# PRICEWATERHOUSECOOPERS 🏛

Technology Forecast: 2003–2005

The Intelligent Real-Time Enterprise
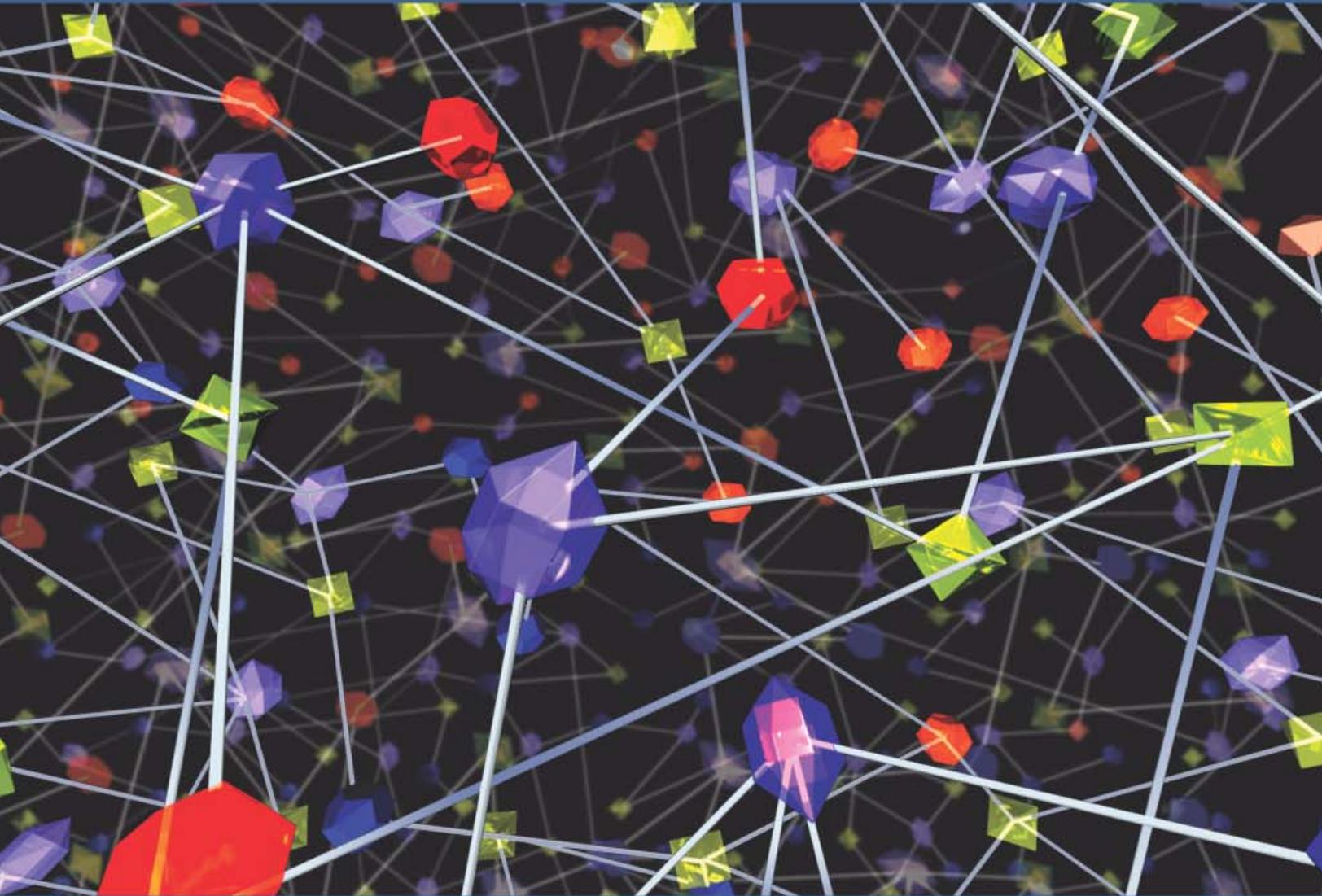
Enterprise Applications | Information Management | Enabling Software

Now Available!

Technology Forecast: 2003–2005   *Highlights*

Technology Forecast: 2003–2005 is the latest in a series that the PricewaterhouseCoopers Global Technology Centre has published annually for more than a dozen years. This year's book provides in-depth coverage of enterprise applications and enabling software and forecasts significant developments in those areas over the next three years. It also contains information of particular interest to senior executives, including CFO Perspectives for each of the chapters and a chapter on business reporting and XBRL.

As the pace of business quickens, companies must eliminate information lag and make more timely decisions. Business intelligence technologies—business activity monitoring, event notification, and digital dashboards—provide executives with real-time information about the status of key business processes, including their relations with customers and suppliers. New business integration technologies, including increased use of XML-based Web services, are making end-to-end automation of business processes easier to accomplish. Meanwhile, the incorporation of analytic capabilities into virtually all enterprise applications, as well as advances in knowledge management and collaborative technologies, increase the speed and effectiveness of decision-making.

Technology Forecast: 2003–2005 discusses these and other changes under way in enterprise IT. It is divided into three sections, each highlighting a different area of enterprise software, that together comprise ten chapters providing detailed coverage of specific technologies and applications:

- *Enterprise Applications* contains chapters on enterprise suites, including enterprise suite architectures, supply chain event and performance management, and enterprise resource planning; customer-facing applications; and business intelligence and enterprise analytics, including real-time business intelligence and business activity monitoring.
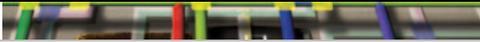
- *Information Management* comprises chapters on enterprise content management; knowledge management and e-learning; and collaborative technologies.

- *Enabling Software* includes chapters on XML and Web services; component frameworks, including J2EE and Microsoft .Net; application and portal servers; and business integration technologies, including business process modeling, monitoring, and management.

In addition, the book features interviews with three leading figures in IT:

- *Vivek Ranadivé*—Founder, chairman and CEO of TIBCO Software. A recognized industry leader, Ranadivé was selected by *InfoWorld* as one of the top ten technology innovators in 2002. He was also recognized by Ernst & Young as a 2002 software entrepreneur of the year. His book *The Power of Now: How Winning Companies Sense and Respond to Change Using Real-Time Technology* (McGraw-Hill, 1999) has been widely used as a business school textbook.

- *Tony Scott*—CTO for General Motors' Information Systems and Services organization, where he is responsible for defining the enterprise architecture and standards across all of GM's global business. His work at GM has included the development of its employee portal and wireless strategy, and he directs the company's involvement in IT standards bodies and technology consortium organizations.

- *Ronald Weissman*—A venture partner with Apax Partners, a leading international private equity and venture capital firm with offices throughout Europe, the United States, Israel, and Japan. Apax manages more than $12 billion on behalf of major institutional investors in the United States and abroad. His focus is on U.S. and international opportunities in enterprise and infrastructure software and on Apax portfolio company development.

Technology Forecast: 2003–2005   Contents

Technology Forecast: 2003–2005 Format

Technology Forecast: 2002–2005 is a publication of the PricewaterhouseCoopers Global Technology Centre. It is prepared with the assistance of a variety of subject-matter experts. Working from authors' drafts, PricewaterhouseCoopers practice units worldwide collaborate in an extensive editorial review process to produce the final text. Our contributors are recognized in the Acknowledgments section.

The labeled figure identifies the following page elements:

- Section name
- Page number
- Chapter name
- Cross-reference icon
- Cross-reference to other Technology Forecast publications
- Explanation icon
- Caption relating to figure
- Source of information

The content of the technology chapters is organized into the following sections:

- **Executive Summary**—A brief overview of the chapter's contents.

- **Technology**—Basic background information covering the technology's development, the way it works, and basic terminology. Recent major events and trends also are discussed.

- **Market Overview**—A summary of market growth, including projections for the forecast period, and of key vendors and their market shares.

- **Forecast**—Forecasts for the progress of the technology over the next one to three years (the "forecast period").

In addition, each chapter contains a CFO Perspective section that considers the business case for the technology under discussion. Several chapters also discuss best practices for using that technology.

The index makes it easy to locate discussions of specific topics, products, and companies. It also defines the acronyms used in the text. Lists of figures, tables, and sidebars in the book follow the main table of contents. Each section of the book begins with a table of contents for the chapters in that section. These are easily identified by the color stripe along the edge of the page.

Technology Forecast: 2003–2005   Interviewee Perspectives

"Closed-loop integration gives you the tools to get your finger on the pulse of your organization, on end-to-end business processes—for example, the entire cash-to-cash cycle. Lack of visibility into these steps in the cycle can cost money and cause additional delays between investment and revenue.... Closed-loop systems let you integrate, measure, and analyze at every step in the process. You can see relevant information in real time, model and simulate changes, take action, and improve how you run your business. This ability to run your business faster and smarter is the future of business."

"The common fallacy is thinking that, with Web services, you do not need to do anything—that application integration and business integration will be automatic. The software industry has been through this before. We heard that with Java; people said, 'Now you can all go home and stop writing software.' We heard that with CORBA, and now we are hearing that with Web services and XML. The truth is that having a Web service is a little bit like allowing people to stand on their front porches and scream, 'Apples!' Now you have everyone out there yelling, 'Apples! Apples! Apples!' But are you buying apples? Are you selling apples? Are you making apple pie? Are you trying to sell apple cider?"

—Vivek Ranadivé, chairman and CEO of TIBCO Software

"When I addressed the Enterprise Software Roundtable, a group of CEOs and CTOs of software companies, in 2002, I asked them, "For how many of your core products is the default installation the one you would recommend your customers use?" Not a hand in the audience went up. Then I asked them, "What if GM sold you a car that you had to take to a mechanic to assemble and tune before you could even drive it off the lot?" I don't think the software industry is sustainable as it is, without some greater movement towards self-configuration, self-tuning, like the autonomic computing initiatives that IBM has been pursuing."

"If I look back on my career, in general, it was in a world where people had to wait around for computers to do things.... Now, instead of people waiting around for computers, I am seeing a lot more of the reverse, which is computers waiting for people to make decisions. So I think the next big opportunity for us is helping people speed up their decision-making. This is computer assisted, but it is beyond what we typically think of as decision support: it includes decision automation, it includes workflow, it includes collaboration, it includes getting people to be more efficient at the things they personally do in a large organization. As a result, I see collaborative sciences, collaborative technologies, and new networking technologies such as wireless as the next big field of opportunity."

—Tony Scott, CTO for General Motors' Information Systems and Services organization

"One constant in the history of computing has been the development of greater and greater levels of abstraction in order to cope with the greater complexity that we ask our systems to manage.... Policy-based computing takes abstraction to the next logical level: management by goals and best practices. Policies can range from those relating to IT goals all the way to business-focused policies such as how we respond when a business partner is late with a shipment of critical parts. Our first efforts at policy-based computing are addressing the management of IT assets and physical systems. Over time, this will extend to applications, data, and business processes."

"...[T]he survival of startups necessitates that they find defensible markets not dominated by the major players or that they offer deeper functionality than that provided by generic product vendors. Some startups do this by embedding market-specific domain knowledge into their products via specialized analytics, dashboards, and reports. This means that the product is ready, out of the box, to offer market-specific solutions and requires less customization than generic products. In this way, young companies can build closer relations with customers by offering greater market insight and value."

—Ronald Weissman, venture partner, Apax Partners

Technology Forecast: 2003–2005 *Ordering Information*

Technology Forecast: 2003–2005 is available in both print and electronic formats. Clients of PricewaterhouseCoopers may be able to obtain a copy from their engagement contact.

The book (order #TC-01-14) can be purchased for US$99 by calling +1-800-654-3387 (U.S. calls only) or +1-314-997-2540, or by sending a fax request to +1-314-997-1351. To place an order for the publication on the Web, go to www.pwc.com/tech-forecast/order. American Express, MasterCard, and Visa are accepted, and payment by check can be arranged.

The CD-ROM enclosed with the book contains the text in Adobe Acrobat format and includes an index for full-text search. It is licensed for use by only one individual. Multiuser licenses are available; for more information, call +1-650-470-6730.

INTERNAL PRICEWATERHOUSECOOPERS ORDERS
Partners and staff of PricewaterhouseCoopers (PwC) can request copies of *Technology Forecast: 2003–2005* through the PwC Global Publications Lotus Notes database (request document #TC-01-14). Partners and staff who do not have access to the publications database can order books by sending a Lotus Notes message to NAC Distribution @Americas-US.

■ About the Global Technology Centre

The PricewaterhouseCoopers Global Technology Centre, located in Menlo Park, California, provides PricewaterhouseCoopers engagement teams and their clients with analysis and evaluation of current and emerging information technologies. The Centre, part of PwC's Global Thought Leadership organization, has a staff of researchers, technology analysts, and advisors with extensive experience in advanced applications of existing technologies and knowledge of the potential uses of emerging technologies. The Centre provides information and services that give our firm and our clients a competitive edge in the marketplace.

Using the research embodied in *Technology Forecast*, *Paths to Value* (a new model for understanding value creation in early-stage companies), and other original thought leadership publications as references, Technology Centre staff deliver on-site presentations on technology trends to clients of Pricewaterhouse-Coopers around the world. These presentations supplement our executive seminars and consulting services, which focus on IT and business strategy issues.

The Centre also provides technology due-diligence and competitive analysis of industry trends and information, computer, and communications technologies. Similar services are provided to European clients by Menlo Park Europe, a London-based group of technology analysts who work closely with the Global Technology Centre. These services reduce uncertainty and allow our clients to better gauge the level of risk associated with a specific investment.

About the cover: The cover image, *Nodes*, created by Richard D. Eberly, *Technology Forecast* staff illustrator, represents an abstract view of the universe of information. The gridlike structure depicts the connections between different nodes of information, which are shown floating in space. Each node displays several facets or surfaces, reflecting the fact that information appears to have different shapes when viewed from different perspectives. Some of the nodes appear to be close to the viewer, while others recede into the background at varying distances. As the amount of information available through company networks and the Internet grows exponentially, tools for navigating information may use visual metaphors similar to this image.

Nodes started out as a group of two-dimensional profiles (geometric shapes) that were created with Adobe Illustrator. The profiles were then imported into Form-Z, where extrusion and sweep tools were used to create three-dimensional models, and the nodes were moved to different planes to give the appearance of depth. The 3D models were finally imported into Electric Image Universe, where the scene was rendered by adding lights and surface textures and by adjusting the perspective (camera angle).

Other *Technology Forecast* Publications

For information about ordering these publications, please see "Ordering Information" on the previous page, or visit our Web site, www.pwc.com/tech-forecast/order.

■ Special Offer: "Emerging Patterns of Internet Computing"

Technology Forecast: 2002–2004, Volume 2: Emerging Patterns of Internet Computing complements *Technology Forecast: 2003–2005* by covering additional topics, including grid computing, computing as a utility, pervasive computing, and self-managing systems. It also discusses the ongoing innovations in microprocessors, servers, storage, communications, and other areas that will eventually provide a scalable worldwide infrastructure based on commodity technologies. The book is divided into three major sections:

- *Processors & Platforms* contains chapters on semiconductors; embedded processors; traditional computing platforms and the operating systems that run on them; storage; displays; and emerging platforms, including mobile handheld devices, consumer Internet access devices, and telematics.

- *Communications* comprises chapters on telecommunications services, including the transition currently under way to widespread use of Voice-over-IP; wireless communications, including 2.5G and 3G cellular systems and 802.11 wireless LANs; wireline communications, including Resilient Packet Rings and metropolitan area Ethernet; and Internet technologies, including quality of service and session initiation protocol (SIP).

- *Web Application Management* includes chapters on Website performance and availability and on system management.

There are also interviews with four leading figures in IT: Judy Estrin, president and CEO of Packet Design; Prof. Leonard Kleinrock of UCLA's Computer Science department; Dr. Richard F. Rashid, senior vice president of research at Microsoft; and Dr. Irving Wladawsky-Berger, vice president for technology and strategy in IBM's Server Group.

Technology Forecast: 2002–2004, Volume 2 is available at the discounted price of $40. (Special order code INC0113.)

■ Special Offer: "Navigating the Future of Software"

Technology Forecast: 2002–2004, Volume 1: Navigating the Future of Software includes extensive material on software topics not covered in *Technology Forecast: 2003-2005,* including commerce servers, mobile Internet, personalization, Website analysis, online merchandising, peer-to-peer computing, digital rights management, and enterprise software architectures. The book also explains the fundamentals of e-procurement, enterprise resource planning, and supply chain management applications. This material serves as a foundation for the updated coverage of these application areas found in *Technology Forecast: 2003-2005.*

Technology Forecast: 2002–2004, Volume 1 is available at the discounted price of $40. (Special order code INC0113.)

■ Prepublication Announcement: "Information Security"

Information Security: Meeting the Challenge of Internet Computing will be published during the third quarter of 2003. It will complement the *Technology Forecast: 2003–2005* by providing detailed coverage of the new security requirements resulting from the widespread adoption of Internet-based computing and e-commerce: identity management, intrusion detection, transactional entitlements, information and software integrity, XML-based transaction security, and compliance with regulations governing customer privacy. It will also cover the basic building blocks of security, including public and private key cryptography, public key infrastructure, network firewalls, and biometrics.

To receive information about *Information Security* via e-mail when it is published, contact us via e-mail at technology.forecast.circulation@pwc.com, or send a fax to +1-314-997-1351 with your e-mail address.

Praise for Past Editions of the *Technology Forecast*

"The PricewaterhouseCoopers *Technology Forecast* is a must-read for those involved in the alignment of business strategy and IT trends. It offers a high-quality source of insight on technology, which we use as input to Reuters' own Technology Foresight activities."

—— Mike Sayers, CTO, Reuters

"The report's content, layout and quality of writing are so strong that it will appeal to just about everyone. The PricewaterhouseCoopers *Technology Forecast* is a 'must have' publication for anyone involved in technology management or education."

—— Paul Christ, Ph.D., Professor, Technology and Electronic Commerce Program, West Chester University

"It is not just quantity but quality that distinguishes this text from others. [The *Technology Forecast*] is impressive in terms of both breadth and depth. What I like best about it is that the writers—about 25 contributors with support from 30 reviewers and a large advisory board—go beyond description and move into analysis."

—— Andrew C. Gross, Professor, Marketing and International Business Program, Cleveland State University

"The PricewaterhouseCoopers *Technology Forecast* is the most lucid, complete and accurate description of current and forthcoming technologies I have seen. For the areas I am familiar with, I cross-check what I think I know, and the Forecast always yields nuggets. For the areas I'm not familiar with, it's a great tutorial and forecast. The writing and production are both first-rate. It's a joy to read."

—— Steve Crocker, former CTO, CyberCash; former CEO, Longitude Systems

"The *Technology Forecast* publications have been the cornerstone information source for the last two in-house technology conferences. We distribute the Forecast to our nontechnology product developers to provide them an in-depth, readable and understandable analysis of the critical trends and new developments in the use of technology. It is well-written, thoroughly researched, and it provides the appropriate level of comprehensiveness for our audience."

—— Steven P. Daitch, Senior Vice President, West Group

PRICEWATERHOUSE COOPERS 🄿🄒

TC-01-14P (v1.0)