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Technology (A Special Report) --- The To-Do List: Get Corporate Computer Services To Talk to Each Other

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EVER SINCE Eli Whitney started making muskets, the ideal of manufacturing has been to use interchangeable parts, rather than customizing each component.

The world of computers, though, has a long way to go to reach that level. Almost every time corporate computer owners want to connect two different systems, programmers must spend months writing new software to accomplish what the industry calls "computer integration."

It's difficult, or in some cases impossible, to share information between the computer systems and software applications of say, a manufacturer and its supplier, or two divisions of the same company. Writing the instructions to get different systems to talk to each is a costly, time-consuming affair.

"It takes people too much trouble to tell computers what to do," says Eric Newcomer, chief technology officer of Iona Technologies PLC, in Dublin.

The solution: Web services -- small, standardized software add-ons that can be grafted onto existing programs to help them to communicate with each other. To their supporters, Web services are revolutionary. They promise to eliminate a lot of the software coding needed every time companies write new applications or acquire new subsidiaries, and to make setting up a purchasing system with a supplier as easy as pointing and clicking.

"They certainly change the way we think about software," says Robert Sutor, director of Web services in the software group at International Business Machines Corp.

Web services are already gaining a foothold, with most big companies using them in some software applications internally. And 85% of large North American companies plan to use at least some Web services this year, according to Forrester Research, a Cambridge, Mass., technology-research firm.

"This isn't theoretical. People are starting to realize real business benefits," says Mark Bauhaus, vice president for Java Web services at Sun Microsystems Corp.

In the Toronto airport, Johnson Controls Inc., of Milwaukee, uses them to help retrieve information from the flight-control system about arriving flights and then turn on lights and air-conditioning at the gate 10 minutes before the planes pull in. Meanwhile, Eastman Chemical Co. in Kingsport, Tenn., used Web services to automate its budgeting process, letting each manager pull data automatically from personnel, logistics and supply-chain databases instead of learning the complex codes for gathering data and entering them manually. The system cuts the time for creating a budget to one day, from five.

General Motors Corp. is already using Web services to link customer information it keeps, such as car-repair records and its database of OnStar customers. The Detroit auto maker hopes one day to expand their use to link its own Web sites with those of its dealers and of various finance and insurance sites. Customers could then click through the links among them and have each site recognize the customer and know, say, what car model they want to purchase or repair.
There are still big obstacles to overcome before Web services take off. One example: confirming that an order placed on one company's online system is received by a second company's system that is linked to it via Web services. Without a bulletproof standard for such confirmation, such as banks have long had for international money transfers, buyers can't be sure their orders were received. Glitches such as network bugs or sudden server shutdowns might wipe out an order in transit, without buyer or seller ever knowing.

"If I send a purchase order, I want to know it actually arrived -- and that it arrived once and exactly once, not multiple times, particularly in financial applications," says Philip Merrick, chief executive of webMethods Inc., a Fairfax, Va., software firm and Web services pioneer.

Many companies are also nervous about providing Web services to people outside their corporate firewalls, because of the difficulty of knowing, for example, whether the person ordering a raisin full of polyethylene really works for the customer and actually is authorized to sign a virtual purchase order. Validating identity and authenticating the authority of the person over the Internet is proving one of the thorniest issues for Web services.

"Identity management is fundamental for us to provide the experience we want," says Rich Taggart, GM's director of enterprise architecture.

Web-services vendors and their customers have yet to agree on the best way to deal with such problems. One large group of customers, the Liberty Alliance, which was gathered by vendor Sun Microsystems Corp., says it has developed standards for identity management and authentication of users that solve some of the thorniest remaining problems.

But other major players in the field have a different answer. Microsoft Corp. and IBM, which combined have nearly half the software industry's revenue, recently said they had cooperated to develop proposed standards for identity and authentication. They said they would submit them to standards bodies in an effort to force a resolution.

It remains unclear how the two camps will resolve their differences, increasing the chances that many customers will continue to take a wait-and-see attitude. For its part, AMR Research, a Boston technology consulting firm, continues to advise corporate clients not to rely on Web services for transactions, says Eric Austvold, research director. AMR recommends using Web services for linking applications within private networks, but it says their economic benefits connecting outside the firewall are "years away."

Still, with the promise of so many benefits, most observers consider the expanded use of Web services to be inevitable.

As it stands, an awful lot of work goes into writing and rewriting the software codes that control how computers perform routine tasks. Consider the difficulty in connecting corporate databases that contain information about customers, suppliers or products. Much of the work that data-processing departments do is integrating old databases to make them work together, so that a bank marketer can find out how many mortgage holders have direct-deposit, say, and design a direct-mail campaign for those who don't.

By using Web services, developers don't have to go through the time-consuming task of totally overhauling the software that controls such databases so that they can communicate. Instead, they add a new layer of text written in a language called XML on top of each database so the database can be used by many different applications without further rewriting.

Steven VanRoekel, director of Microsoft's platform strategies group, which helped create Web services, says that "so much IT time is spent on manual tasks changing existing systems. Web services mean you can really go out and build unique applications instead of maintaining existing systems."

And, by finding new applications for already created Web services, observers say, companies can cut related costs even more. Ted Schadler, an analyst with Forrester, estimates that once a Web service starts being reused, it can cut costs by a factor of 10 over traditional software development.

Some companies say Web services already are saving them substantial money and time, with most using them internally, so that security issues are easier to control.
Shaygan Kheradpir, chief information officer at telecom giant Verizon Corp., says he started developing **Web services** for internal use 18 months ago, and "my estimate is I'll save millions of dollars a year because of this."

Verizon developer designing the process for a telemarketer to sign up a new customer used to have to spend days writing the credit-check part of the application. Now, the company presents credit checks as a Web service on the Internet. The developer simply points and clicks, and the credit check becomes part of his application. "These are atomic concepts -- the atoms that run Verizon," says Mr. Kheradpir. "There is a benefit to just write it properly once, so people just pick it up and focus on writing new applications."

Other companies have found benefits in presenting products or services to outsiders as **Web services**. Con-Way Transportation Services, a trucking unit of CNF Inc., Palo Alto, Calif., developed a Web service for one of its customers, a Midwest maker of industrial chemicals. The chemical company's customers had been able to order its products online, but they had to estimate what shipping costs would be based on a table displayed on a page.

Con-Way developed a Web service to calculate the actual cost, based on the rate the chemical company had negotiated, the distance and the latest fuel surcharges. Jackie Barretta, Con-Way's vice president of information services, says by using **Web services**, the trucking company "can connect our systems with the customers' systems." Since then several other customers have requested similar **Web services**. "We can get them up and running in just a few days," says Ms. Barretta.

The speed with which new applications can be delivered is one of the greatest benefits of **Web services**. In Miami-Dade County, Judi Zito, chief information officer, says the city wanted to let contractors go online to get permits for installing hurricane shutters, rather than forcing them to come to a municipal office building and stand in line. In the past, developing software to allow that would take at least six months, but by creating a Web service to pull the needed information from the city's property-tax database "we cranked it out in three weeks," says Ms. Zito.

And it was simple to make the Web service created for that purpose available to police who might want to know the ownership of a property involved in crimes. Meanwhile, for police in patrol cars seeking crime records, Ms. Zito's department used **Web services** to create links to Miami-Dade's criminal records, which are stored on a mainframe, as well as to state and national records databases. Now officers use their radio-connected laptops to get data, rather than calling in to a busy dispatcher and waiting for a voice response.

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Ms. Zito estimates that, using traditional methods, it would have taken software technicians eight years to create such connections. With **Web services**, it took about three months. "It's pretty dramatic stuff," she says.

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