CUTTER Benchmark Review
Analyzing IT Metrics for Informed Management Decisions

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TAKING THE PULSE OF E-BUSINESS

Welcome to the first edition of ***Cutter Benchmark Review***, the journal that brings you the most current IT benchmarking data and analysis, helping you track the technology trends that matter. Cutter Consortium is continuously studying the market changes in all of our practice areas, including Business Technology Trends and Impacts, Business-IT Strategies, e-Project Management, Distributed Computing Architecture/e-Business, Sourcing, and our newest practice area — Business Intelligence. The mission of this journal is to report on the developments and provide not only the data but also the analysis you need to act on this information.

"The speed of e" is a popular catchphrase these days, and if we were to ask what your IT organization was doing in 1999, we think you'd see why. This edition of ***Cutter Benchmark Review*** looks at how e-business has altered our organizations over the past three years and where we're headed next. We begin by looking at the way participants in our studies have changed in their attitudes toward e-business, starting in 1999, moving through the crash of 2000, and into 2001. Next, we examine the present by reviewing the current driving forces behind e-business. Finally, we look forward with reports on the future of e-business, including the role of XML and wireless. E-business has fluctuated from lukewarm to white hot to cold in the past several years. The articles in this issue report how these changes have been affecting IT managers.

The first article, "Are Corporations Moving to E-Business?" by Cutter Consortium Senior Consultant Paul Harmon, examines companies' attitudes toward e-business in 1999 and 2000. Specifically, the study examines the percentage of companies that had developed e-business applications beyond a mere Web presence and what type of applications were being developed in 1999 and 2000. It reveals that during this time period there was growth in the number of both business-to-consumer and business-to-business Internet applications. Finally, Harmon looks at how e-business architectures are constantly evolving and the momentum gathering in the e-business process reengineering area.

Our research on "Bubbles and Trends," analyzed by Cutter Consortium Senior Consultant Chris Pickering, was prompted by Cutter Consortium Business Technology Council's assertion that "Organizations that view the dot-com failures as the failure of e-business in general and as a rationale to return to 'business as usual' will suffer accordingly." In this study, Pickering reveals that e-business is an established trend, despite the negative publicity surrounding the demise of many dot-coms. He looks at whether or not the demise of the dot-coms has led to a culture of outsourcing and what has (and has not) changed in companies' attitudes toward e-business.

The next article, also by Pickering, investigates the significance of various drivers of e-business initiatives. He examines the relationship between the drivers and the benefits to see where there are matches — and where there are gaps. For example, although reduced costs rate high on the list of drivers, they do not on the list of benefits.

Turning to the technical side of e-business, Harmon discusses how companies are using XML in "Expanding XML's Core Capabilities." He gauges companies' interests in the recent extensions to core XML technologies and advises companies to explore both the Document Object Model and XML Schema. According to Harmon, developers will increasingly be using these extended XML capabilities to develop distributed systems.

Finally, we look at the next blip on the radar screen: wireless. Cutter Technology Council Fellow Ken Orr investigates how companies are planning their wireless initiatives and what departments they feel are responsible for these applications. He also explores senior management's views on wireless and whether companies in general view the wireless Web more as hype or as opportunity.

This edition of ***Cutter Benchmark Review*** tracks the path of e-business — where it has been, where it is presently, and where it's headed. The underlying message is that although the thermometer readings have dropped, the temperature of e-business is still high.

ARE CORPORATIONS MOVING TO E-BUSINESS?

by Paul Harmon, Senior Consultant, Cutter Consortium

Cutter Consortium continues to survey selected companies on their business strategies and computing plans. The companies we survey are established corporations, not e-business startups. Given all the confusion that occurred during this past year — and the widely varying opinions regarding its impact on the e-business transition — we thought readers might like to see how companies responded to the same questions in late 1999 versus late 2000.

It may seem like a decade ago now, but in late 1999, the computing scene was dominated by two things: the possibility that business systems might crash when they tried to adjust to the year 2000, and the rapid proliferation of almost any type of Web-based company. Reviewers speculated that established companies were doing little new software development as they waited for the dawn of the new millennium and that spending on new applications would grow once the Y2K scare was over.

At the same time, venture capitalists were apparently willing to fund any business plan that contained the words "Web" or "e-commerce," and the stock market was willing to fund similar companies as soon as they had a few months of experience under their belts. In the last three months of 1999, NASDAQ rose to unprecedented heights, and enthusiasts predicted that many established companies would soon be roadkill. In the first months of 2000, the market continued to be enthusiastic, but by March, the US Federal Reserve, fearing an "e-commerce bubble," started to raise US interest rates to deflate the market. By the end of the first quarter, the Fed had succeeded, and Internet stock prices had dropped anywhere from 30%-90%. In the course of the year, the strongest Internet companies have recovered, but few have valuations that equal their January 2000 prices. A large portion of Internet companies have gone bankrupt or been acquired by rivals.

Under the circumstances, one might imagine that CEOs would be conservative about Internet ventures. Many CEOs felt they were misled by excessive Y2K hype, and that didn't make them likely to trust the software gurus when they argued for a rush to the Internet. Moreover, in the first quarter, the same CEOs watched many Internet startups crash and burn in the aftermath of the Fed's tighter money policy. It would be easy to imagine that large companies would take a much slower approach to e-business development than the rush that was predicted in late 1999.

MAKING A COMMITMENT TO E-BUSINESS

Let's look at some data. Figure 1 shows how companies responded to the following question in late 1999: Has your company made a commitment to develop e-business applications that go beyond a basic Web site presence? Figure 2 shows how companies responded to that same question in the fall of 2000.

Obviously, a large percentage of the companies we surveyed in late 1999 had already made a commitment to developing serious e-business applications. The overall corporate commitment grew significantly in 2000; almost all the major companies we surveyed were committed to e-business applications.

We didn't discriminate in this question between e-commerce systems and business-to-business (B2B) applications. In another question, however, we asked how the respondent would describe the company's e-business applications and offered the following five choices:

1. A system that provides information or help to customers
2. A system that provides information or help to company people (salespeople)
3. An e-commerce application targeting customers (business to consumer — B2C)
4. An e-commerce application targeting other businesses (B2B)
5. A supply chain application that links your business to suppliers

Figure 3 shows what applications companies were working on in late 1999; Figure 4 shows what applications companies were developing by late 2000. Obviously, some of the applications reported in late 2000

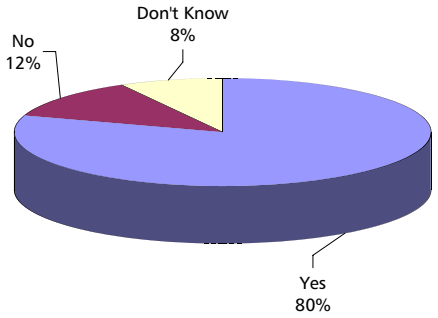

Figure 1 — E-business commitment in late 1999.

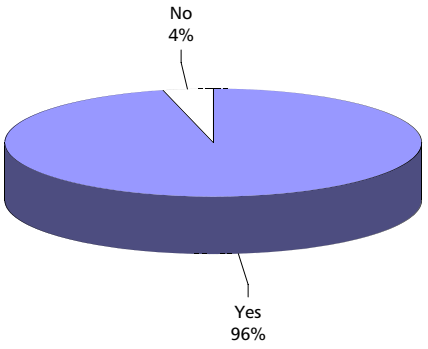

Figure 2 — E-business commitment in late 2000.

could be the same applications or extensions of applications that were being developed in late 1999. Overall it's clear that by late 2000, many companies had moved beyond Web applications and information portals and started to work on large-scale e-commerce and B2B systems.

Many analysts have remarked that in the aftermath of the "Internet crash" of March 2000, venture capitalists switched their primary focus from e-commerce startups to B2B and, more recently, to supply chain or e-marketplace startups. That may describe what venture capitalists are doing, but it doesn't describe what established companies are doing. These companies are moving to establish Internet sales channels. The far more complex process of linking supply chains remains a challenge.

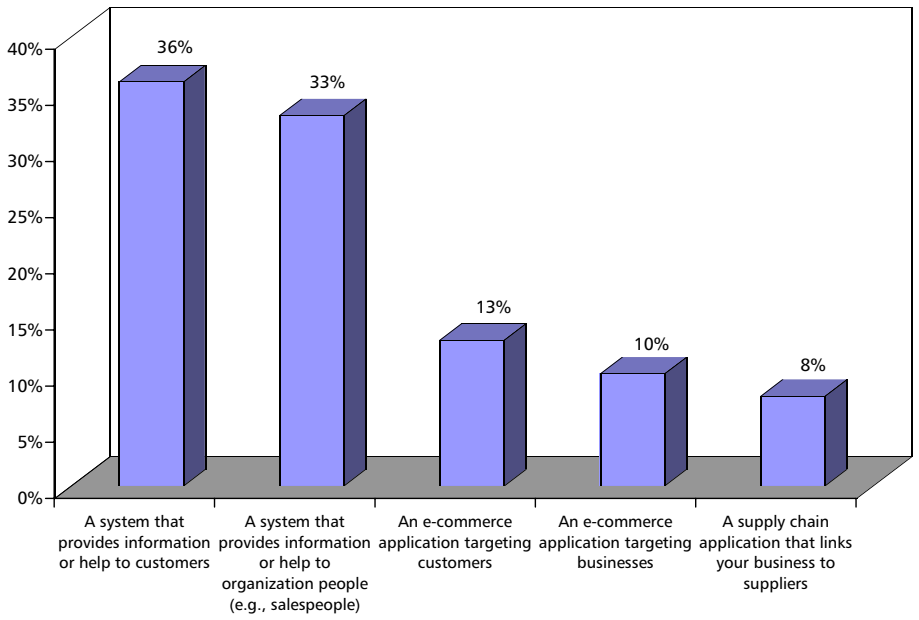

Figure 3 — Internet applications companies were developing in late 1999.

As a way of testing long-term commitment to e-business development, we asked each company whether it had developed an e-business architecture to structure its e-business development efforts. We suggested three options: that it had an e-business architecture, that it did not, or that it was evolving one as it proceeded. I regard information about the existence of an e-business architecture as a good test. It discriminates between companies that are just working on a single test application and those that are laying the groundwork for more extensive development. A dedicated group may develop a single application, but without a major effort to create a distributed component infrastructure, no company can sustain a major e-business effort.

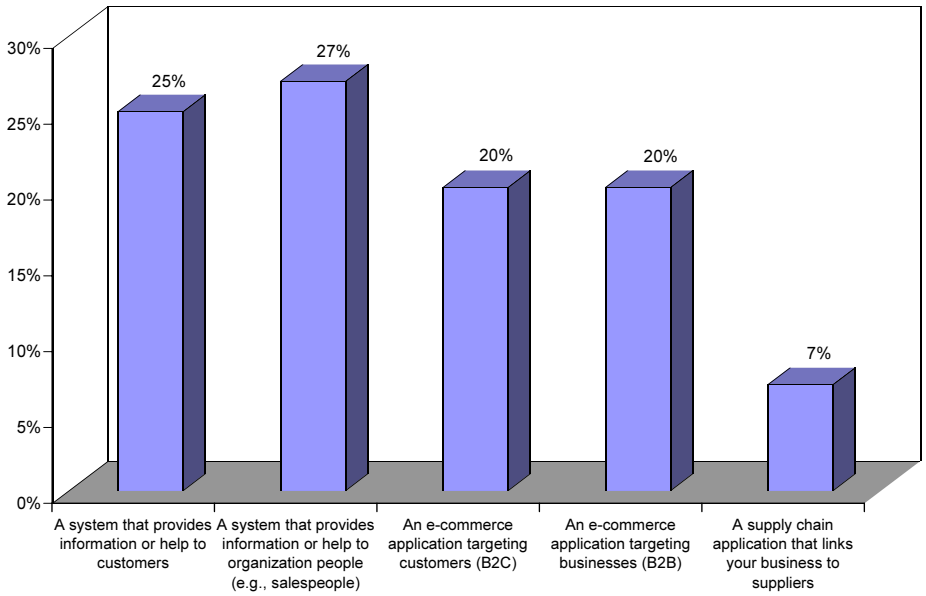

Figure 4 — Internet applications companies were developing in late 2000.

Figures 5 and 6 contain the data on what companies respectively said in late 1999 and late 2000. Notice that the percentage of companies that have an architecture has remained constant and that the percentage that do not have one has dropped by half. Also notice that all of the companies that have begun to create an e-business architecture during the course of 2000 have elected to evolve it rather than trying to create it in a single effort. This is the course that I and many others recommend when asked. A comprehensive e-business architecture takes time to develop. As a prerequisite, one needs a staff that is experienced in distributed component system design and software reuse strategies. Rather than trying to do it in one effort, it's more cost-effective to choose software application projects and develop as much infrastructure as is needed for that project. In this way, after completing three or four projects, you have evolved a nearly complete infrastructure and a component

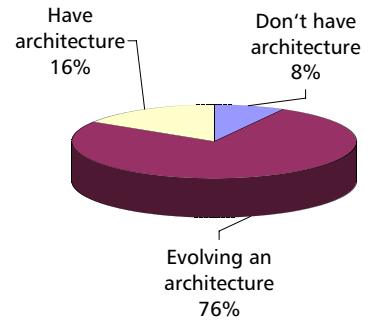

Figure 5 — E-business architecture in late 1999.

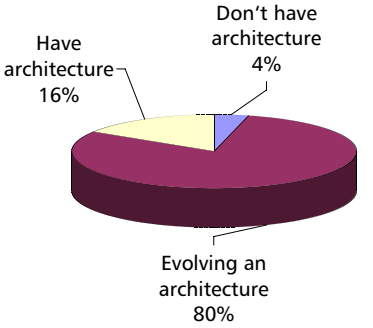

Figure 6 — E-business architecture in late 2000.

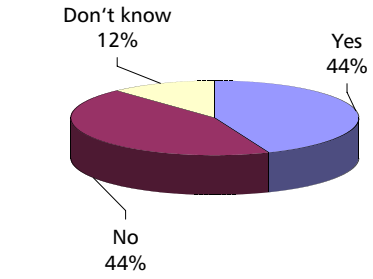

Figure 7 — E-BPR under way in late 1999.

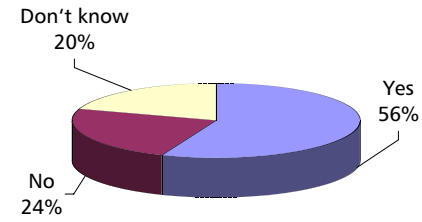

Figure 8 — E-BPR under way in late 2000.

library for subsequent projects. Clearly, our respondents agree with this approach and have elected to follow it.

Finally, we assume that one doesn't create major new e-business systems without undertaking major business process reengineering (BPR) efforts. The term BPR isn't as popular now as it was in the early 1990s, but the fact remains that a company must change its business processes to take advantage of the Internet. To check this, we asked whether companies had major BPR efforts under way to support their e-business transition. Figure 7 shows the percentage of companies that reported major e-BPR efforts under way in late 1999. Figure 8 shows how companies responded to the same question in late 2000.

It's interesting that the number of respondents that don't know if their company is undertaking BPR projects in conjunction with their e-business efforts has grown; I have no explanation for that. Overall, however, the number of companies engaged in BPR in conjunction with e-business efforts has grown significantly.

CONCLUSIONS

As I remarked earlier, I've heard all kinds of predictions about the future of e-business development. Some suggest that the failure of many Internet startups, and the decline in stock values of the remainder, point to a decline in the overall interest in e-business. But the e-business revolution continues to move forward quite rapidly. The failure of Internet startups hasn't slowed the pace or deterred established companies from undertaking the transition.

Established companies undoubtedly have different e-business models from startups. In late 1999, most Internet startups thought they could derive all their income from Web sales. Most established companies probably regard the Web as a business channel that will eventually account for a given amount of their overall sales. Hardly any major corporation is throwing away all its existing sales channels to focus entirely on the Web.

The bottom line is that the drivers of the e-business revolution are still in place and stimulate established companies just as much as they challenge startups. A growing number of customers are willing to buy over the Web. Large companies will seek to respond in order to capture those sales. At the same time, the Internet and its open protocols has provided a new and better way to integrate software systems and employees, both within a company and between companies. Large companies are struggling to take advantage of the efficiencies they can gain by embracing the Internet.

The e-business transition doesn't depend on Internet startups. They may make retail executives sit up and take notice, but overall, the advantages of online sales and the efficiencies of distributed systems integration are powerful motivators. Every major industry has established, competing companies. As long as one company seeks to realize breakthrough efficiencies by selling online or by integrating its supply chain, its competitors will follow, and the transition will continue.

Our advice to corporate planners is to ignore a good bit of the media hype about what's up and what's down among Internet companies. In general, the popular media is too focused on the activities of Internet startups. Established companies are moving toward e-business at their own pace, largely determined by the ability of their IT groups to respond and the activities of their traditional competition.

BUBBLES AND TRENDS

by Chris Pickering, Senior Consultant, Cutter Consortium

Cutter Consortium's Business Technology Trends and Impacts Advisory Service's Assertion #47 states:

> *Dot-com companies will continue to be both the leading and the bleeding edge of business. Although 80%-90% of these companies may not prove economically viable, the survivors will change business forever. Organizations that view the dot-com failures as the failure of e-business in general and as a rationale to return to "business as usual" will suffer accordingly. The key to success will be separating the speculative bubbles from the enduring trends.*

To test this assertion, Cutter Consortium recently conducted a survey to determine how industry has responded to e-business and the dot-com collapse, including changes in management style and corporate capabilities. This article presents our findings.

We all know the old adage "Put your money where your mouth is." Its popularity comes from the fact that talk is cheap, while putting your money on the line shows undeniable commitment. The Cutter Business Technology Council used this principle to assess the future of e-business in question 1 of the survey. Figure 1 shows respondents' answers.

Given the ongoing e-business shakeout, it's no surprise that more than one-quarter of respondents (27%) say that their companies have indeed reduced their spending on e-business. Whether this is due to canceling projects, taking a pause to regroup, or other reasons, it is a natural response to the dot-com failures and devaluations and other e-business failures and uncertainties. New data warrants new thinking, as well as a review of prior thinking.

The other side of Figure 1 shows that e-business is an established trend — in spite of all the negative press that e-business has received since March 2000. As you can see, 73% of respondents say that their companies have not reduced their spending on e-business. These companies are at least staying the course, if not increasing their e-business spending.

Cutter Consortium Senior Consultant Jim Highsmith says that establishing a blended dot-com and wanna-dot culture is critical to e-business success over the long term. Part of this blended culture is a core competency in IT — a competency that should be kept inhouse. Survey respondents lean toward this position, as shown in Figure 2. More than half of the respondents (55%) agree that "My organization feels that IT is a core competency and should not be outsourced," while 45% disagree. The fact that respondents are almost

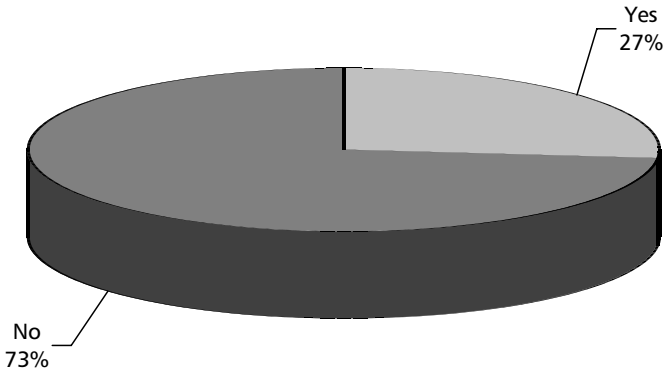

Figure 1 — In the past year, has your company reduced the amount of spending on e-business?

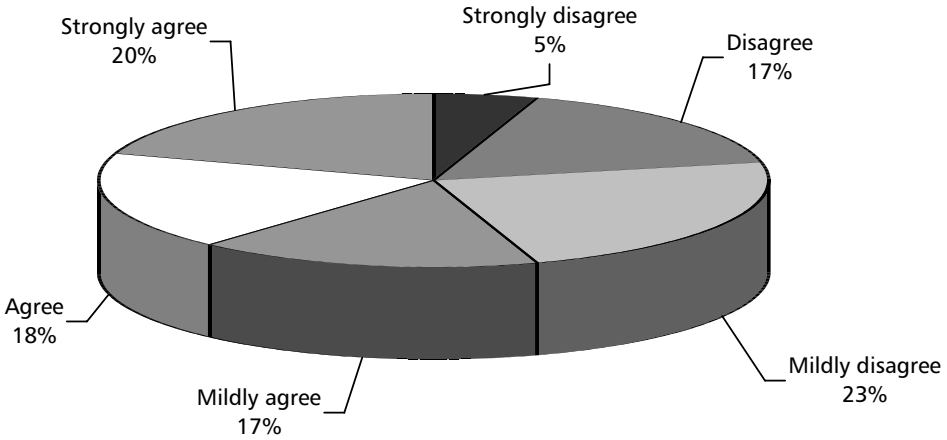

Figure 2 — My organization feels that IT is a core competency and should not be outsourced.

evenly divided suggests that whether or not IT is a core competency that should not be outsourced is dependent on the organization in question. Some organizations will be better off developing internal competency and keeping everything inhouse; others will be better off focusing on business and e-business strategies and tactics, while outsourcing the technical side of things.

Respondents' attitudes toward outsourcing are reflected in their use of outsourcing for Web development. As shown in Figure 3, 57% of respondents do not outsource their Web development, while 43% do. These numbers are almost identical to those for the previous question, showing that respondents are consistent in their principles and actions.

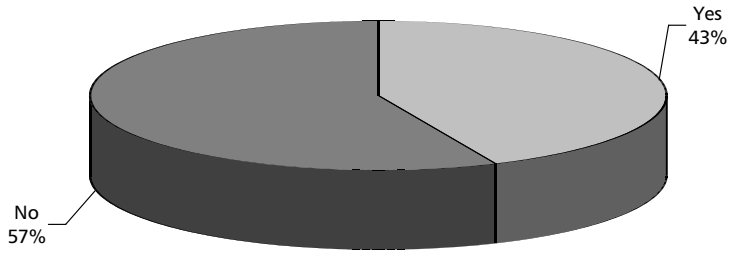

Figure 3 — Does your company outsource its Web-based development?

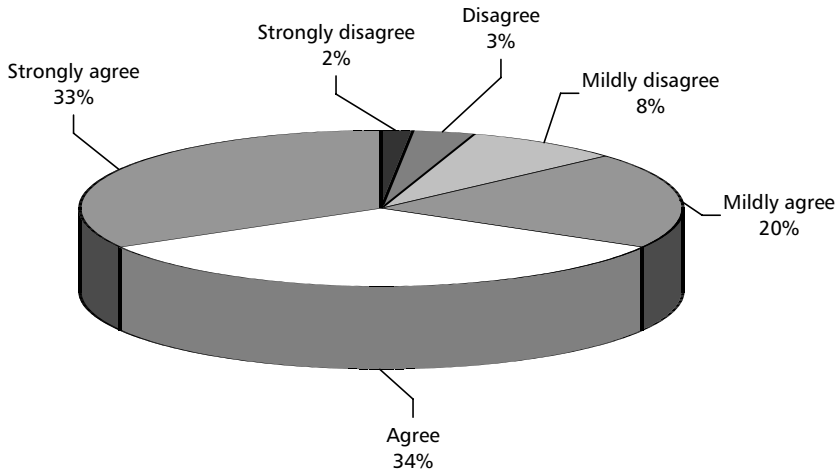

Figure 4 — My organization believes that e-business initiatives are critical for long-term success.

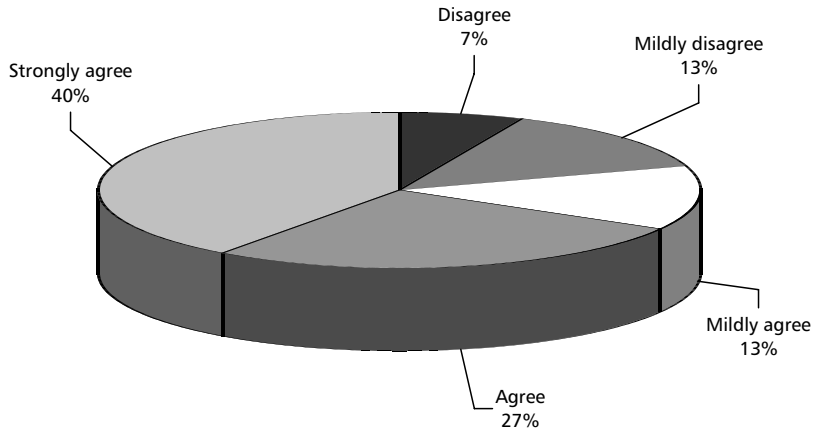

Figure 5 — The Internet is revolutionary for my industry.

Another area that reflects consistency between beliefs and actions is shown in Figure 4. Two-thirds (67%) of respondents agree or strongly agree that "My organization believes that e-business initiatives are critical for long-term success," with another 20% in slight agreement. That means that 87% of respondents believe that e-business has an important role in the long term. This confirms the findings shown in Figure 1: e-business is an established trend. There may be some retrenching over the short term, but e-business is here to stay.

The power of the Internet comes through in the responses summarized in Figure 5. As Figure 5 shows, 80% agree in some way with the statement "The Internet is revolutionary for my industry." It is worth noting that no one strongly disagrees with this statement.

Respondents strongly resist the thought that "the Internet is a business tool, like a fax machine, and is not imperative to business success." Figure 6 summarizes their responses to this assertion. As you can see, Figure 6 is almost a reverse image of Figure 5. Where respondents were overwhelmingly positive about the revolutionary impact of the Internet as shown in Figure 5, they are just as overwhelmingly negative about reducing the Internet and its importance to that of a mere business tool as shown in Figure 6.

Flexibility, speed, and adaptability are three of the most talked about characteristics of the e-business era. They are widely discussed in both the business and technology arenas.

The increased importance of these characteristics translates to increased pressure on organizations to exhibit these traits themselves. Figure 7 shows how survey respondents judge the effects of these characteristics on management styles in their companies.

The overall message of Figure 7 is that dealing with greater uncertainty and instability is a management trend in the e-business era. As you can see, more adaptability, greater agility, and faster response are the top three management styles introduced during the transition to e-business. Recognition of the economy's heightened unpredictability came in a not-too-distant fourth. And relying more on emergent results (or "spontaneous order") to deal with uncertainty in the e-business era is also enjoying a significant following.

Repercussions of the "dot-bomb" explosion reverberate in Figure 8, which shows respondents' level of agreement with the statement "I believe that the business-to-consumer [B2C] business model is valid and that it has and will continue to produce successful companies." At 69%, a supermajority agrees with this statement at some level. The 31% of respondents who disagree are probably reeling from the dot-bomb explosion: common sense, if nothing else, tells us that the B2C business model is valid, so it follows that companies will be able to use it successfully. What confuses the issue is assuming that this means *all* companies can be successful in the B2C space; that is clearly *not* the case. Every company must assess B2C for its own products, sales cycle, and general business model — it will be right for some and not for others.

Throughout the e-business era, it has been easy to focus on technology — the Internet and the Web, e-commerce, Java, XML, and so on — often to the point of implying that technology

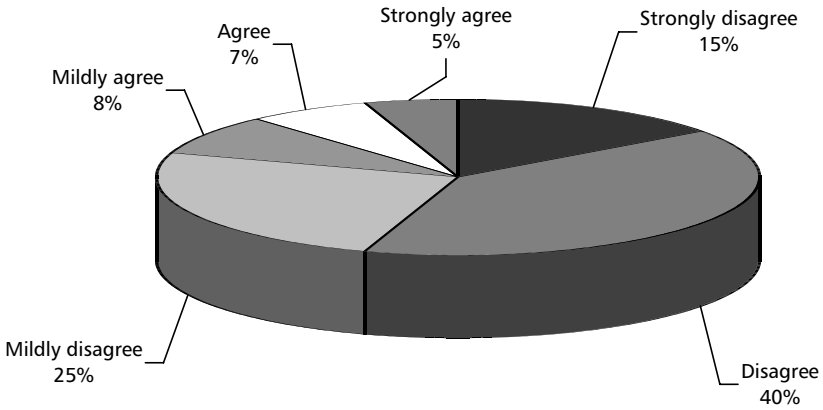

Figure 6 — The Internet is a business tool, like a fax machine, and is not imperative to business success.

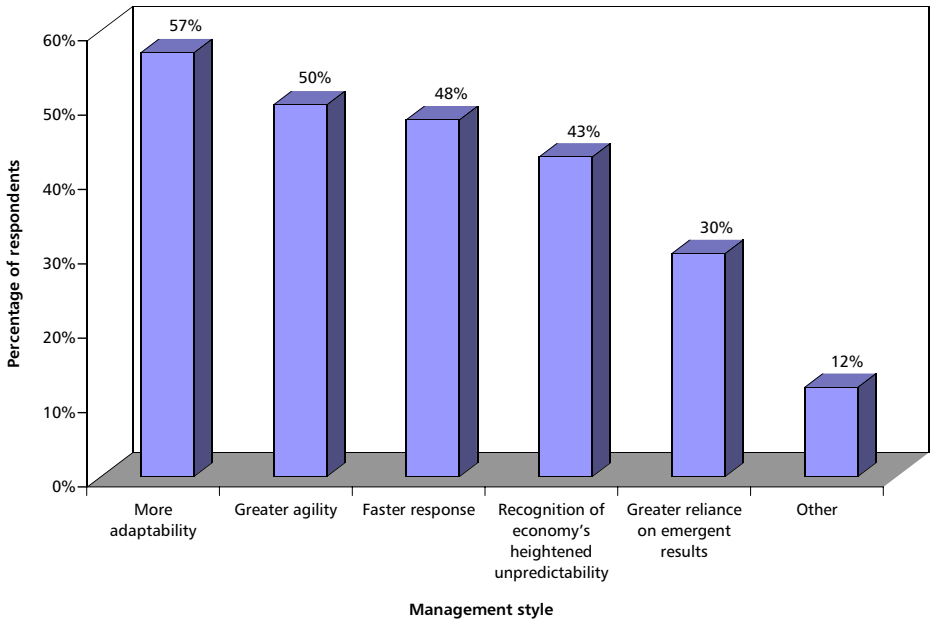

Figure 7 — What management styles have you seen introduced at your company during the transition to e-business? (Respondents able to choose more than one answer.)

is the key to e-business success. Respondents, however, who violently opposed any diminution of the Internet to a mere business tool, disagree with any such assertion. When asked to rate their level of agreement with "The most important qualities necessary to thrive in the new economy — agility, innovation, and speed — are functions of people and not technology," they overwhelmingly put people ahead of technology, as shown in Figure 9. Although 81% of respondents agree with the assertion, only 19% disagree (and only 3% of the 19% strongly disagree). When it comes to agility, innovation, and speed, the message is clear — people first, technology second.

To be successful, information systems, including e-business systems, must reflect business realities, including the realities of market structure. If there were ever a time when businesses looked at their markets as hierarchies and approached them on a hierarchical basis, those days are over. Figure 10

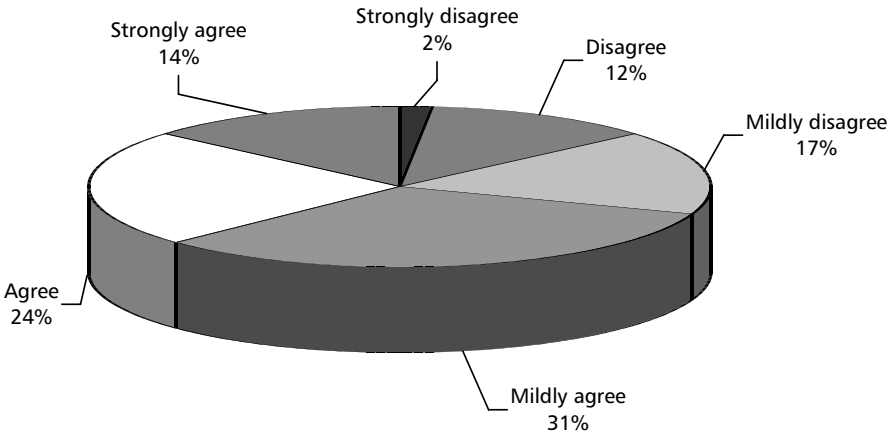

Figure 8 — I believe that the business-to-consumer business model is valid and that it has and will continue to provide successful companies.

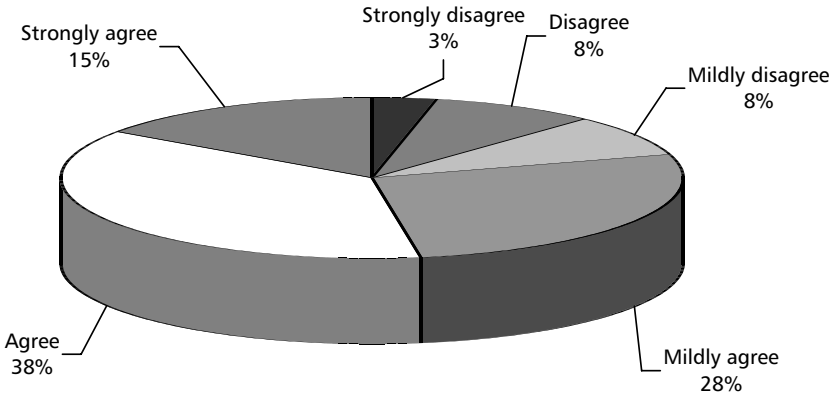

Figure 9 — The most important qualities necessary to thrive in the new economy — agility, innovation, and speed — are functions of people and not technology.

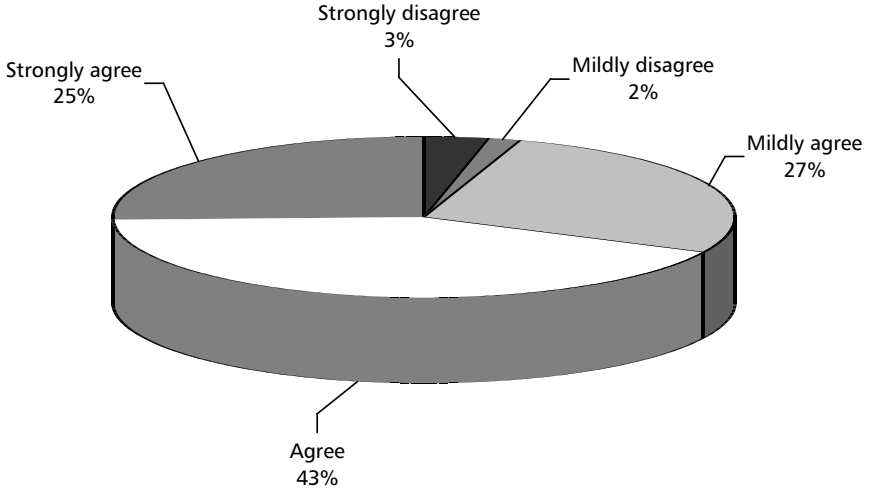

Figure 10 — The market itself is a network, and it can no longer be approached in purely hierarchical ways.

shows that 95% of respondents agree in some way with the statement "The market itself is a network, and it can no longer be approached in purely hierarchical ways."

SUMMARY

If we boil Assertion #47 down to its essence, we get:

1. E-business is a trend (that is, it is here for the long term).

2. The key to e-business success is separating e-business bubbles from trends.

3. "Business as usual" is not a viable option.

Putting these claims to the test of survey data confirms that e-business is here to stay, and that, for most companies, business as usual is not a viable option. As for #2 in the list, survey data suggests that the following items are trends, not bubbles:

- The Internet is revolutionary (for most industries).
- The Internet is imperative to business success.
- The market must be treated as a network.
- Market-inspired traits — particularly adaptability, agility, and speed — are important components of e-business success.
- The B2C business model is valid.
- People are more important than technology for e-business success.

E-BUSINESS DRIVERS

by Chris Pickering, Senior Consultant, Cutter Consortium

E-business benefits fall into three categories: revenue enhancement, cost savings, and intangibles. Revenue enhancement comes from greater sales, whether through e-commerce on the Web or brochureware that attracts more customers to traditional channels. Cost savings are generated by improved efficiency, such as cost cutting or simply getting a bigger bang for the same buck. Intangibles include greater customer satisfaction and better employee morale. Some e-business applications produce primarily one type of benefit, while others produce benefits in all three categories. At the project level, these benefits are usually seen as project drivers.

Part of Cutter Consortium's latest Business-IT Strategies Survey investigates the significance of various drivers across a range of e-business projects. This article looks at the drivers behind respondents' e-business efforts and examines whether the benefits achieved match the drivers behind them.

DRIVERS

Figure 1 shows respondent rankings of the drivers behind their e-business initiatives. One thing that Figure 1 does is disabuse a common bias — that e-business is all about greater revenue. Since the first e-business applications to capture the public's fancy were brochureware and e-commerce — applications whose primary justification is revenue enhancement — many people developed a bias that assumed that e-business necessarily focused on greater revenue. One consequence of this for some has been the belief that e-business offers nothing for them since they don't sell directly to consumers. Figure 1 amends the notion that e-business is all about revenue, and it points to drivers that apply to nearly all companies.

Looking at Figure 1, you can see that greater revenue was an important driver for slightly less than one-quarter of respondents, placing it sixth on the list. The drivers that beat out greater revenue are all related to efficiency and effectiveness.

"Reduced costs" just edged out "to keep up with competition" for the number one spot. That these drivers top the list indicates two points. First, reduced costs are possible for nearly every company (while greater revenue depends on appropriate products and sales channels). Second, e-business

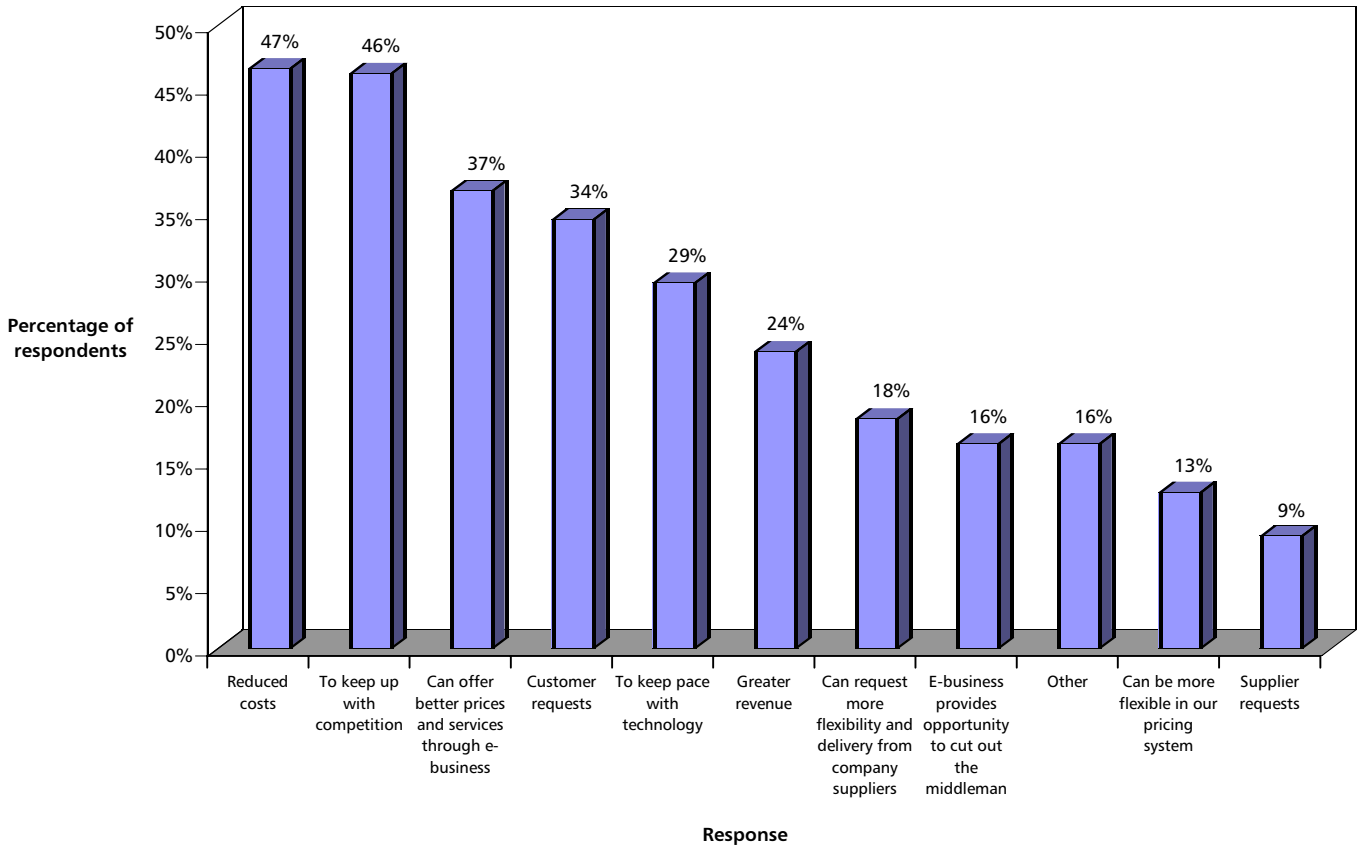

Figure 1 — What was the driving force behind your e-business initiative? (Respondents able to choose more than one answer.)

is a permanent and powerful fixture in business today. The fact that so many respondents felt compelled by competition to pursue e-business speaks volumes.

In Figure 1, the third, fourth, and fifth entries are also efficiency and effectiveness issues. "Offering better prices and service" promotes competitiveness (and is an example of a driver that can offer benefits in revenue enhancement, cost savings, and intangibles). The same is true for number four: implementing e-business in response to customer requests. The continued growth of e-business creates pressures for technological change as well as business change, as shown by the fifth-place driver, "to keep pace with technology."

We finally come to "greater revenue" in sixth place. This middle-of-the-pack ranking does not mean greater revenue through e-business is unimportant. It simply means that more companies can gain nonrevenue-related benefits from e-business than can gain greater revenue — a point worth remembering when analyzing e-business's potential for your company.

The message behind Figure 1 is this: your e-business drivers must reflect your business model. It goes without saying that we would all like to increase revenue. But unless you are already selling directly to consumers, this may be an indirect goal. In contrast, using e-business to improve margins by reducing costs and increasing efficiency is a reasonable goal for almost every company. And greater customer satisfaction, improved employee morale, and other intangible benefits are also right for most companies. Of course, when it is appropriate, there is no reason not to pursue all three types of benefits in your e-business efforts.

BENEFITS ACHIEVED

We turn now to the question of whether e-business drivers typically translate into benefits achieved. Looking at Figure 2 and comparing it to Figure 1 shows a good match between drivers and results. Customer-focused issues rank high on both lists, and increased revenues appear in the middle of both. The biggest divergence occurs with reduced costs, which was the number one driver but only a middling result.

"Increased Web site activity," the most cited benefit of e-business, seems rather tautological, but at least we can have some confidence that e-business efforts will produce this common-sense result. We can only hope that increased activity translates into greater revenue, cost savings, or some intangible benefit.

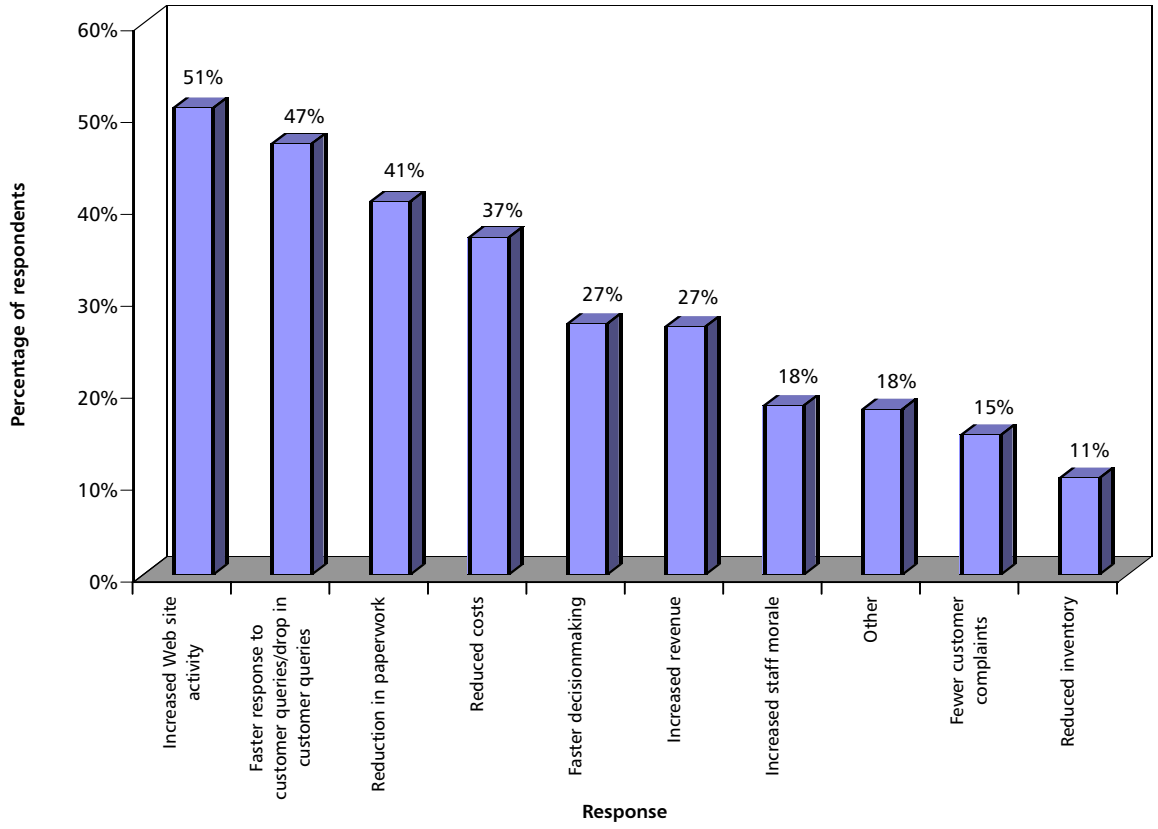

Figure 2 — Which of the following advantages has your company experienced from e-business? (Respondents able to choose more than one answer.)

There is a reasonable match between customer-oriented drivers and benefits. The number two and number three drivers (better prices and service and customer requests, respectively) are matched on the benefits side by the number two benefit, faster response to customer queries and reduced customer queries.

Greater efficiencies and reduced costs tend to be intertwined, as shown by benefits three, four, and five: reduction in paperwork, reduced costs, and faster decisionmaking, respectively. These benefits produce intangible benefits, as well.

Reduced costs may be easier to imagine than to achieve. Whereas nearly half of survey respondents cited reduced costs as a driver of their e-business efforts, only 36.7% cited them as a result. However, as mentioned in the previous paragraph, some of the other benefits cited include a cost-reduction component, so the divergence may be not as great as it appears. Those who expected greater revenue appear to have had good reason to do so. Slightly more respondents enjoy greater revenue from e-business than were driven by that goal: 27% versus 24%.

An example of the intangible benefits e-business can provide is offered by the next entry on the list: increased staff morale for 18% of respondents. Another intangible category that must weigh heavily on the decision behind any customer-facing e-business application is customer satisfaction. More than 15% of respondents cite fewer customer complaints as one of the benefits of e-business. Hopefully, this reflects greater customer satisfaction as well. (How would it not? Well, if the new e-CRM system makes it so difficult for customers to deal with the company that they just stop trying, it would make customer complaints go down, but it would not reflect greater customer satisfaction!)

The last benefit on the list, reduced inventory (cited by 11% of respondents), translates to cost savings, which should lead to greater profitability.

CAVEATS AND CONCLUSIONS

I don't have any hard figures on it, but I suspect that cost savings has served to justify more IT projects than any other reason. The evidence suggests that this is just as true in the e-business era as in previous times. The evidence also suggests that realizing this goal may be harder than it appears. So tread lightly when carrying the cost-savings banner.

It seems that most survey respondents have set a good example for us by finding appropriate drivers for their e-business projects, drivers that are matched by benefits achieved. Matching project goals to business needs and achieving them is both a sign of good alignment and an enabler. It is a cycle we should all seek to establish.

EXPANDING XML'S CORE CAPABILITIES

by Paul Harmon, Senior Consultant, Cutter Consortium

There's no shortage of Extensible Markup Language (XML) hype these days, but it's nevertheless a very new standard. In most cases, when people talk about XML, they are assuming it can do things that are well beyond the basic XML standard issued by the World Wide Web Consortium (W3C). I've argued that there are really four issues to consider:

1. **There is the XML standard issued by the W3C.** This has been published and is widely implemented today.

2. **There are a number of upgrades that have been proposed to the core XML standard.** Among the most important of these are the Document Object Model (DOM) and XML Schema, which we'll consider in a moment. These standards extend the basic concepts of XML to make the technology more useful.

3. **There are major extensions to XML that, in effect, equip XML to function as middleware.** These extensions range from transport specifications like the Simple Object Access Protocol (SOAP) and indexing schemes like Universal Description, Discovery, and Integration (UDDI) to more complete architectures such as e-business XML (ebXML).

4. **There are XML "languages."** These are standard sets of document type definition (DTD) tags or a schema specification that a number of users agree on to make it possible for all the users to interpret XML files.

In this article, we will continue to examine data gathered from some 270 companies worldwide as part of an ongoing survey by Cutter Consortium. We will focus on the interest companies have in extensions to XML core technology. There are about a dozen XML extensions being considered, ranging from XML Namespaces, Xline, and Xpath to Simple API for XML (SAX), DOM, and

Schema. Information on SAX, DOM, and XML Schema are particularly telling in what they reveal about the current state of XML usage.

SAX and DOM are XML programmatic interfaces — they provide a way for computer programs to create and read XML files. For example, SAX converts the information set of the XML specification into a stream of well-known method calls. SAX is currently defined for the Java language, and it is being mapped to several other languages. (SAX is not an official standard. It is a de facto standard of the XML-DEV organization, and work on it is being supervised by David Megginson. For more information, check www.xml.org/xml-dev and www.megginson.com/SAX.)

The DOM Level 2 specification is currently a W3C candidate recommendation and will undoubtedly become a standard in 2001. DOM is an object-oriented (OO) way of modeling the XML information set, representing it as a tree-structured graph of nodes. The DOM specification defines interfaces using the Object Management Group's (OMG) Interface Definition Language (IDL) and is thus program-language neutral. (As a result of earlier OMG work, most standard languages can read and generate IDL.) XML may not be a conventional object or component system, but it can certainly be conceptualized as an object model and used to implement a kind of component middleware system. Or perhaps it would be best to simply say that XML defines a new component model.

We asked our respondents whether they were using SAX or DOM; Figure 1 shows their responses. As you can see, 35% are not using either SAX or DOM. This implies they are using XML for passing human-readable information, or they are not doing enough development to need a more efficient way of passing data between machines.

Of those who are using programmatic interfaces, most are using either SAX (14%) or DOM (43%). The fact that DOM dominates makes sense and fits with our feeling that the more sophisticated XML users are middleware developers who are familiar with OO technology.

Considering this from a slightly different angle, about two-thirds of the companies using XML are using programmatic interfaces, which means they are designing applications that will use XML to pass information between machines. Recall that the XML most people first read about was designed to make it easy for individuals to read XML files. Items had names like "Auto," "Make," and "Vendor," and tags were placed at the bottom of the file to allow readers to interpret the meaning of the labels. The shift to programmatic interfaces suggests that companies are now passing data directly from one computer to another and that most messages won't be formatted to make them easy for users to read. This use of XML requires more sophisticated technology and developers.

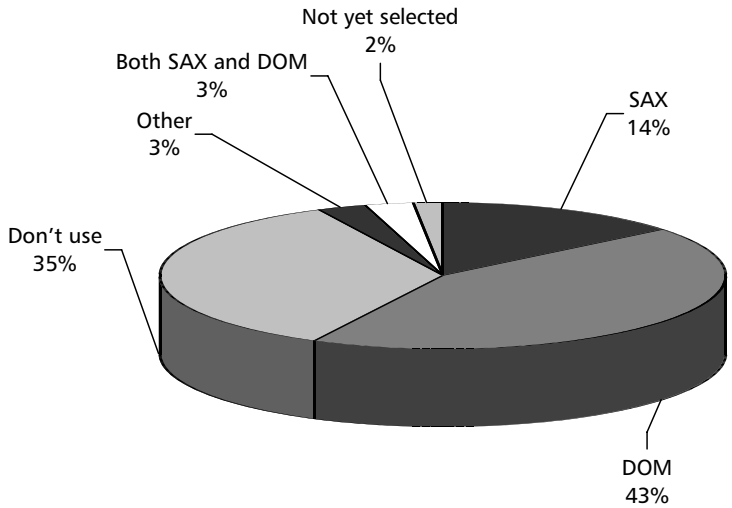

Figure 1 — If your organization uses an XML programmatic interface, which does it use?

The use of XML Schema, which defines a programming vocabulary that can be used to describe XML documents, is closely related to the W3C's work on DOM. XML Schema is an alternative to DTDs, providing a better way of defining the relationships of data elements included in an XML file. Unlike DTDs, which focus primarily on tag names, XML Schema focuses on data types and formats. In addition, although DTDs are included within a specific XML document, XML Schema descriptions are actual XML documents that can be parsed and generated with the same techniques used to parse and generate other XML documents. (Thus, specific XML documents can be instances of XML Schema documents and derive their semantics from the XML Schema.)

DTDs are fine for defining relatively simple documents for display. Preparing and maintaining a DTD to describe how complex documents will be serialized is a different matter. More important, XML Schema can interface easily and directly with other programming languages and databases — it is needed to make serious XML programming possible. Everyone expected XML Schema to be a standard by now, but the W3C

has taken longer than anticipated. It has finally been released in beta form for review and will probably become a final standard late this year. For more information on DOM or XML Schema, check www.w3c.org. You can access a copy of the current standard draft and determine how close it is to being a completed W3C specification.

We asked companies taking part in our survey whether they were already using an early version of XML Schema (there are several alpha versions in circulation) and whether they would be likely to adopt XML Schema when it is finally released. The results are summarized in Figure 2.

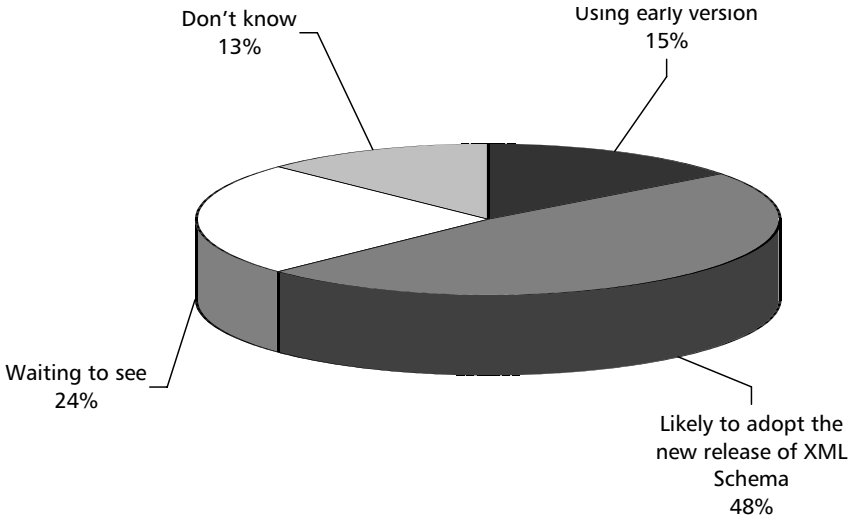

Figure 2 — Is your organization using an early version of XML Schema, or are you likely to adopt the new release?

As you can see, 15% of the companies surveyed are using an early version of Schema. Another 48% suggest that they are likely to adopt XML Schema when it is officially released. Respondents were forced to choose between "using an early version" and "likely to adopt," so we can assume that 63% of our respondents are planning to use XML to pass data between machines in a language that only a computer could love.

This data corresponds closely to the data on programmatic interfaces, underlining the point that companies are interested in XML, but they have already moved beyond the early notions of using XML primarily for human-readable tasks. Two-thirds of our respondents are actively interested in techniques that extend XML to support machine-readable XML. This suggests XML will increasingly be used as middleware that will link software applications and databases in ways similar to how CORBA, DCOM, and Remote Method Invocation are used today.

Although some companies have already pioneered this type of application, most companies are still only planning XML applications of this kind, since the technologies necessary to implement them are still being finalized. We have considered two of the basics here: programmatic interfaces and a 4GL-like programming language that will facilitate efficient machine-to-machine communication. The former is being adopted rather quickly, and the latter will be adapted quickly as soon as the W3C releases the final standard. The other necessity for the more sophisticated use of XML is the availability of transport mechanisms such as SOAP.

In the meantime, I urge companies that have not adopted DOM to learn about it, and I urge all companies to download the currently available version of XML Schema and to review it. Increasingly, your developers will want to use these extended XML techniques to develop distributed applications.

WIRELESS: THE NEXT BIG THING?

by Ken Orr, Fellow, Cutter Technology Council

In a Cutter Business Technology Trends and Impacts *Council Opinion* ("Instant Messaging," Vol. 2, No. 1), I suggested that the wireless Web will be bigger than the wired Web and that this change will happen faster than the time frame in which the wired Web became prevalent. Recently, we conducted a survey to see how IT professionals view the wired world. The basic answer is that IT executives are not convinced that wireless has big implications for them. To begin with, only 30% of respondents' companies are currently developing wireless applications (see Figure 1). There are more companies that plan to develop wireless applications. Indeed, 37% of respondents said their companies are planning to develop wireless applications in the future (see Figure 2). However, the net of this response is that the majority of

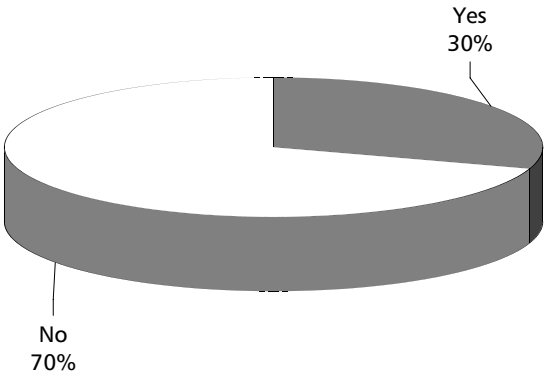

Figure 1 — Is your company currently developing any wireless applications?

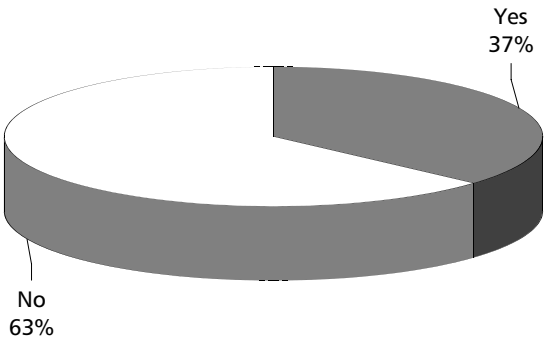

Figure 2 — Does your company have plans to develop wireless applications?

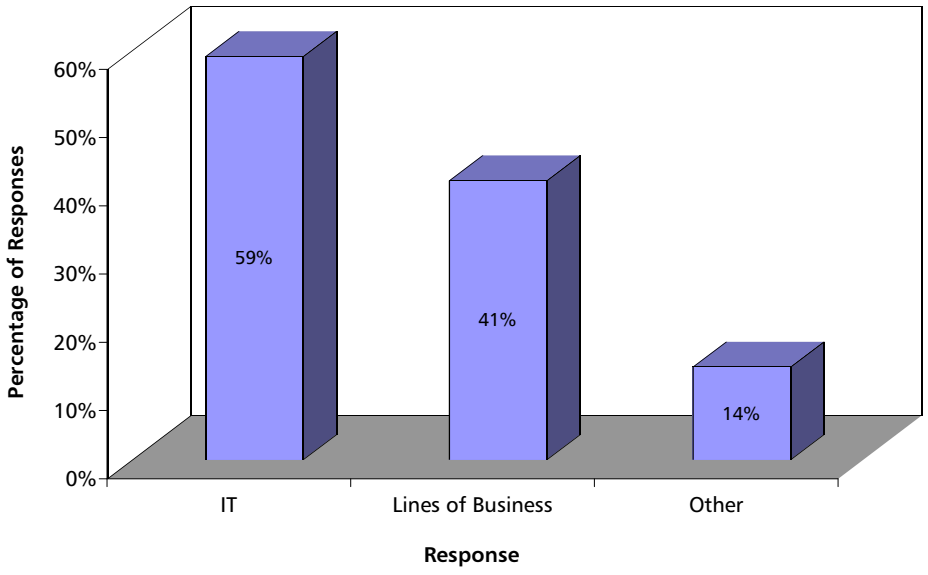

Figure 3 — Which development in your company is responsible for wireless development initiatives? (Respondents able to choose more than one answer.)

organizations are not actively working on wireless applications.

INFORMATION TECHNOLOGY IN THE HOT SEAT

In the early days of a new technology, there is often a problem finding an organizational home for the technology. That seems to be the case today with wireless: of the organizations responding, 59% put responsibility for wireless with IT; only 41% report that the business users are responsible (see Figure 3).

Many businesses look to IT to start things off technology-wise, but it's usually when the business users get involved that a new technology catches hold within the organization. The data from our survey indicates that organizations that are currently planning for the wireless Web saw more opportunities and more often had user departments leading the charge or being jointly responsible with IT.

Another indication of the fact that wireless is seen as an "emerging" technology is that there is very little multidepartmental planning in the organizations we surveyed. More than 80% of the companies answered "no" to the question, "Does your company have a multidepartmental wireless Web planning team?" (see Figure 4).

One of the things that may be keeping organizations from getting more deeply involved in wireless technology is the issue of standards. Of those responding to our survey, the vast majority (71%) said that their senior management felt there was a need to learn about wireless standards (see Figure 5).

HOW BIG IS THE PIE?

Organizations and entrepreneurs are vitally interested in just how big the wireless Web is going to be. Depending on who you listen to, the growth of the wireless Web will be

either enormous or merely a blip. The respondents to our survey are divided as to the size and timing of the wireless Web revolution (see Figure 6). Nearly one-third of the sample believes the wireless Web will offer more opportunities than the wired one, while about half of the respondents feel the wireless Web will offer about the same or fewer opportunities than the wired Web. A sizable group (17%) of executives think that the wired Web will ultimately offer more opportunities than the traditional Web, but not within the next five years.

The final question on our survey had to do with application integration. We asked whether companies have plans to integrate wireless applications with their existing Internet plans. Respondents were largely negative on this issue (see Figure 7).

WHAT DOES IT ALL MEAN?

It's somewhat difficult to draw a definitive conclusion from the results of this survey. Clearly, a sizable number of people think that the wireless Web will be a big thing. On the whole, however, the majority of the people responding to this survey remain lukewarm to skeptical. It may be that with the end of the Internet boom and the return to basics, IT executives and professionals are taking a wait-and-see attitude. Certainly, the Internet and dot-coms were vastly oversold to a willing public.

Nevertheless, I stand by my prediction that the wireless Web will not only be bigger than the wired Web but will happen faster. Skeptics point to the fact that initial Web offerings, especially in North America, have not been overwhelming successes as proof that the wireless Web is overhyped, but I point to the success of cell phones and personal digital assistants and the amazing developments in Japan and Europe. The next time you're getting off an airplane or sitting in a Starbucks,

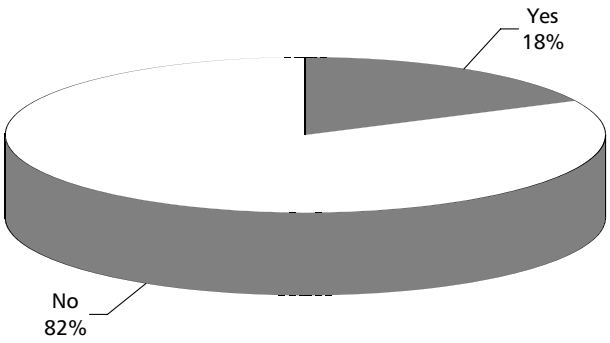

Figure 4 — Does your company have a multidepartmental wireless Web planning team?

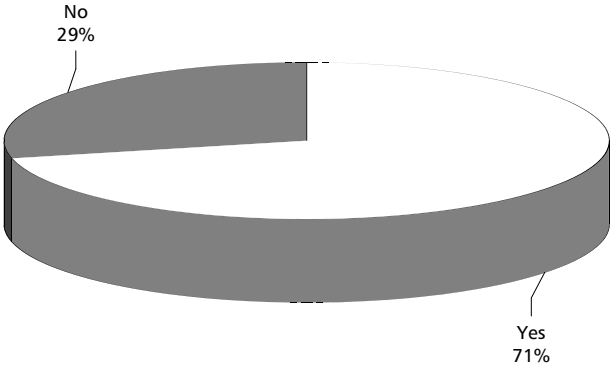

Figure 5 — Does senior management feel a need to learn more about wireless standards and the potential opportunities in t he marketplace?

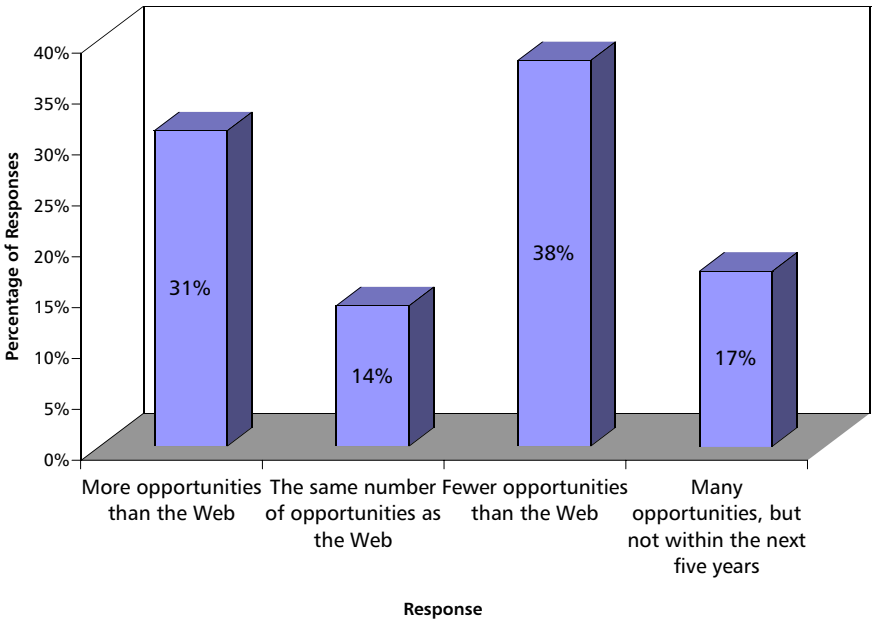

Figure 6 — View on wireless Web opportunities.

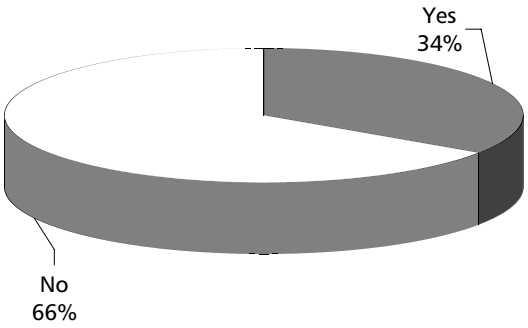

Figure 7 — Does your organization have a plan to integrate wireless Web applications with the organization's overall Internet plan?

count the number of people who are talking on their cell phones. Or count the number of times a day you see someone pull out a PalmPilot and "flash" their business card to someone else's PalmPilot.

This survey seems to indicate that IT management is not yet concerned about the wireless Web, but, if I'm right, we won't have long to wait to know for sure.

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