PRACTICAL ISSUES IN GLOBAL IT MANAGEMENT

Many Problems, a Few Solutions

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World Wide Web, European unification, stock exchanges, and companies merging across national borders — they all bring a world of issues to an IT manager's attention. As the scope of information systems increasingly spans the globe, IT managers encounter problems they never imagined. Sensitivity and awareness aid in solving these problems. This article should also broaden IT managers' technical and managerial awareness to a global level.

CORPORATIONS HAVE BECOME INCREASINGLY GLOBAL. Web sites automatically enable access to buyers and sellers around the world. Transitions of companies from single-country organizations, to exporters of products, to multinational and transnational organizations also force management to reconsider how IT can best be used for competitive advantage.

IT managers for multinational organizations quickly realize that IT's effectiveness depends on the development of an IT strategy that is consistent with the nature and goals of the company. Further, the IT architecture must coherently integrate hardware platforms, telecommunications systems, software applications and development tools, personnel and procedures, and databases. Unfortunately, it is more difficult to implement the elements of a global IT than it is to envision them. Without attempting to catalog all of the problems, Exhibit 1 summarizes and the following text describes the types of issues that the forward-looking IT manager must think about when a global IT system is contemplated or implemented.

LANGUAGE ISSUES
The most obvious problem affecting global IT operations is the multiplicity of native languages that are spoken in different countries. This manifests itself in numerous problems and issues — some readily apparent, others less so.

User Interfaces
Immediately, the question appears, "What language(s) will be seen by users in documentation, video and computer-based training materials, operator and user manual screens and reports?" Even within a country, there may not be a single, standard language. The Swiss, for example, have four official languages, and a country like India has several hundred dialects. Keyboards have varying character sets, causing confusion and relearning. Variations among keyboards and basic operating systems make the user interface more complex.

Not so apparent is the impact the language decision has on the work force. If English is chosen as the lingua franca for the user interface, the work force in contact with computers must also read and speak English.
EXHIBIT 1 Key Issues for Global IS Management by Category

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<th>Language</th>
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<tr>
<td>* Appropriate language is difficult to identify</td>
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<td>* Translation is complex and time-consuming</td>
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<td>* Differing formats for different languages</td>
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<th>Cultural and Geography</th>
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<td>* Varying prejudices and cultural mores</td>
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<td>* Behavioral differences</td>
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<td>* Differing symbolic formats</td>
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<td>* New geographic and behavioral concerns for security and disaster planning</td>
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<th>Systems Development and Support</th>
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<td>* Differing national standards</td>
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<td>* Availability, training, and compensation of employees</td>
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<td>* Different technical and business terminology</td>
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<td>* Hours and availability of support</td>
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<th>Legal Regulations and Enforcement</th>
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<td>* Differing forms of protection</td>
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<td>* Employee hiring, firing, compensation, and monitoring practices</td>
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<td>* Intellectual property laws</td>
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<td>* Accounting, taxation, customs, contracts, fraud, and bribery laws</td>
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<th>Level of Technology</th>
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<td>* Varying levels of technology knowledge and awareness</td>
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<td>* Availability of telecommunications facilities and support</td>
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<td>* Differing uses of technology in businesses</td>
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This, in turn, limits the number of available workers in foreign countries and, potentially, increases the cost of labor by drawing on a limited supply of skilled workers. Contrary to popular traveler’s reports, not everybody outside of the Holiday Inn speaks English. Especially in Africa and Asia, finding English speakers is problematic. In contrast, a decision to use local languages has wide-ranging impacts on system development, data storage, hardware availability, screen formatting, and documentation.

**Effect on Hardware**

One consulting company, which supports offices around the world, determined that it would use local languages for workstations, but English for servers in order to facilitate server support out of the United States. It ran into some interesting problems. Chinese and Japanese characters require double-byte character sets. Thai characters require three bytes. They found that when local offices transmitted documents containing the Asian character sets, characters were interpreted by the “English” servers as control characters and they crashed regularly.

**Is English a Choice?**

English only may be a choice in some countries, but not in all. In many countries, finding IT professionals who know English is a challenge. Another difficulty lies in the rapid changes experienced by organizations because of modifications in business practices and acquisitions. One major non-American computer manufacturer focused on English as the basis for all of its internal work, but discovered that it had to rework most of its documentation and Web site data in local languages when Internet access for international customers emerged as a higher priority for the company. In another company, the use of English as the core language had been achieved, just in time for the company to be purchased by a French company that insisted that everything be converted to French.

Further, in some countries, governmental legislation and enforcement requires the use of the native language as the official language of business. For example, in Quebec, recent legislation requires that workers be allowed to complete the majority of the transactions they work on in French. As another example, one university with a Web site that allowed view-
Not only did the translation of screens take time, but also the conversions required substantial testing to be sure that people in other countries responded as they were expected to, and that their reactions were positive and correct.

Globalization and Localization
If instead of English, a company chooses to adapt the documentation, screens, and reports to native languages, the complexity increases dramatically. This may be the direction of choice when interfaces are seen not only by a limited number of employees, but also by a broader range of employees, vendors, suppliers, and customers whose knowledge of English is unknown. A substantial technological shift in development techniques is required when various versions of software must be adapted, often simultaneously, to a variety of countries. Localization — the design of the base product to facilitate adaptation to a variety of different cultures — and globalization — the adaptation of the base product to a particular international marketplace — entail different standards for system implementation than that used in single-country implementations.

Translation Takes Time
One manager responsible for setting up an office in Europe said that he was aware of the need for a translator to assist him. What he was not ready for was the time it took to translate technical documents. For him there was no scanning and no quick recognition of familiar concepts. He had to have the translator read through all documents in their entirety, including technical and legal documents. One must have a high degree of trust in the quality of translation for such documents. Another software developer commented that the translation of software into local languages also took more time than she expected. Not only did the translation of screens take time, but also the conversions required substantial amounts of additional testing to be sure that people in other countries responded as they were expected to and that their reactions were positive and correct.

Confusing Idioms and Colloquialisms
The marketing literature is filled with examples of marketing slogans that had such negative connotations that product potential was destroyed. The same deterioration in communication occurs when computer screens, Web sites, and reports are designed incorrectly. Phrases, pictures, music, video clips, icons, and colors may generate reactions that are quite different than those anticipated.

Adaptation
Other issues arise when global language products are being adapted to native languages. English has been the predominant language on the Internet, in e-mail usage, and in many other aspects of computing. However, as computers are increasingly adopted in other countries, this predominance is changing. The manager of a global IT must ask such questions as: Can you find native speakers capable of translating technical English into the local language? Will your English-speaking staff be able to correctly review and approve the translations, or will you have to employ locals to do translations and other locals to verify their correctness?

SYSTEMS DEVELOPMENT AND SUPPORT ISSUES
The development of software for use in multiple countries is affected by many other considerations than just the selection of a presentation language.

Standards
Standards are not necessarily global standards. For one, the U.S. standard Electronic Data Interchange (EDI) has a somewhat incompatible counterpart in the European version of similar software, Electronic Data Interchange for Administration, Commerce and Transport (EDIFACT). One consulting company in the United States adopted as its standard a certain laptop from Toshiba. Later it found that it could not buy that model in Japan. The same company found that some modems sold in Japan would not work in the United States. Another firm attempted to adopt Frame Relay as its communications protocol standard and found that this service was not available in many countries. Further, not only do traveling professionals have to carry multiple power plugs and transformers around with them, but they also have to carry telephone jacks appropriate to many countries. Even telecommunications software must be programmable to accommodate differ-
ent standards: A “1” bit means busy in the United States, but open in Mexico.

Availability of Technical Staff
Many countries are suffering from a shortage of programmers and technical staff while other countries have a surplus. Pakistan graduates only 600 IT people per year, whereas Bulgaria set up Rila Software Corp. to offer the services of 7000 software professionals. Brazil has 5000 IT job openings, but 12,000 people graduate each year. Europe has 510,000 IT jobs vacant now, rising to 1.6 million by 2002. The Netherlands has such a shortage that it is implementing a program to bring back retired programmers.

In addition to the uneven distribution of technically competent employees, there are also difficulties with differences in the popularity of some development environments. One executive observed that he was surprised to find that in Europe, Sybase was more popular for database development than was Oracle, the database his company had standardized on. This required an unexpected decision. To continue to use Oracle would require having to hire scarce (read more expensive) Oracle programmers or having to train them. The other choice was to use Sybase in Europe and Oracle at home. No training would be required, and personnel costs would be less, but integrating systems would be more difficult.

Differences In Compensation
Programmers in different countries earn and expect differing levels of compensation for the same job. Salaries, required fringe benefits, anticipated stock options, and bonuses, for example, will vary. Technical personnel are paid almost twice as much in Germany as in the United States while the same personnel in the former Soviet-bloc countries earn a fifth of that paid to a U.S. programmer. This presents a significant problem when staff is being moved among countries and when staff from different countries are working side by side.

Travel Costs
To the extent that companies send trainers to provide on-site training, organize multi-country planning and project teams, or send executives on evaluation and oversight missions, the travel budget expands dramatically.

Software Availability
Software is not always available in each country, even with commonly known products. One company implementing an enterprise resource planning system found that it could not acquire versions at the same level for all of the countries its plants were in. In Mexico, the software was not available in any form, and the only acceptable alternative from another company was incompatible with the systems in the other countries.

Software Transferability
Because some software applications and packages are developed with specific countries in mind, they have features that are useless in other countries, while they lack other features needed in another location. One U.S. manager, asking about the presence of tax tables in a management information system being offered for global usage by a European software firm used to dealing with value added taxes was asked, “Why would you want that?”

Date and Time
One question that arises in transaction processing systems is what day and time is it? A global operation needs to establish fixed dates and times or fixed dates and times with offsets to indicate times. Correct displays for dates and times in many software packages are easy to install. In-house software may have to be modified, however.

Currency and Formatting
There is an obvious need to accommodate all currencies in computer systems and to align these currencies with current exchange rates. Some currencies use more than two decimal places. Others have such small units (e.g., yen and lira) that the whole numbers require a larger number of columns than comparable American entries. In Europe, not only must conversions be carried out, but the EU billings and receipts must show the EU value of a transaction as well as the values in the local currency. Further, in developing end-user systems, one may want to display the values of the local currency, as opposed to showing the same value everywhere. In some countries, billing and payment in U.S. dollars is desired rather than in the local currency. In short, currency issues alone can result in considerable reprogramming of systems originally developed for U.S.-only use.

Another change in perspective relates to differences in the types of monetary transactions used in different countries. In Europe,
most transactions are by bank transfer rather than by check. These transfers are cheaper if they are conducted within the same bank, so many companies have accounts with multiple banks. The number of banks may exceed the number provided for in U.S.-developed software packages.

Technical and Business Terminology
A global company cannot assume that people in different countries will call things by the same name. In Germany, a graphics card is referred to as a Grafikkarte, in France as carte vidéo, and in Spain as tarjeta de video. The trade-off is either to use the U.S. terms and not have it understood by all readers or to use the local terms, in which case duplicate databases may be needed that are built around inconsistent format lengths, local character sets, etc. Queries and searches are further complicated when multiple terms must be included within the search string.

Many programs embody the formal specifications of business operations, and the techniques, terminology, and formulas of the multiple professions that participate in a company. However, these elements are not consistently understood around the world. Forecasters and planners, accountants and budgeters, purchasing agents, and others may use the same term in different countries, but the meaning of the term can vary. For example, the meaning and computation of economic order quantity, a very significant figure of merit for both management and operations, vary from country to country.

Development Methodology
One U.S. IT manager expressed the opinion that while analysis and design techniques did not vary much from country to country, Americans produced programs faster than Europeans because they don't spend as much time on analysis and design as Europeans. The American programmers changed jobs much more frequently; because they had no long-term perspective as to the length of time programs would be in operation, they did not concern themselves as much with long-term maintenance. While the concepts of evolutionary development are frequently discussed in U.S. publications, actual experimentation and implementation of the techniques have happened more often in European organizations.

Although programmers everywhere have a great deal in common, differences can arise. For example, a U.S. project manager in Germany concluded that German programmers tended to be less concerned with security than U.S. programmers. The comparative rarity of systems incursions in Germany was one reason for laxity in this respect. This manager also said that the German programmers tended to worry less about user mistakes and thus provided less error checking within the user interface than their U.S. counterparts. His German programmers protested, "Users aren't supposed to press that key," when asked why they didn't include error routines.

Country Version Releases
Companies releasing multiple versions of a software application must consider whether they should release all versions simultaneously. The last version of Windows, for instance, was initially released to almost 21 countries simultaneously, and others followed. Failure to implement in all countries simultaneously can cause embarrassment and insult to the personnel in those countries not included in the initial release and complicates processing with the need to support both old and new versions of software.

Security
When an organization contracts out programming projects to foreign programmers, there is a concern that security may be compromised. This was the fear of several Y2K consultants who raised the issue with respect to the outsourcing of many projects to programmers in India, Israel, and countries of the former Soviet Union. The State Department experienced second thoughts when it suspended the use of a planning system that was used in all embassies. It had had the program modified substantially by Russian programmers and, belatedly, decided it had better determine whether there were any back doors that allowed unauthorized entry or clandestine loss of data.

Hardware and Software Support
One company with global operations had trouble getting its desktop and laptop computers repaired competitively around the world. Unlike vendors in the United States who see computers as commodities that bring profit through support and repair, "authorized representatives" in many countries would not repair systems they had not sold. The same company could not get repair authorizations to send its defective computers to "global" depot repair centers.
Software support is difficult to find in many countries, even if it is supposed to exist. One large software company indicated that it provided "global" support, but the company implementing the software found that there were no local offices in some countries.

Help Desk Support
In a global system, the goal of 24/7/365 coverage is essential. People cannot resolve technical issues at 3:00 A.M. when they are at home in Thailand because that is when the help desk in the United States can call back. Help desk support is another area in which variations in equipment and software localization can cause havoc. Some groups won't talk to one another. Not only must help desk personnel be able to converse technically with users, but they must be able to converse in a manner that instills trust and confidence, and this ability is a social factor that varies with country and culture. One company tried to outsource help desk-type operations to local vendors in Asia, but ended up setting up its own support system when it discovered that many of the vendors simply could not deliver on their commitments.

LEGAL ISSUES
Even casual international travelers realize that each country has different tax laws, personnel laws, reporting techniques, and so on. What is not so obvious is how these laws interact with one another within a global company and how they must be dealt with. The recent popularity of enterprise resource planning systems has, in some measure, been motivated by the availability of software that is already programmed to handle multiple currencies and to generate reports for multinational companies. In addition to those issues, a manager of a global IT entity is certain to have to contend with legal issues in one or more of the following categories.

Accounting
Not only do accounting laws vary from country to country, but the overall goals and objectives of accounting systems also differ. In the United States, accounting systems typically emphasize information that properly informs stockholders and potential stockholders, of the financial health of a company. In Europe, the emphasis is on tax reporting. French accounting laws provide very specific format and details (such as a required chart of accounts) while the United States has greater variability within and among commercial sectors.

Trade Protection
Although free-trade pacts have opened many markets, protectionism continues in ways that interrupt a company's ability to enforce worldwide standards. Brazil has restrictive import laws to protect local computer and data communications companies, which may prevent a company from using the same hardware and software products within Brazil that they would use elsewhere.

Fraud Protection
Implementation of global systems, especially Internet-based electronic commerce sites, invites increased opportunities for fraudulent purchases. It is said that to stay in business, fraud has to be kept in the low single digits. International fraud rates can approach 20 percent. The greatest level of fraud is indicated to originate in Romania, Egypt, Russia, Belarus, Israel, Thailand, Pakistan, and Mexico. Credit card companies do not save harmless companies that accept charges without signatures.

Job Protection
The Antillian government takes protection of its professionals and nonprofessionals seriously in order to maintain full employment. The police constantly raid businesses to find people without legal working papers. One hotel chain needed to send in a technician to fix network problems. The technician, a Canadian, worked for the U.S. company and operated out of St. Maarten. For two years he had been living with a girlfriend, while working surreptitiously on the company's network. The Antillian government had processed no paperwork during that time. When the technician had an argument with his girlfriend, she threw him out, changed all the locks, and called the immigration authorities who promptly arrested him. It cost the hotel chain several thousand dollars to get the technician out of jail.

Worker Hiring and Dismissal
In Germany, says one manager, it is almost impossible to fire a worker — the worker must be paid off. Legally, a fired worker, through job seniority, is able to bid on the jobs of other workers with less seniority. Another manager said that even when her company downsized in Japan, the reaction led to a highly publicized uproar among the dismissed workers. Yet another manager noted his conclusion that
“hiring an Italian is hiring them for life.”

A manager setting up a programming site in Germany found that the laws prevented him from hiring people outside of quarterly transition times. A worker has to give an employer at least a full quarter-year notice of his or her intent to leave for another position. This timing with January, April, July, or October transition times makes it possible that almost six months can lapse before a person can leave one job to begin another.

Unions
A global company implementing an enterprise resource planning system found that union job classifications in some European countries conflicted with the degree of integration of job functions built into the system. It also found that the statistics being generated were often tied to the productivity of specific workers, a form of data gathering that is prohibited by the unions and by law.

Physical Facilities for Workers
In Germany, the law holds that every worker with an office must have a window. It also says that when a rental facility is vacated, it must be in the same condition that it was in when it was first rented. In the latter case, one manager reported that in moving to a new location, he had to arrange to paint the old facility first and even put in new light bulbs.

Vacations and Overtime
Europeans think that Americans work too hard. Most western European countries require by law that workers receive at least five weeks vacation, and some receive a minimum of six. France, as travelers have learned, appears to be closed in August. These variations in production introduce a significant variability into the estimation of project manpower requirements. Working overtime is not always a possible option to offset the different vacation requirements. In Germany, for example, an effort to abolish overtime is under serious consideration as a means of extending work to the unemployed.

Fringe Benefits
Unemployment taxes, social welfare costs, and other salary-related taxes vary widely in form and amount from country to country. Human resource systems must accommodate these variations. In France, a large company has to provide three different levels of cafeteria services for three different employee salary levels.

Privacy and Electronic Monitoring
In most European countries, it is now illegal to measure the work of individuals. The acquisition of individually referenced data on workers or customers is not permitted. Thus, monitoring systems may need to be discarded or revamped. Privacy concerns have been accentuated by the adoption of Data Directive Number 25 by the European Union. The directive enacts provisions under which countries or individual companies must be certified as having secure data protection techniques to protect privacy. National privacy commissions must approve the collection of information about individuals, and the data collected may be used only for the purpose it was approved for, unless the individuals give their consent to secondary uses. Further, this data cannot be transferred to other countries unless they also enact similar data protection provisions. Non-EU companies operating in countries such as the United States, which are not certified as treating data with appropriate privacy controls, must either implement systems that conform to the directive throughout their company or operate one set of systems in the EU and another elsewhere. Privacy restrictions even place limitations on where data can be moved in the event of a disaster recovery effort, and this may force a company to move production to a hot site elsewhere in Europe or the world.

In a contrary direction, personnel databases may need to be expanded to collect information not used in the United States. In Japan, data is collected on worker blood type because that is seen to be one factor for judging management potential.

U.S. managers also need to be aware of how laws on privacy affect worker supervision and discipline. One international company, operating on generally enforceable principles that usage of corporate assets for private e-mail and Web surfing are not allowable, fired a Swiss worker for misuse of the e-mail system. The company found, however, that Swiss law disallowed such monitoring, and it became liable for its violation of the worker's privacy.

Licensing
Although some companies have been able to affect global licenses with larger software vendors, software licenses are not always easy to come by. The cost for a software license can fluctuate widely for the same product in different countries or for comparable products. One consulting company seeking to use a
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One automobile company found that it had to adapt its programs and databases for storing warranty information on two counts. Some countries had laws indicating that warranties had to be of three-year duration rather than the one-year duration that they had been using. The same company, in Europe, also had to negotiate when warranties began, because the warranty was legally referenced to the shipping date. Because the cars were housed in several countries but were shipped and dropped at multiple sites in different countries, the shipping date was somewhat ambiguous.

**Preferential Treatment of Local Suppliers**

India and Nigeria require that companies coming into the country partner with subsidiary companies. Some companies refuse to do this to avoid losing intellectual property rights for their software copyrights and patents.

**Limitations on Software and Hardware Exports**

The U.S. State Department issues a daily updated table of denial, which identifies products that cannot be exported to other countries. Until recently, the United States prohibited, through export controls, strong encryption software from being exported to other countries. Although now somewhat relaxed, restrictions still exist. Some countries — France and China, for example — do not allow the use of encryption. Consequently, maintaining corporate standards is difficult or impossible.

**Cultural Issues**

Beyond formal legal differences are a variety of subtle but substantial cultural differences. It is not enough for an organization to be just multilingual; it must be multicultural as well. How people view the world, their government, their relations with other people, and computers, for example, greatly affects their work habits and ability to deal with problems.

**Social Values**

The computer consultant Esther Dyson once remarked that through their cultural history, Russians have been "trained" to avoid direct truthful answers. They believe that accurate information can get them in trouble and that it is better not to have any information about them in the computer system. Consequently, Russians may not tell the truth when responding to queries.

**Intellectual Property Protection**

Copyright and patent laws are unevenly observed around the world. Commercial software vendors attempt to avoid undue exposure in "one copy" countries — especially in Asia — in which their software is stolen and reproduced for illegal sale. A manager in Romania said that it would be "foolish to purchase software when we can just copy it. Everyone copies software." Corporations that wish to protect copyrights, patents, and trade secrets need to implement security techniques that prevent the loss of their property.

**Customs**

Customs officials may obstruct the movement of data and software carried by personnel on airplanes. "How much is that worth?" is a question that has been directed at many travelers. How do you answer when software on a disk was developed in-house by the company: Fifty cents for the disk? Two million dollars for the development of the program? Nothing for a copy of a program?

In Indonesia, there is a 100 percent tax on products being brought into the country. Even Indonesian locals are unclear as to precisely how this tax is to be paid, but eventually it will be assessed; users who purchase a laptop for $2500 must pay another $2500 to bring it into the country. Other countries have customs rates that can increase costs for a new piece of hardware between 20 percent and 50 percent.

**Warranties**
Despite its economic and technical significance, Japanese culture has not been entirely receptive to computer technologies. Not only is the integration of the computer into many corporate processes behind that of the United States, but some systems may not fit in well at all. It has been observed, for example, that the social and group-oriented dynamics of reaching a decision may be quite antagonistic to an expert system designed to reach decisions on its own. E-mail is less commonly used in Japan because of its person-to-person nature, which is inimical to more familiar and desired group processes.

**Ability to Effect Change**

Americans are used to fairly rapid changes in staffing and organizational issues. In Europe, there are worker's councils and unions in many countries that must be consulted months, if not a year, in advance of any significant changes in working conditions, including the closing of a plant or the movement of a data center. As a result, the speed with which decisions can be implemented varies among countries.

**Colors**

One game manufacturer noted that in Germany, computer games in which people are killed or in which blood is red are prohibited, so their games had to be redesigned for that market by converting human figures to animals and the color of blood to green. A software project manager noted that screen colors evoke different responses from people. Bright colors may be interpreted as being too offensive or aggressive by one group but readily accepted by another. The selection of colors may evoke unintended negative reactions — yellow in Russia, for example, or red and white in Quebec, or blue in Egypt.

**Bribery**

In many cultures, bribery remains an integral part of doing business. Without it, communications lines are not installed and deliveries are not made. Licenses and permits to operate may flounder in bureaucratic limbo. One company found itself having to work through “partners” so it could avoid being directly involved in bribery, which is an illegal act for U.S. citizens, irrespective of the country in which it is performed.

**Behavior**

It is well known that in some countries, foreign analysts, programmers, and managers may treat badly or completely refuse to interact with women and minorities. Femaleovers may present a problem in countries in which females are expected to take a subservient position to men.

**Career Development**

When staff are located in numerous countries, developing satisfactory career ladders and implementing flexible movements of staff become complicated. A programmer who has advancement potential may not be able to fill a position in another country if he or she is not fluent in that country's language or in the language of the country of the home office.

**Temperament**

One internal auditor remarked on the differences with which he has to approach managers regarding problems discovered within different countries. In Japan, saving face is important. A worker, in particular, must not be made to look bad in the eyes of managers. Problems are communicated to the worker first and moved up the line when necessary. Some Brazilians, the auditor reports, are very excitable and emotional when confronted with problems. In this country, he communicates problems as early in the audit as possible so emotions can be gotten out of the way. The problems are addressed again later when the managers have cooled down a bit.

**Communication Styles**

While Americans favor fast-moving, direct, and to-the-point forms of communication, the Japanese are often described as deliberately vague in initial conversations. They gradually move toward consensus, allow for silence, and value thoughtfulness.

**Cultural Symbols**

It is well known that gestures and icons represent different things in different cultures. This becomes especially important in the development of Web sites. In the United States, the index finger indicates a count of one, but in Germany it is taken to mean two because the thumb is one. Other symbols that we take for granted such as mailboxes, school buses, and tab folders are not used everywhere or even used at all in some cultures.

**Climatic, Political, and Physical Environment**

IT planners may have to worry about entirely different forms of disaster prevention and
recovery in different places around the globe. Think of the evening news and imagine how different the plans have to be when there is a chance of civil unrest, political coups, or frequent power outages due to hurricanes, earthquakes, freezing temperatures, high humidity, or lightning storms.

**Holidays**
Different countries have different holidays, so assuming that all staff will be at work in a given time period is probably a mistake. What level of staffing can be expected during Ramadan, Chinese New Year, or Saint Paul’s Day?

**LEVEL OF TECHNOLOGY ISSUES**
Clearly, not all countries can provide the same level of technical infrastructure to companies moving into them. This is of greatest import when a high-technology company moves into a less well-developed country.

**Knowledge of Technology**
Citizens of countries around the world are not equally knowledgeable about technology. While in the United States over 80 percent of respondents to one survey indicated that they knew what the Internet was, in several European countries less than 30 percent of the population recognized the term.

The typical worker in a less well-developed country may require greater ramp-up time than a typical worker in the United States. It has been observed that more than 50 percent of the people in the world have not made a telephone call and an enormously greater percentage have never worked on a computer. A Web site training operation in one company had to be greatly simplified to avoid long downloads to its staff in a country with 26 Kbps telephone lines and to be useable on 286-, 386-, and 486-based computer systems, using only older versions of Internet Explorer and Netscape Communicator.

One company implementing enterprise resource planning systems in plants around the world found that most of the staff at a plant in China not only lacked any computer training, but many of them were still using abacuses. The trainer found that the Chinese, however, were more anxious to learn new technologies than workers in many other countries and learned to work with new system very quickly. He also discovered that things moved faster because there was no “old way” to compete with. By contrast, in Europe the same trainer found people making paper copies of customer orders even though they were using a “paperless” system.

**Telecommunications and Utilities Availability**
The investments required for access lines differ considerably across the globe. The prices for communications lines vary widely, perhaps by an order of six times the cost of a U.S. line. A basic circuit in Britain that leases for $2800 a month leases for $9600 in Germany. In some countries, private telecommunications lines may be illegal. While the United States has one telephone line for every two people, China has one for every 200. Only 35 percent of Germany’s trunk exchanges (switches) are digital, whereas in France that figure rises to 75 percent.

Some countries have very well-developed national strategies for supporting the emergence of high-technology businesses. Singapore and Malaysia, for example, stand out as dynamic centers for information technology planning. The United States and most Western countries with larger land areas have less coherent, but significant planning efforts to develop specific high-technology sectors. On the other hand, some countries cannot support wide area network connections. One company used to working with Internet communications could not get virtual private networks established in some countries and had to rely on wireless communications almost exclusively in Sweden, because private physical (copper or fiber optic) lines were nearly impossible to obtain.

**Support for Telecommunications**
In some countries, telecommunications are still fairly centralized in state monopolies or in monopolies only recently opened to competition. This leads to a great variety in the level of service availability. In parts of some countries, telephone utilities operate only six to eight hours per day. Electrical power availability is similarly constrained to limited parts of the day. The lead times for ordering telephone lines vary widely. One IT manager waiting the installation of lines at his shop in Spain waited six weeks and was told, upon inquiry, that the original order could not be found and a restart of the order would require another equivalently long wait. The installers, nonetheless, arrived the very next day using the original order. On one Caribbean Island, one resort paid $6000 per month for 64 Kbps of bandwidth, but the lines seldom were avail-
able, were frequently dug up, and the resort often had to bring in specialists who could assist the local utility to address technical problems that it could not handle.

There are global telecommunications providers that offer to help put together unified global telecommunications systems. However, some companies found a wide gap between what was advertised and what was available. One “global” provider actually had multiple individual contracts for outsourced services among countries and did not deliver a unified solution to its customers. Another provider with similar arrangements did not even have services in all countries as promised.

Nature of Retail Businesses
Several companies discovered that implementing some newer systems was not easily accomplished because of differences in the way retailing is done in different countries. A clothing manufacturer could not implement an ordering and inventory program in Italy because the stores it worked with had virtually no access to computers on site. In Europe, a food distributor had to modify its expectations because of the predominance of small food stores in Spain and Italy and the absence of larger supermarkets similar to those that it had in Britain.

Espionage and Monitoring
Secret services in certain countries carry out corporate and international espionage, not only on suspected secret agents but on corporations. Several people indicated that their suitcases, computers, and private papers were tampered with in several countries. Taiwan, France, and China openly monitor data transmissions, and the United States and Great Britain are known to operate Project Echelon, which monitors faxes, e-mails, and telephone calls across the globe. One PC support person noted that telephone-based connections by staff traveling in certain countries dropped regularly because the lines were being tapped.

SOLUTIONS AND ASSISTANCE FOR GLOBALIZATION
Many global information system problems are new. Yes, large multinational companies have existed for years, but for most of their post-WW2 existence, control of offshore organizations including information systems has been decentralized with manual consolidation of financial information. It is only the universally felt need for efficiency and coordination of the past 10 to 15 years, itself largely IT driven, that has spurred the need for global access to and control of information from any point in the world. As these problems have just surfaced, solutions and solution suppliers have only begun to appear. The solutions discussed in the following sections are divided into assistance for companies that merely wish to trade internationally, primarily using the Internet; companies that sell software in multiple countries; and companies that wish to or must have a physical presence in one or more foreign countries.

Assistance in Entering the Global Cyber Marketplace
A company wishing only to sell its wares globally over the Internet has a range of options, including handing globalization efforts over entirely to an application service provider (ASP). An increasing number of ASPs specialize in globalization services and will completely handle Web site language translation, customs and other fees and tax computations and collections, and international delivery. They will also physically host the Web sites and electronically transfer collected sums from the buying companies’ bank and order records to the selling companies’ information systems in various ways.

Organizations requiring greater control over the globalization process or who find the ASP’s fees prohibitive can opt for consulting services from these ASPs and other firms mentioned in the following sections. Services offered range from language translation (primarily for Web pages) to full Internet globalization “engineering.” At least one ASP has developed a formal methodology for Web systems internationalization.

International Software Sales
Many companies offer assistance in translating the user interfaces and manuals of a software package into a foreign language. Technical consulting services address such issues as character storage for local languages and differences in telecommunications standards. Service providers of radically varying quality are available in most countries to provide localized support for software. All require training by the software producer, and many charge a setup fee in addition to a per-call fee. In return, customer support language and custom barriers are overcome, and the software manufacturer is spared the very significant problems and expense of staffing an overseas office.
**Physical Presence Required in a Foreign Country**

Problems increase dramatically for the organization that must maintain a physical presence, including a local IT and a staffed IT department in one or more foreign countries. As the senior vice-president of a company with considerable international experience put it, "business processes vary radically by country, and development and support — the people intensive part of the business — must be localized.” The most disturbing implication of this quote for IT managers is the impossibility of imposing a single software solution on international sites. This in turn implies custom programming to translate and integrate data.

Assistance with the legal and business variances between countries is available from any of the international accounting firms. Services provided by most of these firms range from consulting through turnkey systems development for the offshore offices and integration into the parent IT. A variety of middleware packages can be specifically purchased to ease the burden of data translation between systems and to facilitate global IT integration. Finally, as mentioned previously, highly parameter-driven enterprise resource planning systems may offer enough flexibility for multiple country installations and minimize data integration problems.

**CONCLUSION**

Information systems for global business pre-

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**EXHIBIT 2 Contact Information for IT Globalization Assistance**

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<thead>
<tr>
<th>E-Business globalization services:</th>
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<tbody>
<tr>
<td>Global CommerceZone Inc.</td>
<td><a href="http://www.gczone.com">www.gczone.com</a></td>
</tr>
<tr>
<td>GoShip, Inc.</td>
<td><a href="http://www.goship.com">www.goship.com</a></td>
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<tr>
<td>MyCustoms</td>
<td><a href="http://www.mycustoms.com">www.mycustoms.com</a></td>
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<tr>
<td>Uniscare</td>
<td><a href="http://www.uniscare.com">www.uniscare.com</a></td>
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<tr>
<th>Internationalization consulting:</th>
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<tr>
<td>Some international computer firms, notably IBM, offer some form of IT internationalization assistance. They are not shown here. Many more consulting firms than are listed here can be found using the keywords “internationalization consulting” in any Web search engine; many of these are specific to a country — that is, they offer assistance targeted at setting up a branch office in Singapore or Japan, for example.</td>
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<tr>
<th>Organization</th>
<th>Services</th>
<th>URL</th>
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<tr>
<td>BTS, Inc.</td>
<td>Multilingual technical translation, multinational hardware</td>
<td><a href="http://www.bts.planet.net/">www.bts.planet.net/</a></td>
</tr>
<tr>
<td>OneRealm.com</td>
<td>The company provides several technical conversion tools. The page shown is a resource in itself, pointing to books and white papers on internationalization and other internationalization consulting sites.</td>
<td><a href="http://www.onerealm.com/products/products_faq.asp">www.onerealm.com/products/products_faq.asp</a></td>
</tr>
<tr>
<td>Austraat Seminars and Consulting</td>
<td>Software internationalization consulting; site contains an online tutorial on internationalization.</td>
<td><a href="http://www.austraat.com/">www.austraat.com/</a></td>
</tr>
</tbody>
</table>
sent IT managers with a host of thorny issues. Many of the problems are new, even for companies that have had a long-standing international presence. Now however, as one executive put it, "we are driven by the need to establish global product lines and write global contracts. We find ourselves trying to develop a common information backbone out of parts that don't fit together well."

Interestingly, one of the newer problems — the internationalization of Web-based commerce — has available the broadest and most complete set of solutions. Exhibit 2 lists some companies that specialize in IT globalization.

However, many global IT issues have a legal or social basis and are likely to remain intractable indefinitely. In the past, IT professionals have seen themselves as technicians doing a job with a fairly limited scope. The need to establish and maintain global information systems may change that perception as IT professionals are forced to increase their knowledge of the global community. An oil company information executive observed that when he discovered how limited the communications systems were in locations critical to his company, he had to take a broader view of his function and become involved with governmental leaders in planning international broadband and satellite systems across Africa. Another company expanding into Asia found that it had technical personnel problems when relations between India and Pakistan broke into hostilities and required IT to assume a peacekeeping role, at least in-house.

The only certainty: that the drivers behind integrated global information systems, increasingly global product lines, supply chains, and customer bases will continue to grow in importance for everyone concerned with information technology. ▲