and business professional, I marvel daily at all the benefits of simply being connected to the Internet. As a computer scientist, I feel proud of the people in my profession who created it and continue to expand its abilities. The WWW is an invention that is transforming the world on the scale of an industrial and social revolution.

But I am also troubled and worried. As a practitioner, a software engineer, and a project manager, I see the maintenance shock that descends on companies when trying to maintain their Web systems. I see stunned companies. Once the thrill and excitement of their new Web site—the e-commerce or e-business package—goes on-line, a paralysis, a frustration, a feeling of being overwhelmed by the volume and speed of changes, inevitably sets in. They did not envisage such speed!

Along with this *velocity of change,* they did not envisage another significant requirement: *business and technical operation synergy.* That is, the tight bonding between strategic business decision-making and the technical operations of the company requiring the immediate execution of those decisions. The Internet has exasperated this synergy.

In the old days—the pre-Internet days of software development and maintenance—software companies typically functioned in a certain way. For instance, the executive team would do 5-year strategic planning. They would go to some off-site location, typically a fancy resort, and spend weeks developing the 5-year plan. Frequently this planning was done in a mildly euphoric, inebriated state since it was such tedious work. When they got back from the plush resort, the executives would then disseminate the plan throughout the company. It would take months for the company as a whole to put the necessary procedures, schedules, tools, hardware, people skills, resources, standards, and processes in place to support the new plan. But now, pure Internet companies are changing these rules, which in turn affects all companies—including the bricks-and-mortar companies—that provide an Internet offering. Pure Internet companies realize that it is impossible to do any kind of serious, long-term planning. Certainly 5 years is too long a period to even envisage for the Internet economy!

What they do now is short-term strategic planning. For instance, they realize that they can only imagine the next few months, and they do weekly strategic planning. So, every Monday morning, the executive team meets. In their euphoric (yeah—love the stock price!) but tired

(overworked) state, they review certain information: the traffic monitoring statistics for their Web sites from the last week; the competitors' Web sites; and their strategic plans from last week. Based on subsequent analysis, they may simply change their key strategic decisions. For instance, the marketing vice president may decide that new products or types of transactions or partnerships have to exist immediately because the competitor just released new features on their Web site.

Once this meeting is over, the team then takes the new decisions and strategies back to the rest of the company and begins implementing them. They cannot afford any lag in their execution because they know the competition is just a click away from them. So, all the work schedules and tasks get adjusted immediately. No longer is there any comfort-zone time delay between the decision making and their execution. No longer is there any opportunity for managers to focus on getting their staff to "buy in" to the new decisions. The company must respond immediately; otherwise, it could easily lose its market share or even go out of business.

Hence, this means that for all software and Web development, the content authors and software developers have to respond immediately. It means people must adapt straight-away and their tools and development environments must do so also, not to mention the processes and procedures. There essentially is no time to change—everyone and everything must "switch over" to suit the new decisions.

The serious implication then for companies doing Web development and maintenance is that their environments must be very flexible and instantly adaptable to change. Of course, the only way to achieve such a Utopian ideal is to automate everything. That way managers go on-line and make the process changes and everyone falls in behind, guided by the process controls of the tools. *It is only through the use of tools and automated processes that companies have any hope of achieving the efficiencies, flexibility, and immediacy of change needed to support the velocity of change required by the Internet.*

But what kind of tools? Because Web development is just like software development, the tools we used in the past for good software engineering are needed: requirements, testing, quality assurance (QA), help desks, distribution, design and modeling, workflow, and so on. One vital tool that many software companies found out about the hard way (through their software quality problems) was that of configuration management (CM).

CM helps a company control the creation and evolution of its software, along with the processes involved. CM takes on even more

significance now in the Internet economy. Not only is it a major technical solution for enterprise development and maintenance practices, but it is now elevated in importance and assumes or generates tremendous business value for companies. It helps companies avoid many Web site mistakes (such as publishing bad content) and enables companies to quickly recover from crashes (by being able to rebuild sites or roll back to previous versions). CM assumes much more business-critical status because of the dramatic upsurge in the speed of change and because of the synergy between business decisions and technical operations. This book is essentially about the incredible value and criticality of CM for Web development and maintenance.

The Internet is not going away. It is only going to get bigger, bolder, and faster. Without CM, companies will struggle. My goals in writing this book are very grandiose indeed. In short, I want to save the world's companies from encountering a Web crisis—the inability to maintain their Web systems while growing the business at a fast rate. In the next chapter I discuss in detail the nine key challenges that companies must address in order to avoid a Web crisis. We do not need to suffer its consequences. We have learned a lot from the software crisis. In the old days, the software industry knew it had software problems. Those problems boiled down to the inability to deliver quality software on time, with all the changes required and within budget. This kind of crisis could easily befall all companies doing Web development and maintenance. To see the beginnings of a Web crisis, you only have to look at all the Web site crashes because of server upgrade problems or bad content displayed on Web sites.

We should learn from the early software crises and not relive all those problems with Web developers, content authors, and new tools and languages. If you look inside the companies doing Web development today, you see a great sense of urgency. This urgency is creating frustration and a sense of being overwhelmed. Web developers are expected to work 24 hours a day. They wear pagers at all times because they could be called on to do Web fixes or upgrades at any time.

There are at least five drivers or causes of this urgency, which will be discussed further in the next chapter. Essentially though, they are (1) competitive issues, (2) societal forces, (3) being successful too quickly, which results in (4) too many avoidable mistakes, and (5) the need to choose the right development processes. These drivers affect the kind of Web development and maintenance environment and resources that companies provide. Hence, it is important for companies doing Web

development (which eventually will be every company on this planet) to recognize the driving forces and adjust their environments to them.

The beginnings of maintenance problems

Consider a typical Web system. A medium- to large-sized system may consist of 20 Internet Web sites, one of which may be a private intranet site and the others, global Internet sites. Each site represents a particular e-commerce product targeted to a specific market niche. These sites share a significant amount of code and content because they are essentially the same product. About 80% is common code and content, meaning 80% of the same material is shared across all sites. The other 20% is tailored or unique to each site. Hence, if a change has to be made, much of the decision-making involves deciding the ramifications of the change. For instance, should the change be propagated to each site if it affects the common, shared code, or is it specific to the site-dependent code? How are the updates published simultaneously to all sites?

Now scale this up to thousands of Web sites/products, and thousands of changes ranging in priority from urgent show-stopper bugs to low-priority "wish list" changes. Quite a bit of work is involved in making the changes, including the decision-making about the change (who, how, why, when, cost), the speed with which the change has to happen, and the mechanics of doing the change, testing it, and publishing it on the appropriate live sites. The decision-making, mechanics, and speed all have their elements of complexity. On top of that, imagine that the Web sites are subject to government or industrial audits. How does a company keep track of all the pieces? How does a company make all the changes without making any mistakes, such as publishing the wrong version of the content?

Then imagine having to redesign the Web sites on a regular basis in order to keep customers coming back, or having to merge and create new sites—all while maintaining (fixing bugs, adding enhancements) the existing sites. A tremendous amount of work must be done in parallel, requiring significant technical and managerial coordination and synchronization.

Then, add to those factors the variant explosion problem. For instance, each site represents a variant of the original, common code and content. So, at any time there are 20 variants that are live. Well, actually, there are more because each site must cater to all versions of browsers (in

fact, all versions of Internet Explorer and Netscape Navigator, among others). Thus, each of the 20 variants has multiple variants themselves because they must support all versions of those browsers. Even further, those products are designed to run on non-PC (personal computer) devices such as smart phones (phones that can connect to the Internet). Now, each variant and its browser "subvariants" must support further variants that will be accessible through all the "micro-browsers" for the smart devices—and all versions of those micro-browsers. Thus, the variant explosion continues as more devices are added to the product line. A company could very easily be supporting at least 200 variants of one product at any point in time.

No company can manage this variant explosion problem manually. Tools and techniques are needed to assist. That is where CM comes in. At a high level, CM is a disciplined approach to managing the evolution of software/Web development and maintenance practices (e.g., the publish–fix–test–publish cycle) along with their products (e.g., Web content plus the back-office applications and tools and variants). CM tools provide all the support that assists the developers (programmers) and content authors along with the project managers and team leaders. CM has been around for at least 30 years, and there are now very mature CM tools in the commercial marketplace.

Unfortunately, very few companies with mission-critical Web systems are using CM tools today. Some are developing their own CM tools and techniques because they are not fully aware of the commercially available CM tools. In fact, they may never have heard of CM at all. The purpose of this book is to make the Web community aware of the Web crisis they will face if they do not employ CM as part of their development and maintenance infrastructure. And then, given that awareness, what are the best practices for a company in selecting and deploying a good CM solution?

The Web crisis consequence

Many companies are heading toward a Web crisis. This crisis involves the proliferation of quickly "hacked together" Web systems that are kept running via a continual stream of patches or upgrades developed without any rigorous or systematic approach. With the Web there is the speed and the ease of making mistakes. "Bricks-and-clicks" (the bricks-and-mortar companies that provide their products and services via the Internet) and

pure Internet companies cannot afford to make mistakes because downtime means lost business. For instance, eBay was the first company with Web problems that got the mass media's attention. Its Web site went down, resulting in a loss of at least $5 million in revenue, more than a 29-point drop in stock price in one day, and a tarnished reputation.

All companies will eventually do business over the Internet. The world cannot afford to have faulty Web systems, or Web systems that crash or have any downtime. We live in the Internet economy now. The Internet is not a fad. It is a way of life and is a major part of the world's economy. It drives the stock markets and makes—or breaks—millionaires overnight. In March 2000, the Nasdaq stock market indicator hit 5000 [2], confirming further that technology companies now drive the U.S. economy.

I see a reemerging pattern from the "old software" days. That pattern concerns companies concentrating on creating new software without thought of maintaining that software. Everyone in the world can see the side effects of the emerging Web crisis—Web sites crash and serious mistakes are made because wrong, inconsistent, or stale content was accidentally published to the live sites. Software companies can no longer hide their software maintenance problems from the world because now all problems are visible from the Web site.

In the old software days, it was an acceptable fact that companies released products that were buggy [3]. They could always say to the client, "Hey, we will fix that in the next release. And that will be in three months' time." With the Internet economy, that response is no longer acceptable. If the Web site has a bug, serious financial and litigation consequences could result and a client may be lost since the competition is just one click away. Because the customers can see the Web site, they expect your company to be able to fix the problem right away.

If one projects forward in time into the next decade, nine key challenges are evident for companies concerning their Web system development and maintenance. Table 1.1 summarizes them and they are discussed in detail in Chapter 2. Although CM is not the entire solution to the nine challenges, it is the core support capability that is needed to address all challenges well. I believe that a good, well-automated CM solution will give a company 80% protection against the Web challenges. Without CM as a core part of a company's IDE (interactive development environment), a company will struggle to survive because it will make mistakes that can be avoided and will waste time "firefighting" or

Table 1.1
Nine Key Challenges Facing Companies With Web Systems

Speed of change
Variant explosion
Dynamic content
Process support
Performance effect
Scalability
Outsourcing
Politics
Immaturity

recovering from those mistakes rather than moving forward and expending time on creative endeavors like new products, Web sites, or partnerships.

Survival is no longer good enough for companies. If you look at pure Internet companies like Amazon.com, you see that they are not just surviving, but thriving. That is, they keep growing. They didn't just stick with selling books, but moved into selling movies and music, conducting auctions, and so on. Jeff Bezos, the CEO of Amazon.com, has said that eventually they will be selling everything imaginable (apart from live animals and guns).

Then imagine way out in the future when the world learns how to digitize everything. What would it be like if we could digitize pasta and send it through the Internet? as Nicholas Negropointe, a visionary of our digital future, proffered.

To do business over the Internet, companies have to be able to thrive. They have to really know how to do business and to grow in the face of continual and constant change, and be able to execute plans quickly. A key enabler to this is CM. Companies need to structure their Web development and maintenance activities and environment around CM.

There are different ways of doing just that. One is by simply buying a good off-the-shelf CM tool and inserting it into the environment with appropriate processes. Another way is to wait until the heavy-duty Web content management vendors [4] (such as Vignette and Interwoven) add it to their tools so that CM is embedded. But this will take time, time that companies cannot afford to waste without some kind of CM support. Creating good, automated CM facilities is quite complex and takes many

years. Most of the CM vendors have taken nearly 10 years to perfect their capabilities, so I expect the same kind of maturing period for the Web content management vendors.

CM is not merely a technical solution to development and maintenance problems. It has tremendous business value, and consequently needs to be considered a key strategic issue and core competency for a company. It is such an incredibly powerful support system that, by itself, can save the world from the Web crisis. In Chapter 3, I discuss further what configuration management really is and the value and benefits it offers companies.

CM is typically not considered a "sexy" topic, and you will not hear it discussed with loving affection around the Silicon Valley bars unless surrounded by CM aficionados. What you do hear about, though, are all the problems the companies are having because they do not have CM. Metaphorically, I view the value of CM as similar to the value provided by the pylons of a large bridge. The pylons provide insurance in the sense that the bridge will not fall. But they also enable structures to be built on top of them, such as multiple tiers. The bridge can also withstand the prevailing conditions such as traffic loads, weather patterns, or accidents. But if the pylons are not solid or are improperly designed, then each user of the bridge is at the mercy and whimsy of the weak points in that bridge. Users take their lives into their hands each time they cross the bridge. It is like asking a truck driver to drive his big, heavy truck over a makeshift, rope bridge while praying that the rope bridge holds. Just like the truck driver, no company wants to function on prayer alone. A company needs to function with good engineering principles, processes, techniques, and tools to support them.

The Web changes everything

The Internet economy changes the rules of business such as the 5-year strategic planning that I mentioned earlier. Companies are abandoning their 5-year strategic plans. They must write and rewrite their business plans every quarter or even every week: "Now the fast eat the slow" [5]. "Net speeds force all sorts of cultural changes. Hierarchies flatten out. Budgeting cycles get compressed. Decision-making gets pushed out to the front lines. And customer expectations, not the executive board, guide the next big project…. The prosperity of a firm is directly linked to the

prosperity of its network" [6]. Carly Fiorina, the chief executive officer of Hewlett Packard, said in March 2000 at the Governors' Conference in Washington, DC, that even the role of the CEO has been changed and what we used to consider as power (the owner of the knowledge) has greatly changed.

The Web offers challenges at many levels: business, process, people, and technical. The ways of doing business have changed. Companies must find better processes to support these business changes. Users are now in control because if they are not happy with their "Web experience," the competition is just a click away. Technical solutions must be found to support the business changes and the speed with which they happen.

On the business side, companies need to know how they can maintain all their Web systems while continuing to grow. They need to thrive in the face of constant change and growth. It is not good enough to just survive now. The old software model of, for instance, scheduling new releases of products every quarter, is not acceptable anymore. Customers and business partners expect everything now; immediately! That is a consequence of the Web: 24 x 7, meaning up and running and ready to do business 24 hours a day, 7 days a week. There are no notions of downtime and asking customers to wait. The expectations and the speed and timing of business have changed. Everything we know about software development and maintenance then has to be adjusted to these new expectations.

Speed has changed everything

The speed of doing business, making decisions, responding to customers, fixing bugs, and designing enhancements increases dramatically with a Web system. Everything must now be done in a much faster manner. Decisions must be made quickly: when and how fixes and enhancements are made to the Web sites along with when and how fixes for upgrading the network infrastructure are made. Developers must speed up the release cycle for fixes, bugs, patches, enhancements, and site redesigns.

Even the way in which product brands and advertising are treated or executed is different. Internet companies are willing to scrap their investments in brands and start all over because franchises are being established at a much faster pace [7]. For instance, E*Trade Group Inc.'s strategy is "built around the need to shine in the overcrowded e-broker

market. To stand out, the company fashioned itself into a financial portal, complete with stock quotes, financial news, and company releases for free. The core idea? Be the place that empowers the small investor to trade like a pro" [8]. Now it is the Web experience that defines the brand. If the customers/users of the Web site are happy with the service, they like the brand/company and they will continue.

In the third quarter of 1999, $5 billion in venture capital funding was pumped into Internet businesses in the United States, which is double the entire amount for 1998. "The result: multiple brands fighting for dominance. . . . On the Web, brands are born, force-fed to maturity at a terrifying rate" [7].

E-commerce systems can be up and running in 90 days. E-commerce is changing traditional bricks-and-mortar businesses. For instance, the financial market sector is a booming Internet business. As an example, the city of Pittsburgh, Pennsylvania, was the first city in the United States to auction $55 million worth of municipal bonds directly to investors over the Web [8]. It cut out the middlemen and appealed directly to the buyers, thereby eliminating steep underwriting fees, and helped cut the city's cost of issuing bonds by paying a lower yield at the same time, saving the city at least $1 million. There was a feeling of controlling their own destiny. Such e-commerce means investors have access to more offerings, more information, and better pricing than they have ever had. Electronic trading is also significantly changing how traders operate. Pension funds, mutual funds, and insurance companies have much better transaction data along with the reduction in trading fees and improved performance.

Not only has the Internet changed the way we do business, but in itself it generates new business, such as new opportunities for customized products in foreign markets for electronic trading. There will be an "explosion in secondary trading. This will create more liquidity in the market, making it less volatile. Every investment bank must reinvent how they think about their business. . . . Technology is changing the balance of power. There is a shift in the bargaining power from the sell side [dealers] to the buy side [institutional investors]. . . . Institutional investors see electronic systems as a tool to increase productivity and manage more money" [8].

Companies have to adjust further to the level of control that their clients wield. The customer is in control [9]. If they do not enjoy their Web experience, they easily click over to the competitor. Customer expectations have changed. They expect everything now and they expect to have

control over everything. Companies are being forced to take a much more responsive approach to the customer. Industry's idea of customer satisfaction has to be adjusted to suit the Internet economy.

A company must be flexible in all aspects: its planning approach, its line of products, and its customer response services. They must keep pace with the customers' whims and fancies, along with technological advances. Creative ways have been found as in [5], for instance:

- Solutia, a chemical company spin-off of Monsanto, has its strategists plan for four different short-term outcomes for each initiative, enabling them to change and act fast when they have to rather than being blind-sided.

- Sun Microsystems's CEO holds weekly "whack-o-meter" sessions to assess ways that rivals might "whack" Sun in the marketplace. This enables Sun to react quickly.

- Accompany, an on-line buying club, has their executives communicate strategy shifts in group e-mails. They only hire people who thrive on ambiguity.

- Bluefly.com, an on-line discount clothing outlet, tunes up its sales budget weekly to synchronize with strategy changes.

- Portera Systems, an e-services firm, does weekly sales analysis and adjusts strategy based on those analyses, resulting in software changes every few weeks (rather than every 18 months).

The message for companies is that every level of the company (its business, process, people, technology) must be prepared to change in an instant. Thus, every executive decision a company makes has ramifications on its Web development and maintenance environment—and vice versa. Web development is also quite different from traditional software programming in that it is a more asynchronous style of programming. I discuss the differences further in Chapter 2.

Companies that embraced the Web created new opportunities

Companies embrace the Web in various ways. Some try "Webifying" or putting a browser front-end on their products and legacy applications.

That is what most bricks-and-mortar companies do in order to get their Internet offerings out there as quickly as possible. They quickly realize, though, that adding a front end is not the ideal situation and they end up redesigning a pure Internet version that will give them the performance and usability needed.

Other companies create from scratch their e-commerce or e-business system. Some fail at releasing their Internet offering and just give up. Those that fail usually find an alternative way of embracing the Web, such as by mergers or partnering. Many companies catch "Web fever" out of necessity or out of excitement. We will end up having all companies being bricks-and-clicks companies at some point in time. Today we still have pure Internet companies that came into existence with the advent of a viable Internet and appropriate technologies.

Pure Internet companies, such as eBay, came into existence apparently very quickly. Some bricks-and-mortar companies, such as Charles Schwab, have rushed to the Internet. Others have lagged behind, such as Merrill Lynch and Wal-Mart, while others, such as Christie's and Levi Strauss, decided not to tackle e-commerce. The laggers had to catch up quickly and the others decided it just did not make a lot of sense to them [10]. They found that selling on the Internet is a complex proposition. There were lots of logistics: Build a distribution center or outsource it; develop a complex Web system for complete inventory and distribution management; have better customer service call centers; and sort out how to deal with returned merchandise.

Some companies decided not to expose all their brands initially due to industrial politics such as union issues. Others realize that the technology is not yet ripe for their particular type of commerce; for instance, getting the right sizes in jeans from Levi Strauss or buying the right engagement ring from Tiffany's.

Partnerships are becoming popular because companies need to attract millions of new customers to prevent any slowdown in their growth [11]. Company evaluations are predicated on fast growth and the ability to financially leverage their large audiences through commerce, advertising fees, and other services. Companies such as Kmart are using retail as a way to get new users to sign up for its new on-line service, BlueLight.com, which is a free Web service. Regardless of how it happens, companies achieve many benefits by making the move to the Web, especially if they are the first mover in their industry.

The typical benefits that any company, especially bricks-and-mortar ones, can achieve by a Web presence are summarized in Table 1.2 [12, 13].

The Web will revolutionize every business. Table 1.3 shows the benefits that car companies such as Ford, GM, and BMW are reaping from the Web [14, 15], and Table 1.4 shows benefits that the banking industry is espousing [16].

In the car industry, I consider a particular Internet offering to be a business miracle. Ford, GM, and DaimlerChrysler have agreed to join forces to create a single automotive parts exchange that runs on the Internet [17]. To me, this is a miracle because I cannot imagine this happening between these fierce competitors at all before the introduction of the Internet. It will be the world's largest Internet company. Economists, looking at such a deal, are now realizing that business-to-business e-commerce will add about one-quarter percentage point to the annual growth of major industrialized countries during the next 10 years. This attests to the power and potential of the Internet.

IBM has already done considerable analysis on the return on investment (ROI) that a Web presence gives them [18]. A Web presence will allow IBM to:

Table 1.2
Typical Benefits of Embracing the Web

Increasing competition and globalization
Growing interactivity
New opportunities
Efficiencies and cost savings
Enhanced market and customer reach
Real-time activity
Match supply to demand on a day-to-day basis
Improved customer service
Cut cost of selling products and offerings
Cut cycle times and improve flexibility in order to cope with radically different demand patterns created by growth of e-commerce
Cut time to market by tying every element of the front and back office together using the Web
Sales force can tap data instantly, helping them to customize and close deals in hours rather than days
Unit sales rise significantly and head count falls by same percentage

⏺ Save $750 million by letting customers find answers to technical questions on its Web site;

⏺ Handle a portion of internal training over the Internet instead of in classrooms, saving $120 million;

⏺ Expect $1 billion in savings in total per year with the Web;

⏺ Save $240 million on the goods and services it buys;

⏺ Apply the Web to all business operations: logistics, procurement, training, and so on;

Table 1.3
Benefits of a Web Presence for the Car Industry

Suppliers are linked on-line, which allows them to offer far greater possibilities than just improving communications.
Factories can build to order, eliminating billions of dollars in carrying costs.
Dealerships can report warranty problems live from their service shops so plants can correct any assembly-line problems immediately.
Suppliers can control inventories at the main plants, thereby ensuring "shelves" are constantly stocked.
Factories can apply the Web to the entire auto production process.
Billions of dollars in revenue can be generated.
Costs can be reduced.
Site can spin off as a separate Internet company.
Everyone can access all information via an intranet, instead of having to get copies of print, microfiche, and CD-ROM forms.
Employees can better cope with large volumes of diverse and time-critical information.
Management difficulties with decentralized processes are eliminated.
Publication can be delayed until the last possible moment so that a company can incorporate the very latest information.
Market-specific configuration of manuals is possible.
The overall process, from planning to delivery, is bound together seamlessly, providing a better quality product and higher customer satisfaction.
GM can turn its one-time customers into buyers of long-term services (OnStar) with predictable monthly revenue streams.
BMW can provide Internet access in its cars via built-in phones and devices.

Table 1.4
Benefits to the Banking Industry With a Web Presence

Changes financial dynamics of banking industry
Reshapes relationships between bank and customer
Transfers power (as information) into the hands of the customer
Lowers the cost of entry for new banks and increases competition by making product comparison simpler
Allow banks to survive
Allows nonbanks to create their own distribution networks at a tiny fraction of the cost of building branches
Allows more complex products to be sold than over telephone networks
Defines a new role for themselves

- Plug in at least 6,700 suppliers to its on-line procurement system;

- Provide ubiquitous access to information.

This list of benefits and IBM's ROI along with the issues I discuss in Chapter 2 convince me that the main focus for all companies now must be their Internet presence. *No company should treat its Web site as simply just a list of documents,* though Web sites require serious software development and need to be given the appropriate respect. Also, no company decision should be made without considering the ramifications on Web mainte-nance. Every improvement made to the Web development environment has ramifications on the business strategies. They are all tightly bound together now. You cannot, nor should you, separate these issues.

We already have enough experience to know that companies that ignored the Web or failed in their Internet offerings are paying a price.

Companies that ignored the Web are paying the price

Companies that have ignored the Internet bandwagon have paid a price for that decision. For instance, "Galvanized into action by a tech-driven stock market and its humiliating lapse in letting the competition jump ahead in the battle for the retail on-line market, Merrill is in the process

of remaking itself" [19]. Merrill Lynch is building an electronic replica of its global capital markets businesses, which employ more than 17,000 people and take in more than $6.5 billion in revenue in a year. "Like so many other financial services companies, Merrill is under siege from the Internet" [20]. The rapid growth of electronic trading systems is forcing fundamental, structural changes in the markets. "More than any other company in Corporate America, the brokerage Goliath is feeling the Internet's destructive force. . . . The brokerage industry is absolutely feeling the pain more than any other industry. . . . Traditional companies such as Merrill Lynch are at a disadvantage when a disruptive technology like the Internet blasts through" [20]. Merrill Lynch had to make a key strategic decision about where to expend its resources. No company wants to develop technology that cannibalizes its thriving bricks-and-mortar business, but the forces made it so. Wal-Mart, the world's biggest retailer, is another example [21]. Nimbler rivals beat Wal-Mart in e-commerce. Merrill Lynch and Wal-Mart had to play catch-up.

Some companies even opted out of developing an e-commerce solution. Christie's, the famous auction house, was beaten by Sotheby's and Amazon.com. Companies have been slow to adapt or incapable of adapting to the Internet or of creating an Internet presence. An example is Time Warner, which overcame this deficit by its merger with AOL, which has the Web presence and more than 40 million subscribers [22]. This merger was the biggest ever (until the Vodafone-Mannesmann merger). No doubt, we will continue to see even bigger mergers (which will in turn create more complicated Web development environments that have to function under more pressures).

Traditional brick-and-mortar companies, such as the giant retailers, were surprised by the Internet. "E-commerce evolved much quicker than anticipated . . . sales picked up so fast that traditional retailers were forced to speed up their e-commerce offerings . . . old-line merchants are starting to 'get it' by experimenting with different business models and cleaning up their sites" [23]. E-retailers have struggled with the quality of their Web systems. One of the main issues has been technical problems with their Web sites [24]. New business models also have problems. For instance, on-line book sellers decided to download for free the release of a new Stephen King novel. More than 400,000 copies were sold in the first 24 hours, after recovering from the server crash at Barnes & Noble's site. Amazon.com was getting 1.5 hits per second on the book [25]. Companies have to find better ways of maintaining their Web systems.

We need Web engineering

We need Web engineering. The industry cannot mature by using "cow-boys" to "hack" code and content and to do server upgrades without well-defined processes. Well-understood maintenance cycles such as that shown in Figure 1.1 in conjunction with change tracking cycles as in Figure 1.2 must be put into place. We must move beyond the simplistic two-step Web publishing cycle shown in Figure 1.3 of (1) fix the bug and (2) publish it. Tightly integrated tools that allow us to access the meta-data across tool repositories and automate workflow across tools are needed.

We need to blend in all the best practices from the software world. After all, Web code and content are software and they need the same respect. People developing and maintaining code and content and data-bases must be treated like software engineers. Arthur C. Clarke has his definition of an engineer, which as I remember goes something like: "An engineer is someone who can create something for $50 which any fool could create for $100." The sooner the Web industry finds its engineering techniques, the better. And it will achieve its potential. Louis Gerstner Jr., IBM chairman, said in 1999 something to the effect that the true revolution coming from the Web is when the Web can get integrated with your business processes. That can only happen when we have engineering practices and tools comfortably in place.

Considering the business side of the Web with financial analysts from Wall Street, who can affect a company's stock price, it is the maintenance and business operations that matter over the long haul. "In the final
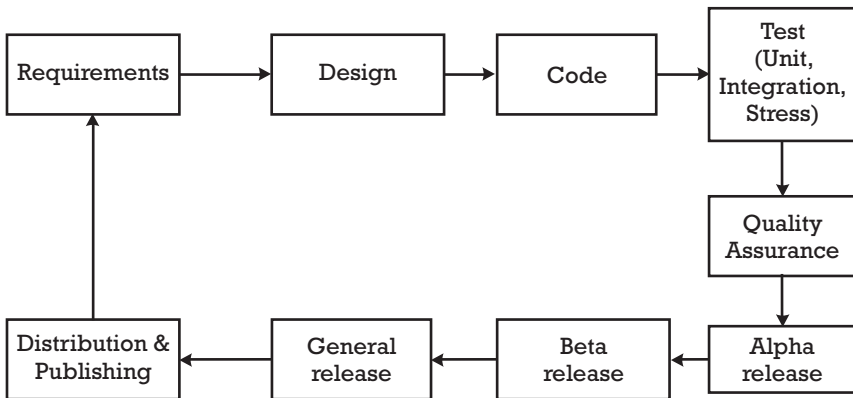

Figure 1.1 Typical best practice software maintenance life cycle.
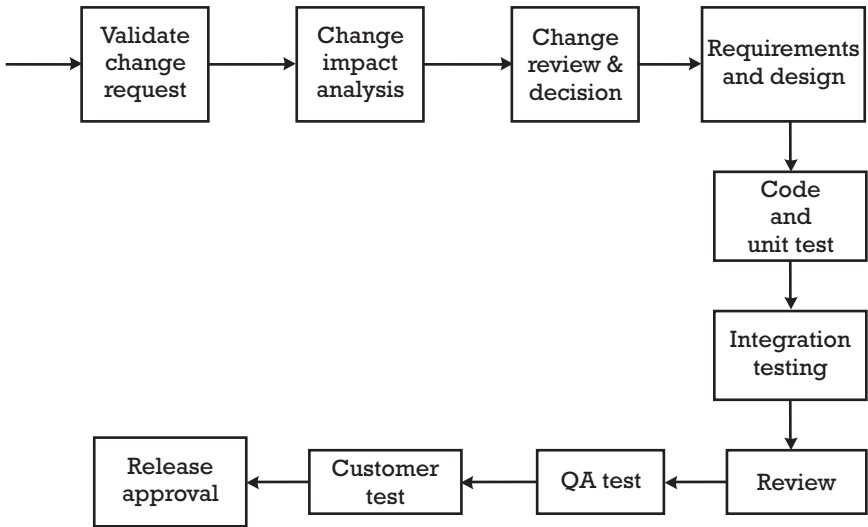
Figure 1.2 Typical change request (i.e., to fix a bug or provide an enhancement) life cycle.
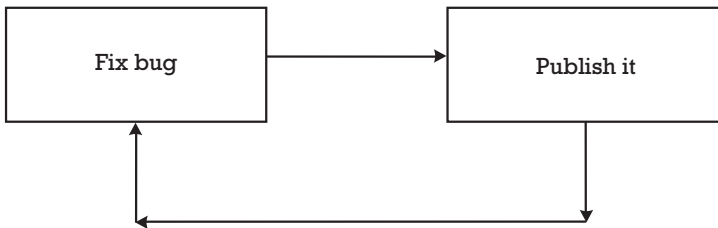

Figure 1.3 Typical, but dangerous, Web maintenance life cycle.

analysis, we can't allow ourselves to be seduced by revolutionary new technologies and Web services absent of solid business models and profit margins. Eventually, all companies will have to justify their stock prices on some multiple of earnings" [26].

Companies are busy now

Companies with Web systems are busy now dealing with basic infrastructure issues: getting enough servers and developers, focusing on network

speed and performance, doing server installations and upgrades, providing secure access, analyzing traffic monitoring results, hiring staff, and planning for e-business. At some point, the complexity of Web system maintenance will hit them. The process of maintaining and growing large Web systems is a complex one. But it can be done in a pain-free and cost-effective manner. The case studies in Chapter 6 will give you examples of how it can be done. All of the companies discussed there use CM tools and practices.

From my experience and from watching many Web companies, I have come to the conclusion that the key elements to achieving good Web maintenance are these:

1. Use CM as the core or heart of development and maintenance.

2. Automate as many processes as possible.

3. Integrate all tools as tightly as possible.

4. Define Web development standards to guide developers and content authors.

The rest of this book focuses on CM, the problems it solves, and the value it adds to companies. Because of Web development, the business value of CM is being elevated. CM used to be sold as a reactive technical solution to development and maintenance problems. But now the proactive business value of CM can be seen. For instance, CM helps a company:

‣   *Eliminate mistakes:* Wrong content does not get published on a Web site.

‣   *Recover from site crashes:* Recreate the Web site, or roll back to an earlier version of the site.

‣   *Automate quality:* Ensure workflow is followed via automatic notifications and approvals.

‣   *Optimize teamwork:* Enable teams to function effectively at all times in their safe workspaces where they control code mergers.

‣   *Manage change complexity:* Allow companies to control changes to everything in a manageable way without chaos.

- *Adapt to process changes:* The maintenance or release cycle can be changed easily via the GUI or browser based on the current business strategy.

- *Enable survival and growth:* Growth rate is a requirement for the Web. Bricks-and-clicks companies will not be competitive without CM. CM is the glue for addressing all Web crisis challenges.

The future and some good advice

Companies are growing larger because of mergers. Pre-Internet, the client–server world gave us many distributed, disjointed development environments and tools. The trend to mergers creating incredibly huge companies will push the industry back into a more centralized, enterprise-wide focus. This will have a profound effect on their software and Web development environments. Companies will make more enterprise-wide tool decisions leaning toward a uniform tool set rather than group-specific ones that encourage a plethora of different tools.

I encourage you to get the best possible CM solution for your company so that you can garner its benefits while avoiding the Web crisis. Do it now. Buy the best tools. Cheap tools sometimes create more headaches than they are worth. Better tools cost more. What price are you willing to put on the success of your Web system?

Do not be afraid to automate processes. Good tools that automate processes and are tightly integrated will take time to deploy. Put your best people on these activities. You cannot afford to have your Web systems fail. Get the best development and maintenance environment possible. This will take time and resources. In the meantime, put top priority focus on your CM solution. Yes, you need your Web tools such as HTML editors and testing tools, but as soon as your CM is in place, the potential for mistakes is immediately reduced and you have a solid foundation for all future development along with maintenance of legacy systems.

You merely have to look to some statistics to realize that the challenges will escalate. Michael Dell, chief executive of Dell Computer Corp., predicts that there will be $4 trillion in annual Internet business transactions and 500 million Internet users by 2003 [27]. Similarly, Vinton G. Cerf, "father" of the Internet, predicts that by 2006, more than 900 million electronic devices will be linked to the Internet, equaling the number

of telephones in the world [26]. Behind these transactions and devices, much Web development and maintenance will have to take place.

Be proactive and win!

Companies need to be proactive and include CM as part of their infrastructure. Do not make the typical mistake of being reactive, of ignoring CM until the Web crisis problems hit. The consequences, recovery time, and lost time cannot be removed. Your competitor can use your lost time to overtake you as market leader. Prepare well for the future now because at some point in time, technology, network infrastructure, and security won't be the battle. Technology will become ubiquitous. Content will be the battleground. If you have a solid maintenance support system via use of CM, then your company can easily pass through the battleground without too much collateral damage.

An outline of each chapter

This book is not about the low-level technical details of Web coding (such as how to write efficient Java code) or of CM implementation (such as how to branch and merge five variants). Such answers are readily available from books or a Web tool or CM tool vendor. Most of the how-to technical issues already have answers that can be easily found because CM has been around for about 30 years. My goal with this book is to raise awareness and highlight the key business issues and technical challenges that have not been brought to industry's attention. Those are the issues that get companies into trouble. My goal is to point companies in the right direction by avoiding the common pitfalls, by pointing out the issues that they need to take into account, and by optimizing their efforts to get the best possible CM solution. I see companies making typical mistakes that can be easily avoided.

This book explains how to articulate your Web needs and problems and then define your CM requirements so that you can choose the best CM tool and deploy the best CM solution throughout your organization.

This book does not tell you which is the best CM tool or vendor because there is no such thing. A tool is good when it suits the needs of users, and there are so many different kinds of users and needs in the world that every tool has its value. Also, I do not want to focus on specific

tools because it is the CM concepts that are important and timeless. Those concepts are implemented in the tools in different ways. CM tools will evolve, vendors will get acquired and products dissolve, and eventually, the CM industry per se will "die" or, rather, CM will become ubiquitous. By this I mean that eventually IDEs will have embedded CM capabilities along with their software tools. Thus, CM will eventually provide the infrastructure for integration with a full suite of tools (requirements, testing, traffic monitoring, site administration, help desks, software distribution tools, and so on). Eventually, CM will be a fundamental capability in IDEs rather than one you have to add.

This chapter is designed to whet your appetite about the spectrum of issues covered in this book. It is also designed to lay the groundwork as to the importance of e-commerce and e-business to the world and how it has changed the way we used to do business and, hence, why companies must be proactive with their CM solutions. The Internet is not going away. It is only going to get bigger, bolder, and faster. Without CM, companies will struggle.

Chapter 2 focuses directly on the nature of the Web. It explains further why the Internet is no fad. I look at the four phases that companies go through in developing and maintaining their Web systems, along with a detailed description of the nine key challenges that companies face in addressing the Web crisis. Categories of problems or mistakes are presented that indicate a company has hit some kind of Web crisis. I look at what is driving companies to a Web crisis point, along with the complex nature of Web systems themselves. The chapter concludes with how Web programming is different from traditional software programming.

Chapter 3 gives a detailed discussion of what I mean by configuration management, why the world has so many interpretations of CM, why CM is not a "sexy" topic, the business value and benefits of CM, why companies are driven to a CM solution, signs that there are CM problems, and the role it plays in standards such as the Capability Maturity Model Integration and ISO 9000. I focus on the operational areas of CM, including version and configuration control, configuration item structuring, construction of configuration items, change management, teamwork support, process management, auditing, and status reporting.

Chapter 4 focuses on the key aspects related to CM tools and the vendors. It shows the spectrum of users and, hence, the spectrum of products. The two types of tools—evolutionary versus full process—are discussed. It ends by answering commonly asked questions such as which tool is best and what the ROI is for a CM tool.

Chapter 5 presents the key steps involved in selecting a CM tool and deploying a CM solution. It walks you through the important strategic issues that must be addressed, including defining the CM problems, capturing the CM benefits and vision, doing a readiness assessment, developing the requirements list, performing risk management, assigning selection criteria and a rating system, developing a Request for Proposal for a vendor, choosing the tools finalists, doing a proof-of-concept pilot project, making the tool decision, and finalizing the selection process, which, in turn, becomes the start of deployment of your CM solution. It also discusses the importance of the tool selection team and what such a team should look like, and how to develop CM processes.

Chapter 6 contains the fun stuff. It is a collection of eight case studies that show how some well-known brick-and-click and pure Internet companies use CM tools in their maintenance practices. The companies are Carclub.com, eCampus.com, EDS, Lockheed Martin, Lycos, NASD, One-Source, and USinternetworking. The tools they use include eChange-Man, ClearCase, Harvest, PVCS Dimensions, Perforce, PVCS Professional, StarTeam, and Continuus. The chapter also contains the summation of what could be called best practices for Web engineering based on what the companies in the case studies have learned, along with my experiences.

The Appendix presents checklists and templates that a company can use to help it through the key steps involved in CM tool selection and deployment, and planning for its CM solution.

Why I wrote this book

My goals in writing this book are very grandiose indeed. As I said earlier, I want to save the world's companies from encountering the Web crisis. We do not need to suffer its consequences. Let's apply all the lessons learned from traditional software development. We now have developers and content authors who may not have had any experience in traditional software development. They are doomed to repeat all the mistakes and suffer all the failures of the pre-Internet software developers.

I also have many specific reasons for writing the book:

1. The Web, from a business viewpoint, is relatively new and there is a need to articulate all the problems and challenges it presents from a business and technical viewpoint. You can easily find books that tell you the technical side of creating a Web site. At the time

this book was written, there were no books that gave guidance on maintaining large Web systems. My goal is to articulate all the business issues that companies have to face along with showing how technical solutions (such as CM tools) can support them through those challenges.

2. Companies and software vendors keep making the same mistakes: Companies are picking the wrong CM tool, or they pick the right tool and it becomes shelfware. I see weaknesses that can be readily improved. People keep asking me the same questions: "Which tool should we pick?" Or "We chose a tool but it hasn't worked out for us." Vendors ask me: "How can we sell an enterprise-wide CM solution? How can we get developers to accept our process-oriented tool?" I answer the most commonly asked questions.

3. To raise awareness about the crucial need for CM in Web development and maintenance.

4. To make it clear that there are many solutions, by way of CM tools, to address all your Web teams' critical development and maintenance needs.

5. To show you the many benefits and inherent value of CM and how your company and your Web team can tap into those benefits.

6. To stop companies from wasting time and making avoidable mistakes.

7. For those companies who already understand the need for a CM solution, to show them how they can optimally, and in a pain-free manner, pick a CM tool and deploy it. Or, if you have already picked a tool and it has become shelfware, to show you how to get back on track with it and deploy it.

8. To help companies avoid the common CM pitfalls.

9. To present techniques for making maximum use of CM tool vendors. I have worked with many of them and have gleaned many insights.

10. To help advance the state-of-the-art, or maturity level in companies for Web development and maintenance.

The audience for this book

This book has been written to address a wide audience based on the needs I have seen in industry:

‣ Executive management such as CEOs or managing directors who need to make strategic decisions as to where to expend resources, how to get the most value, and how to avoid the Web crisis;

‣ Technical managers such as vice presidents of engineering, product marketing managers, and information technology managers who need solutions for improving development and maintenance efforts;

‣ Project managers such as CM managers, product managers, and quality assurance managers who need to know how to select and deploy a CM solution;

‣ Developers who want a broader perspective on Web development and maintenance, want to know what is possible perhaps beyond what they currently do, and want ideas on how to "sell" CM to their management;

‣ CM vendors who want to give their prospects and clients an independent opinion about CM and guidance on how to sell the CM solution internally to their management and project teams;

‣ Venture capitalists who want to be able to evaluate the engineering practice of start-ups.

Key messages from this chapter

To repeat what I said earlier: No company should treat its Web system as simply a list of documents. Web systems are serious software development and need to be given the appropriate respect; otherwise, the consequences can be disastrous. Also, no company decision should be made without considering the ramifications on Web maintenance. Conversely, every decision made about the Web development environment has ramifications on business strategies. They are all tightly bound together now. There is synergism. You cannot, nor should you, separate these issues.

Companies must now take a more holistic approach in their decision-making.

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