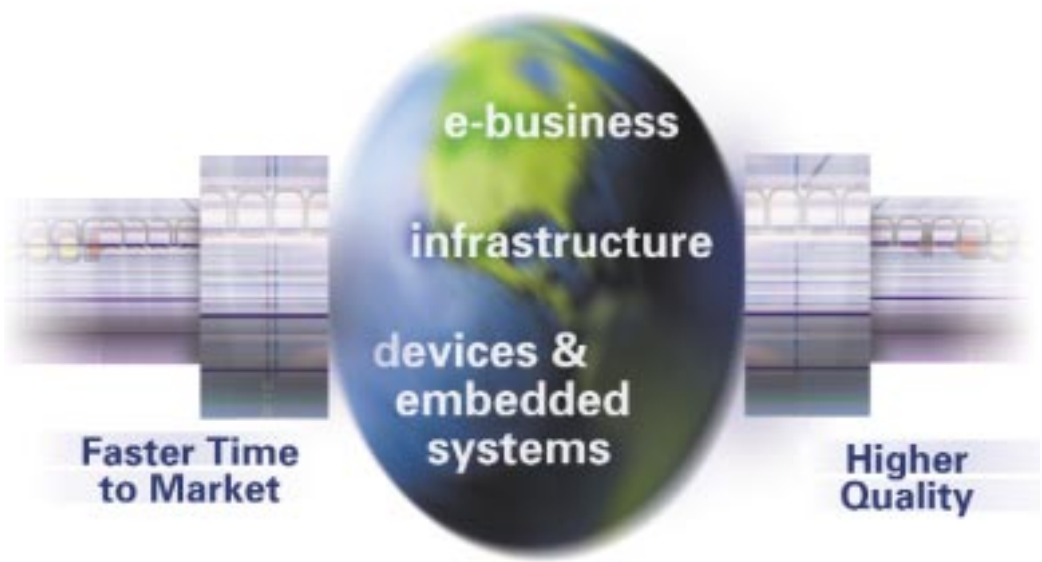
Overcoming the Software Development Paradox: Six strategies from market leaders



THE SOFTWARE DEVELOPMENT PARADOX: BUILD IT FAST...BUILD IT RIGHT

Software is the heart of every business. It's part of the vehicles we drive, the cell phones we use to communicate and the behind-the-scenes transactions that allow us to purchase tickets to sporting events without ever leaving our houses. Unfortunately, time pressures, growing complexity, and a shortage of skilled programmers have made software development more challenging than ever.

In today's digital economy, effective software development has become the critical competitive differentiator for businesses in all markets. In June of 2000, the U.S. Department of Commerce published a study called "Digital Economy 2000" in which they noted that business investment in IT equipment and software more than doubled between 1995 and 1999. They also reported that over the last five years IT industries have contributed nearly one-third of the real U.S. economic growth. This is because industries in many sectors of the economy are incorporating more and more software, embedded devices, and computing infrastructure into their products and their business operations.

The traditional barriers to exploiting the powers of computing – processing power, network access and storage capacity – are no longer barriers for most companies. On the other hand, the ability to consistently build truly excellent applications – and do it fast – often remains elusive. In fact, according to the Standish Group's widely publicized 1999 CHAOS study, only 26 percent of today's software development projects are completed on time and within budget.

Business leaders in every market segment – including telecommunications, financial services, electronic product manufacturers and e-business infrastructure providers – are looking for ways to improve the economics of software development but, software development is getting tougher all the time. Development teams are being asked to produce applications that deliver more sophisticated functionality than ever. They're being asked to link more diverse, complex hardware and software resources. And, they're being asked to do all this at a time when the available supply of talented, experienced programmers is tighter than ever. To succeed in the new economy, software development teams must address these two factors:

SPEED: no tolerance for delay

Time-to-market pressures on development teams have escalated radically. Because market innovation and competitiveness depends so much on the rollout of new software, development deadlines have become business-critical. Companies can no longer wait nine to twelve months for a development team to design, write, test, and refine an application. Those that can't accelerate the development process will miss important windows of opportunity and lose out to more nimble competitors.

QUALITY: no tolerance for error

Back when applications were strictly for internal consumption, minor flaws in software might delay a project – but not much more than that. Today, software touches every relationship in the supply chain. Errors can result in lost revenue and permanently alienated customers. They can even get you on the

evening news and cause a drop in your stock price. In this highly exposed, high-stakes environment, development teams have to consistently deliver software that can stand up under the 24x7x365 demands of the marketplace.

These two requirements – faster time-to-market and extremely high quality – form the heart of the "software development paradox." Whether you're a distributor trying to extend your e-business reach, an electronics manufacturer trying to competitively differentiate your products or an infrastructure provider trying to deliver next-generation services, you have to consistently develop great software — fast.

Companies that successfully solve the software development paradox can significantly improve business performance in many ways. They can service customers better. They can build smarter products. They can adapt to changes in the technology landscape more adroitly. And, they can save money by smarter allocation of human resources and capital.

What the winners know

So how can companies produce software faster and better? To discover the answer, it makes sense to look at the measures taken by companies – such as those profiled on these pages – that have successfully dealt with the software development paradox.

The primary attribute that these companies have in common is that they've recognized and confronted the nature of the problem. The challenges of software development in the new economy can't be solved simply by hiring more developers (even if that were possible) or adopting a new programming language. In fact, the addition of new languages and technologies to the IT and technology skills portfolio – while certainly worthwhile in terms of the capabilities they deliver – tends to exacerbate these problems.

Winner Profile

Lockheed Martin Canada

Lockheed Martin Canada is Canada's premier supplier of electronic defense systems. The successful delivery of those systems depends on the company's ability to write highly sophisticated, highly reliable applications – on time. The scope of such projects is often quite broad, putting pressure on development teams to manage a wide range of requirements, resources, and delivery milestones.

Program manager Rick Martelli says Rational has been instrumental in ensuring that teams can meet these stringent demands. "We can capture requirements, identify risks and place our work under strict configuration control," Martelli declares. "Rational products provide a capability that is available nowhere else."

Martelli and team use Rational Suite® Enterprise. "We were able to rapidly implement a very controlled, disciplined approach," he recalls. Martelli's team got up to speed quickly on Rational tools – despite having no prior experience with them. "Plus, new team members can get to work right away because everything is standardized."

As winning companies embrace the reality of software as a competitive differentiator, improving the economics of software development with better tools, processes, and augmenting the capabilities of existing personnel, is the key to producing better bottom line results.

What winners do: Six winning strategies for time compression and risk reduction

Successful software development teams have responded to the software development paradox by employing best practices that optimize both the speed and quality of software development. These best practices can be categorized into six strategic imperatives:

1) DEVELOP SOFTWARE ITERATIVELY: reducing risk

No one can completely eliminate problems across the development lifecycle. However, it's possible to identify risk earlier, regardless of whether it is in the analysis, design, testing, managing or coding phases of a project. Serious software

development organizations use an iterative approach that allows for continuous refinement of project deliverables (see Fig.1).

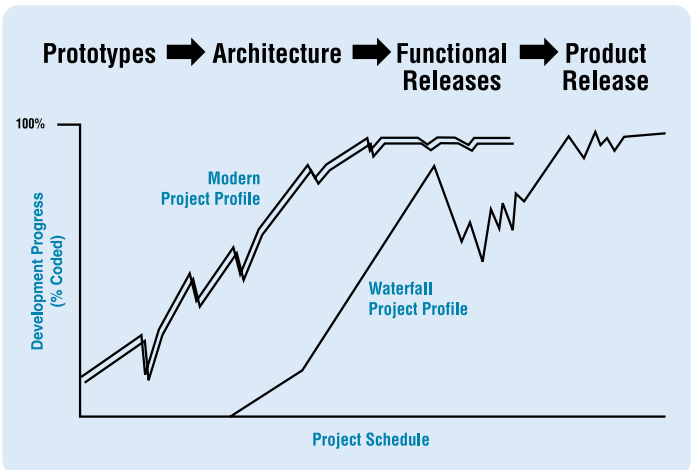


Fig. 1: A continuous, iterative approach to software development significantly reduces the risk of project delays and cost overruns.

By taking an iterative approach to development and by confirming that specific functionalities have, in fact, been effectively delivered at assigned milestones throughout the process, successful teams keep problems manageable and assure quality throughout the project.

2) MANAGE REQUIREMENTS: the start to project success

Development teams often spend too little time understanding their real business problems and the needs of the users and other stakeholders that a system must address. Without a clear understanding of these issues, organizations can develop off-target solutions, miss critical windows of opportunity or be overrun by the competition. By following a process that keeps projects on track from the beginning, winners avoid the costs of repairing or re-releasing software later in the lifecycle. With the proper requirements-management discipline, teams are also better able to address changes, avoid "feature creep" and keep projects on budget and on schedule.

Winners clearly know how to keep development projects focused on real business value and consistently apply this type of financial discipline to their development efforts without compromising speed or quality (see Fig.2).

3) USE COMPONENT-BASED ARCHITECTURES: the foundation for software re-use

One danger in large, complex systems is that changes in one area of an application can have a "domino effect" – impacting many other areas of the application. Successful development teams address these potential dependencies through the use of component-based architectures. Assembly of software in manageable modules creates resilient and flexible architectures that prevent the ripple effect of change. This also enables developers to build applications that can be easily modified without massive effort.

As organizations re-use components, they also reduce the total amount of code they need to write. This further speeds development and reduces the opportunities for errors to be introduced into the process.

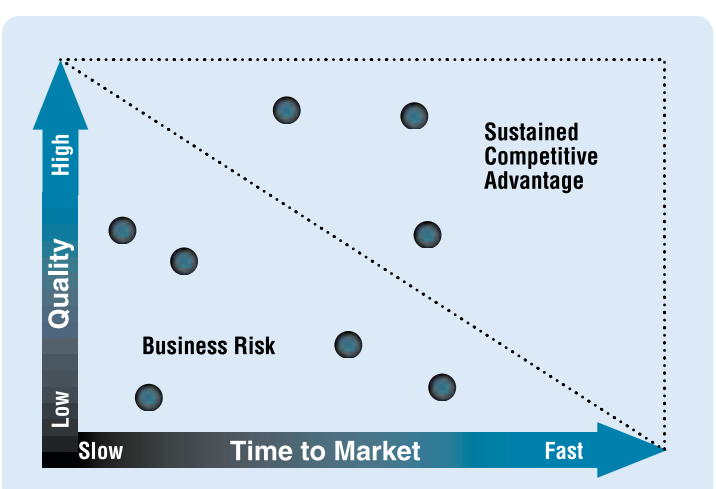


Fig. 2: To be truly successful, businesses need to rise above tradeoffs in quality or time to market.

4) VISUALLY MODEL SOFTWARE: the blueprint for success

Today's software executes highly complex operations. Development teams therefore need a highly intuitive and accurate way of modeling all of this functional complexity. Without such a model, they simply won't be able to comprehend, specify or document the systems they've been asked to build.

Winners use visual modeling to achieve this critical level of abstraction. Visual modeling tools enable managers and developers to clarify important design decisions and to manage system complexity. Through the use of a modeling language, such as the industry-standard Unified Modeling Language, development teams can achieve a common ground that allows them to communicate technical complexities in a simple manner.

5) CONTINUOUSLY VERIFY QUALITY: building in quality from beginning to end

It's no secret that it's much more expensive to find and fix problems after a system has been deployed than it is to catch them early on. That's why successful development teams continuously verify the quality at each step of the development process.

Typically, they're able to accomplish this continuous testing through the use of automated testing tools. By making the execution of intermittent tests quicker and easier, these tools help ensure that quality-by-design best practices won't slow down fast-track projects.

6) CONTROL CHANGES TO SOFTWARE: reduce project errors and delays

Software development is all about change. Effective development therefore requires effective change management. With effective change management in place, development teams can produce releases on time, on budget – with predictable quality. Project managers know whether a build is complete. Testers know whether a new build needs testing. And developers can keep track of their huge collections of different files.

Winners understand that change management is the key to prioritizing team activities and priorities. By controlling change throughout the software development lifecycle, they manage its inherent complexity. They know that if they don't control change, change will surely control them.

Winner Profile

Choice Hotels

Choice Hotels International franchises more than 4,392 hotels in 43 countries under brands such as Comfort Inn, Quality Inn, and Econo Lodge. The smooth operation of those facilities — from online reservation systems to efficient guest services — depends on the development of well-crafted, rapidly deployable applications. "We rely on complex software systems to manage our entire business. It is essential that our software is of the highest quality so that we can guarantee our guests a superior level of customer service," says Gary Thomson, CIO.

Choice Hotels' information systems team faced a major challenge as they first began mapping out a strategy for developing and delivering web based systems for the global franchisor. They were not maximizing communication between the different development teams throughout the development process. To improve their software development process and introduce repeatable quality, speed and resource-efficiency to Choice's development efforts, Choice Hotels' CIO Gary Thomson put his faith in Rational tools.

"Rational Suite helps us meet and exceed these demands by providing us with a comprehensive solution that spans the development lifecycle including managing change, requirements and testing. By offering the most important aspects of software development in tightly integrated tools, Rational allows us to collaboratively work to deliver a stable infrastructure that forms the base of our operations."

Rational Software: the e-development solution provider

Since its founding in 1981, Rational® Software has played a central and unique role in the advancement of software design and development. The Rational solution, e-development, is a comprehensive approach to overcoming the software development paradox. It features seamless integration between the best practices you follow, the tools you use, and the services you call on to accelerate success (see Fig.3). Everyone benefits from this solution – development team members work faster, customers and stakeholders find it simpler to participate in the process, and managers can execute against business goals more easily. The result: high-quality software delivered on time.

To keep you ahead of the technology curve, Rational partners with the major players in the software industry, including IBM, Microsoft, Hewlett-Packard, Intel, Sun Microsystems, and SGI. Rational's strategic partnerships ensure broad product compatibility and a smooth transition to the technologies of the future. In addition, the Rational Unified Partner Program puts over 400 partners, including consulting firms, system integrators, and technology development partners, within easy reach.

Rational's unique e-development solution includes many innovations that improve your ability to deliver with speed and quality – from standards-based modeling to Rational e-development accelerators that jump-start development efforts. Rational has a long history of delivering practical, innovative solutions to address software development problems. Rational was an early leader in the adoption of the Unified Modeling Language, was first to deliver an integrated lifecycle development solution, and has taken change management to a new level through Unified Change Management. Rational understands the pressures you face to deliver the right software and deliver it quickly and have spearheaded new solutions and approaches that can help you today.

Rational's leadership is widely recognized throughout the industry. IDC has recognized Rational as the revenue leader in multiple application development and deployment markets for four years in a row. Rational's e-development solutions have been selected by 49 of the *Fortune* e-50 and by 45 of *USA Today's* e-business 50. Rational and its solutions have also been the recipients of numerous awards from leading industry organizations and publications. For more information on Rational's software engineering leadership, visit www.rational.com/leadership.

Fig. 3: Rational's e-development solution combines three major elements into a platform for project success.

Rational's e-development solutions support the success of its global customer base in three ways:

BEST PRACTICES: process made practical

Through its 20-year relationship with customers that build complex software systems, Rational has identified a set of key principles that are highly correlated with software success. These best practices are crystallized in the Rational Unified Process™ – the most comprehensive and effective total framework for optimizing return on development budgets. The Rational Unified Process is a Web-enabled, software engineering process that delivers software best practices to all team members. Leading companies worldwide recognize the wisdom of

these best practices and their relevance to everyday development challenges. The Rational Unified Process has been adopted by IBM, Microsoft, Oracle, Sun Microsystems, Ernst and Young, and many others.

UNIFIED TOOLS: support your entire project team

Rational's industry-leading development tools are organized into five categories: requirements management, visual modeling, automated testing, content management, and change management. They enable development teams to execute their assigned tasks faster and more accurately. Whether it's testing the performance of a Web-enabled database application, pinpointing a discrepancy in a design spec, or alerting a project manager to a potential cost overrun, Rational's tools ensure that every aspect of the development process happens when and how it's supposed to.

SERVICES: accelerate your success

At a time when experienced developers and development managers are scarcer than ever, Rational's comprehensive services offer a highly attractive value proposition to companies seeking to accelerate the development of flawless applications. These high-value services offer the same rich expertise and experience that form the foundation of Rational's best practices and tool offerings. They encompass technical support and directed application of Rational tools (as well as those of select partners), development consulting/project implementation services, and a variety of cost-efficient education and training offerings. These services help organizations further reduce project risk and get to market even more quickly. ■

Software development teams and IT managers that recognize the existence of this crucial software development paradox will achieve the same substantive business advantages as the companies briefly profiled on these pages: faster time-to-market, a sustainable culture of innovation, and improved customer service. They'll also avoid the possibility of public embarrassment due to failed software projects.

Winner Profile

John Hancock Financial Services

John Hancock Financial Services, Inc. and its affiliated companies provide a broad array of insurance and investment products and services to retail and institutional customers. Software development teams at John Hancock rely on multiple Rational tools including Rational RequisitePro®, Rational ClearQuest®, Rational ClearCase® and Rational Robot to develop and deploy robust software applications that can support a growing infrastructure and a large customer base. Director of Software Quality Assurance Carl Fowler understands the value of delivering applications on time with high quality. "Using an integrated software lifecycle solution has given us the ability to measure the overall quality of the applications we are developing and to be able to demonstrate that back to the business customers."

By employing best practices and continuously verifying quality, Fowler and team have improved application dependability and efficiency. "Rational tools have enabled us to standardize development processes and automate areas of the lifecycle. We are now saving six weeks off each major development release cycle".

To learn more about how your software team can overcome the software development paradox with Rational's e-development solution, please visit us at www.rational.com/offer/winners

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the e-development company™

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