Management Problems of Internet Systems Development

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Abstract

This article is based on an online DELPHI Questionnaire study of the management problems of Internet/Web systems development. Three questionnaires are used. The 26 most important problems are presented. No individual problem is overwhelmingly rated as most important. However, two clusters of related Internet problems, which together include 13 of the top 16 problems stand out as the two most important problem categories. These are 1) strategic planning and other strategy-related problems; and 2) data integrity and privacy problems.

This article first discusses the overall results of the study. Then the “strategy” category of problems is explored. The similarities of the findings of six prior DELPHI studies to those of the present study suggest that problems associated with strategic activities are exceedingly important as a cross-discipline problem area.

The problems of data integrity and security are thereafter examined.

Introduction

The research reported here is based on a study of Internet/Web systems development management problems. Using a DELPHI Questionnaire methodology, the study identifies these problems, and places them in rank-order according to their importance, as perceived by the Internet expert participants. The results provide insight into the Internet/Web systems development processes so that a more orderly process of improving these development activities can ensue.

Most observers will agree that the actual development practices employed to create Web systems do not correspond closely to the practices developed and refined over decades for non-Web systems, reason enough by itself for research into the problems of managing these new practices. The search for appropriate Web development methodologies may be made more difficult by the rapidity of change of these technologies.

Although the World Wide Web has been widely discussed in print, few aspects of the Web systems development have yet been carefully studied. Many or most of the published works that purport to be studies are primarily descriptive or are self-interest efforts to promote a particular company’s Web-related products or services.

This study is directed to the management problems of Web systems development. While the Web technologies are clearly related to the traditional information technologies, they are so fundamentally different as to constitute a major departure from prior technologies. There are relatively few systems development personnel or managers who understand these new technologies or how to manage them.

A great deal of effort has been given to developing the Internet systems now in existence and in process of implementation, but there is no evidence that this effort has resulted in successful systems. Attention should be given to creation of a common body of knowledge about how to develop new Web systems.

The perspective of this study is that of Internet systems development managers, corporate senior managers and other concerned managers within service, commercial and industrial companies that are not primarily Web-based. The identification of these management problems shows managers the extent to which other companies share similar problems. This may encourage these companies to find and share “best practices,” about Web systems development. Identifying these problems also encourages academic researchers to focus on important problem areas rather than on those selected because of personal interest or intuition.

The objectives of the study are 1) to identify these problems; and b) to evaluate the importance of each problem. This article presents the results of the study, which identified the twenty-six most important systems Internet/Web development problems and placed them in rank order of importance. The article then discusses the
group of related problems that is the most dominant among these top twenty-six.

Research Methodology

The selected methodology is the DELPHI Questionnaire Management Problems methodology. This methodology is particularly appropriate where an effort is needed to surface and specify all problems of a problem domain and where, because of the absence of factual information on which to base decisions, it is the judgement of experts that must be relied upon. This methodology has been used recently in the field of Technology Management, and prior to that in the field of Information Technology. In each of these areas the usage was similar to that of this study—to identify, assess, prioritize, and gain insight into the most important management problems associated with development activities involving the use of advanced technologies.

This study identifies the leading problems of Internet systems development encountered by “old economy” companies, that is, companies that were not created to use an Internet business model but instead have added Web activities to their traditional operations. Three questionnaires are used in this study, each in sequence, to solicit the opinions of Internet systems development experts who are managers in Internet systems development, or who are academics whose research interests are related to Internet systems development.

The set of problems for the first questionnaire was compiled by the authors and consists of 139 potential Internet systems development problems. The initiation of the study with this large number of problems gives greater assurance that the list of possible problems is as exhaustive as possible. The participants selected for the study were known to have Web expertise. The mode of distribution of the questionnaire was that of posting it on a Web site. The Web experts were directed to that site by an e-mail solicitation, and completed the questionnaire while online at the site. Their responses were then electronically communicated to a waiting database. Each of the next two questionnaires followed this process. Additionally however, for the third questionnaire an identical questionnaire was prepared in traditional printed questionnaire form and mailed to about 200 invited participants for whom an electronic address was not known; 14 persons responded by U.S. Mail.

Additional problems were solicited for evaluation with each questionnaire. For all three questionnaires participants rated each problem on a scale of 1 to 10, with 10 being “Most Important.” Of the 139 problems of the first questionnaire, the 46 ranked highest in importance were continued to the second questionnaire for evaluation, and the top 26 of these were continued to the final questionnaire. The results of this final evaluation constitute the study results reported here. Responses from 83 participants were received for this third questionnaire (including 14 via traditional mail), and each of the 26 problems of this third round was evaluated by at least 77 participants.

Study Results

Three findings of the study are important. The first is that a set of similar problems, which collectively might be called “strategy and planning” problems, dominates in importance. The second important finding is that a second set of problems, these involving data security and integrity, is evaluated as nearly as important as the first set. Taken together, these two sets of problems overwhelm all other problems in importance.

The third important finding flows from relating this study to other studies; it is that the top problem area of strategy and planning is strikingly similar to the “Most Important Problem” found by six DELPHI studies in other technology arenas. This suggests that this “strategy and planning” problem may also be most important in other fields of high technology where management problem importance studies have not been completed.

Strategy and Strategic Concerns

Of the first five problems in importance, four are related to strategy and strategic planning concerns about Web systems and their development, such as to how these systems’ development is linked to company direction and strategy, and how this development should be coordinated with strategic planning of the company. This concentration of concern in this area of strategy and planning goes beyond the top five as well, to include problems 13, 14, and 16, so that seven of the top sixteen problems are related to each other as parts of this “strategy” group. The four problems (numbers 2, 3, 4, and 5 in importance), as well as the other three (13, 14 and 16) are shown in Table 1.

Each of these problems represents a facet of one set of problems. This set of problems is more important than any individual problem or any other set of problems. Collectively these problems make it clear that the most important Internet/Web systems problem is not a technical problem, or even direct management of a technology. The most important problem is a broad management problem involving strategy and strategic planning for development and deployment of all of a company’s Web systems within the context of overall company operations. These seven highly ranked problems indicate the high level concern of systems development managers and other managers that the goals and
objectives of their company’s Web systems are not consistent with the corporate goals and directions.

By examining the seven strategy-related problems together a pattern can be seen. This pattern apparently represents the general belief of the participants that companies have no effective strategy for the Internet, that is, either they have no “Internet strategy” or the strategy they do have is not considered effective. It is not possible to establish a coherent Internet (and Web) strategy unless the potential of the Internet and Web for that company is understood (problem 14 of Table 1, “Potential Benefits…”). To understand the potential benefits requires careful, reflective thinking in a manner that holistically considers all potential benefits from all areas of a company, that comprehends and considers the technologies themselves, and that also considers the company’s business model and core competencies as well as those of competitors. This careful, reflective thinking might be called “Holistic Thinking,” to use the terminology in problem 2 (Table 1) about “the short term and long term implications…” To think holistically in this manner is an exceedingly difficult task that involves abstract thinking and a great deal of pooled knowledge about the entire Internet area as it relates to a particular company.

However, if this holistic thinking is done well, a reasonable perspective of the potential of the Web systems for a company can be seen. Then strategic planning for Internet/Web operations can proceed in a manner consistent with the company’s philosophies and procedures about strategic planning and in such a way that “The Linkage of Internet Strategic Planning With Corporate Strategic Planning…” is accomplished (problem 3, Table 1). (The 16th problem, “Internet Personnel are not Strategists,” suggests that the actual developers of the Internet/Web systems may not have a sufficient understanding of strategic planning to be effective participants in the Internet strategic planning.) Via this Web systems and corporate planning linkage, “Internet Development Projects Are Aligned With Corporate Strategies” (problem 4, Table 1); that is, the linkage accomplishes this alignment. With this alignment, a company is able to prioritize its Internet objectives (problem 5, Table 1) and then define its site objective (problem 13, Table 1). This trail of logic, while serpentine, seems reasonable and inter-relates all of the top seven strategy-related problems that emerged from the study so that they collectively compose a coherent mosaic of an overall Web strategy problem. Of course, direction setting and planning activities are more complex than described here and vary widely from company to company; so a simple portrayal such as is provided here cannot do justice to the realities of strategic activities.

The importance of strategic management of Internet technologies as a problem area echoes results found in other DELPHI studies. Beginning in 1984 and continuing through 1996 (prior to the emergence of the World Wide Web), a series of four DELPHI studies was done to assess the importance of the problems faced by information technologists of companies. Each of the last three studies was, in effect, a continuation and update of the preceding study, and each ranked 18 to 20 information systems issues. The first of these studies [3] ranked “Long Range Planning and Integration” as the number one problem. The second [1] placed “Strategic Planning” in the top position. The third study [5] ranked the issue of “Improving Strategic Planning” as third in importance. The fourth study [2] ranked it tenth.

More recently, two Delphi studies have focused on management problems associated with development of high-tech products. The first of these studies [6] established “Strategic Planning for Technology Products” as the top problem among twenty-four problems. This problem was so dominant as the top problem that a follow-up Delphi study [7] was conducted in which participants were asked to identify the most important sub-problems of this strategic planning problem. This second study clearly established two of the sub-problems of “Strategic Planning For Technology Products” as about equally important and as overwhelmingly more important than all of the other nineteen problems rated. These two top problems, per the second study, are “Linkage Between Corporate and Technology Strategic Planning,” and “Linkage of Corporate R&D Strategic Planning With Business Unit Product Development Planning.” As indicated by the titles of these problems, they are closely related to each other and in the discussion of that study were dubbed “the linkage problem” of strategic planning for technology.

All studies mentioned above have shown the prominence of strategic thinking and strategic planning. The final study considered also detailed “the linkage problem” as the most important dimension of the strategic planning problem of new product development involving high-technology products, which is consistent with problems 3 and 4 of this study.

Establishing the most important problem of Web systems development as involving strategy and strategic planning and showing the consistence of this finding across different DELPHI studies have an importance that may extend into other fields of technology management. It brings to the forefront the need for a major effort directed the general area of strategic planning for all types of technology initiatives.

Data Integrity and Security Concerns

Six problems among the top 16 are concerned with the integrity and security of data. (Thus, 13 of the most
1. Direct access to internal systems and files by multitudes of customers via their browsers.
2. A wide variety of types of interaction between the company and connected browser-users (such as customer inquiries and responses to these, sales transactions, and various kinds of services provision).
3. The ability of companies to electronically gather unprecedented amounts of information about contacts and customers, such as by tracking customers’ progress through a web site and noting their shopping interests and purchasing patterns.
4. The transformation of digital data transmission systems (enabled with new types of transmission technologies and protocols) into true networks without fixed or even closely constrained data paths. As a consequence any transmission may move freely from web site to web site around the globe, making it difficult to trace the origin and paths of travel of a specific transmissions. This capability can give near-anonymity to a web user.
5. The emergence of Extranet “exchange” software that facilitates a one-to-many relationship of a purchasing company with its vendors, or a many-to-many interface of a purchasing company with other purchasing companies and a host of vendor companies.
6. The development of peer-to-peer software that
enables a communication or data file transmission at one Web site to be made available for acquisition by any other internet user at that users’ request.

In conjunction with these new capabilities, their very speed of emergence coupled with the extraordinarily rapid acceptance of the Web contribute greatly to the data integrity and security problems now encountered. Similar to their preceding traditional information technologies, controls development and integration into the systems responds to the need for them. While business data processing began in the mid 1950s, it was the late 1960s before even rudimentary computer auditing procedures were developed, the mid-1970s before the first computer auditing courses were taught at universities (the third such course was introduced by one of the authors in 1976), and the mid-to-late 1970s when the profession of computer auditing blossomed. As another example, after databases began to be used in the early1970’s, and especially when they began to support online operations within a few years, the corporate world became alarmed that so many data resource eggs were at risk in one database basket. It required several years to develop and implement database controls such as backup-and-restart, and multi-level password access. It took even longer for auditors to establish procedures to access and test the data in the databases and the controls over that data.

Accordingly, especially considering how recently and rapidly the Internet/Web phenomenon has emerged, it should be no surprise that data integrity and security problems are accompanying it’s development and that solutions do not exist for some of these and are not widely used for others. The situation is exacerbated greatly by the very embryonic state of a professional class of Web systems development specialists, and the risks are further compounded by the failure of focused attention to these problems on the part of a specialized professional Internet security group akin in some respects to the computer auditing profession.

As seen in Table 2, of the six data integrity and security problems, all but one are directly related to consumers, “uninvited” outsiders, customer companies, and vendor companies. Each of these, in turn can be associated with one of the new technology capabilities presented above. The consumer-related problems (numbers 1 and 6) are, in a sense, opposite sides of the same coin. The one side is “Protecting Information About Consumers” (problem1), and the other is “Providing Adequate Reassurances to Consumers That Information is Fully Protected” (problem 6).

Thus, there is the problem of consumers’ privacy and data confidentiality, and there is also the problem of providing systems with safeguards that give solid and believable assurances to consumers that their privacy and personal data are protected. Even beyond this is the problem of convincing the consumers that their transactions data and information about their operations that are entrusted to the company are fully protected, whether or not this is so. This stems in some measure from the third of the above-noted new capabilities of Internet systems, the ability of companies to gather unprecedented amounts of information about contacts and customers. Consumers are not reassured, for example, when the public press informs them that when a particular dot com company was sold, the sale included customer data. The personal data about the customers, perhaps previously guaranteed to be held to the highest standards of confidentiality, are then transferred to the purchaser and this customer information may be considered the most valuable asset sought by the acquiring company.

Neither are consumers reassured that their interests are protected by routine practices of some Internet software companies, such as that of Hotmail, which provides free e-mail service. “Hotmail customers are automatically added to Infospace’s Internet White Pages unless they remove the check from a box in their registration form and ‘opt out’…” which, of course requires some vigilance on the part of consumers. Overlooking the “opt out” option means that “users might be putting themselves at risk of receiving junk e-mail…..once their information reaches the directory, advertisers can easily obtain it….once your e-mail addresses get into spammers’ data bases, you can’t get it out again…” [4].

With reference to both consumer and company customer data and privacy (problem11) concerns, Internet technical developments ultimately are likely to provide a reassuringly satisfactory level of data protection, such as through cryptography, new forms of Internet cash payments technologies, and other technical developments. During the first decade of consumer billing by computer (when computers began to store large quantities of data about customers), similar concerns were widespread among consumers. These concerns with respect to traditional computer systems data security and privacy have moderated over time as database controls and other technical mechanisms improved, and as computer auditing emerged. As was so with traditional systems, it is likely to require several years of effort to develop and implement widely the needed forms of Internet data protection.

Problem 12, the Absence of Adequate Firewalls, is an extension to a grander scale of concerns long present with traditional systems about having too many data resource eggs in one database basket and these eggs being too easily accessible by unauthorized persons. This extension is due to several of the new capabilities provided by the Internet technologies as described previously. The most important new capability is that of providing direct access to internal systems and files to multitudes of real or potential customers, as well as to internal users. Via browsers, outside customers and especially company—
customers with which the company may conduct several forms of business—need access to certain files and yet must be excluded from others. Even employee “customers” must be given access to data on a need-to-know basis, and denied access to certain personnel and other sensitive data files. Online vendors too must have access to company data, such as about inventory levels and bids solicitations, but should not be granted access to other data files of the company and particularly not to the files related to competing vendors that may also be online as parts of the same “exchange” Internet network.

Intruders with malicious or malevolent intent also are in a position to more easily access company information resources. In part this is because of the sheer numbers of persons who can access the company web site with their browser and who may have technical abilities sufficient to cause damage (such as with viruses) or to copy confidential information. In part too, this concern is because of the capability of the Internet that permits any transmission to move freely from web site to web site around the globe. This complete freedom of movement makes it difficult to trace the origin and paths of travel of a specific transmission so that one transmission may propagate viruses and multiply its impact many-fold times. This capability of propagation may jam web sites in denial of service attacks.

Problem 15 about protecting the intellectual property rights of a company, is partly a consequence of being able to distribute data rapidly across the Web. This intellectual property can be widely compromised by being placed on the Internet, such as in chat rooms. Further, it is easily copied by anyone at all if it is placed on the net, and can even made freely available for transfer across the net through peer-to-peer computing. The ways companies resolve these problems may be partly with technical controls, and partly through the courts systems that are now grappling with companies’ legal rights to their copyrighted information on the Web.

In this milieu of several new Internet-provided new capabilities that endanger a company’s digital data assets or permit the companies to use these assets more effectively against the interests of consumers, the high importance ranking of data integrity and security problems and of consumer privacy problems becomes understandable. The similar but much lesser magnitude problems of data protection in traditional systems suggests that the Internet data integrity and security problems now experienced will be overcome, but only after many years of effort. The more recent experiences involving the rapid emergence of new Internet technologies which provide new capabilities, however, suggests the likelihood that new kinds of severe integrity and security problems will emerge long before existing problems will be adequately dealt with.

Other Important Problems

A surprise finding of the study is the extent to which the top two groups of problems overwhelm others in terms of importance, with all of the thirteen problems related to these groups within the top sixteen problems overall. The other three problems in this group of 16 (see Appendix for a listing of all 26 problems) are number 7, A Shortage Of Trained Internet Systems Personnel, number 9, Mobility Of Trained Internet Personnel, and number 10, Company Logistics Systems are not Internet Compatible. The first two of these are Internet personnel problems, which supports assertions earlier in this article that Internet systems are often developed by persons not trained in systems development. Academia has not yet been able to catch up with industry demand for qualified Internet systems personnel. This problem area can largely be attributed to the speed with which this demand has emerged and accelerated.

Problem 10, Company Logistics Systems are not Internet Compatible” is a new dimension to the long-term systems integration problem. Without intending to diminish the importance of this problem, it can be noted that as with other, still present, forms of systems integration problems, this tends to be dealt with by each company over a period of time, and the occasional juggling of systems relationships within companies often means that new integration problems emerge that need new solutions. Several software vendor companies are now amending their offerings to facilitate their integration with their clients’ Web systems. As examples, SAP, Oracle, and other Enterprise Resource Planning (ERP) purveyors are preparing Internet-compatible ERP systems. Problems 22 and 23 also are Internet systems integration problems.

Of lesser but still significant importance among the remaining ten of the top 26 problems is another set of two related problems, number 18, Costs/Benefits Analyses For Internet Systems Are Difficult, and number 24, Traditional Costs/Benefits Analysis Methodologies Are Used To Evaluate Internet Projects. This suggests that Internet/Web systems developers are not using methodologies that establish in advance which projects are of greatest merit and should be the highest priority projects. This project prioritization process should take place within the framework of and be a part of strategic planning. Therefore, arguably these problems represent another dimension of the first-most in importance problem group of strategy and strategic planning.

The previously mentioned study of technology management problems in new product development of high-tech product companies ranked in importance the top twenty four problems and found the problem “New Product Project Selection” to be the second-ranked
problem of the study [6]. That study showed that managers experienced great difficulty in establishing a systematic approach to selection of new high-tech product projects and determining which cost/benefits criteria that should be applied. The discussion suggested that a suitable methodology for high-tech product project selection needed to be developed. These results seem relevant to this Internet study’s finding.

Conclusions and Implications

The premier finding of the study is the high importance of big picture, strategic planning and other strategy-related problems. The implication of this finding for companies is that policy makers and planners of companies should be aware that the weak link of their company’s Internet/Web activities is likely to be strategy. What is needed is a holistic analysis by companies’ managers of the benefits available from the Internet, and translation of these analyses into strategic plans for Internet/Web systems that are carefully linked to company strategic plans as well as to specific action plans for development of Internet/Web systems. For academic researchers this strategy problem seems to send a clear signal: undertake research that assists companies with development of Internet/Web planning systems.

Related to this Internet strategy-related set of problems is the discovery that DELPHI management problems studies in other technology arenas also have found strategy and strategic planning to be a top technology management problem. In the final analysis this discovery may be the most important consequence of the present study.

The next major finding of the study is the high importance of data integrity and security problems, and of data privacy problems. The ratings of specific problems of this group help to clarify and specify the nature of the problem area. As noted, the solutions to these important problems are unlikely to be found and implemented quickly.

References


## Appendix
### Final Evaluations from Round III of the Top Twenty Six Problems

<table>
<thead>
<tr>
<th>Rank</th>
<th>Problem Statement</th>
<th>Overall Average</th>
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<tbody>
<tr>
<td>1</td>
<td>Protecting Information About Consumers.</td>
<td>7.659</td>
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<tr>
<td>2</td>
<td>The Absence Of Holistic Thinking.</td>
<td>7.590</td>
</tr>
<tr>
<td>3</td>
<td>The Linkage Of Internet Strategic Planning With Corporate Strategic Planning Is Inadequate.</td>
<td>7.439</td>
</tr>
<tr>
<td>4</td>
<td>Internet Development Projects Are Not Aligned With Corporate Strategies.</td>
<td>7.410</td>
</tr>
<tr>
<td>5</td>
<td>Companies Have Not Prioritized Their Internet Objectives.</td>
<td>7.247</td>
</tr>
<tr>
<td>6</td>
<td>Providing Adequate Reassurances To Consumers That Information Is Fully Protected.</td>
<td>7.185</td>
</tr>
<tr>
<td>7</td>
<td>A Shortage Of Trained Internet Systems Personnel.</td>
<td>7.101</td>
</tr>
<tr>
<td>8</td>
<td>Intranets Remain Security Problems.</td>
<td>7.073</td>
</tr>
<tr>
<td>9</td>
<td>Mobility Of Trained Internet Personnel.</td>
<td>7.013</td>
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<td>10</td>
<td>Company Logistics Systems Are Not Internet Compatible.</td>
<td>6.962</td>
</tr>
<tr>
<td>11</td>
<td>Providing Data Privacy And Data Security To CustomerCompanies.</td>
<td>6.939</td>
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<tr>
<td>12</td>
<td>Absence Of Adequate Firewalls.</td>
<td>6.914</td>
</tr>
<tr>
<td>13</td>
<td>No Site Objective Is Defined.</td>
<td>6.897</td>
</tr>
<tr>
<td>14</td>
<td>Potential Benefits Available From The Internet Are Not Recognized.</td>
<td>6.890</td>
</tr>
<tr>
<td>15</td>
<td>Intellectual Property Rights Have Become A Major Concern.</td>
<td>6.854</td>
</tr>
<tr>
<td>16</td>
<td>Internet Personnel Are Not Strategists.</td>
<td>6.850</td>
</tr>
<tr>
<td>17</td>
<td>WWW Sites May Not Be User Friendly.</td>
<td>6.844</td>
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<td>18</td>
<td>Costs/Benefits Analyses For Internet Systems Are Difficult.</td>
<td>6.756</td>
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<td>19</td>
<td>Companies Do Not Keep Up To The Dynamism Of The Internet-Based Marketplace.</td>
<td>6.707</td>
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<tr>
<td>20</td>
<td>Customer Service Through Internet Systems.</td>
<td>6.684</td>
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<tr>
<td>21</td>
<td>The Speed Of Change Makes Internet Technology Forecasting Difficult.</td>
<td>6.662</td>
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<tr>
<td>22</td>
<td>Integrating Internet Systems Across Multiple Sites Within a Company.</td>
<td>6.519</td>
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<tr>
<td>23</td>
<td>Linkage Of Internet Systems To Other Internet Systems.</td>
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<td>24</td>
<td>Distribution Channel Conflicts Inhibit More Widespread Use Of E-Commerce.</td>
<td>6.398</td>
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<td>25</td>
<td>Traditional Costs/Benefits Analysis Methodologies Are Used To Evaluate Internet Projects.</td>
<td>6.308</td>
</tr>
<tr>
<td>26</td>
<td>Competitors May Be Leaping Ahead.</td>
<td>6.268</td>
</tr>
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Table 1
The Dominant Group: Strategy and Planning Problems

2. The Absence Of Holistic Thinking. (Score = 7.590) The managers of many companies have not thought through the short term and long term implications of the Internet/WWW for the entire range of company activities.

3. The Linkage Of Internet Strategic Planning With Corporate Strategic Planning Is Inadequate. (Score = 7.439) In many companies, Internet strategic planning is often not linked to corporate strategic planning.

4. Internet Development Projects Are Not Aligned With Corporate Strategies. (Score = 7.410) Too many Internet development projects are begun without considering how they should or would be linked to the business plans and company strategies.

5. Companies Have Not Prioritized Their Internet Objectives. (Score = 7.247) The managers of many companies have not fully thought through which Internet systems benefits are most important and should have development priority.

13. No Site Objective Is Defined. (Score = 6.897) Often no carefully defined objective of a Web site is established to serve as a design guideline that specifies the nature and scope of the problem or opportunity being pursued.

14. Potential Benefits Available From The Internet Are Not Recognized. (Score = 6.890) In many companies many of the activities and processes that could be dramatically improved with Internet systems have not yet been considered during the design of Internet systems.

16. Internet Personnel Are Not Strategists. (Score = 6.850) Most persons who participate in development of their company’s Internet applications are not familiar with strategic thinking concepts and so are unable to develop or understand the need to develop cohesive Internet strategies.

Table 2
The Second Group: Integrity and Security Problems

1. Protecting Information About Consumers. (Score = 7.659) Consumer personal and financial information provided through the Internet is not fully protected from hackers and from misuse by receiving companies.

6. Providing Adequate Reassurances To Consumers That Information Is Fully Protected. (Score = 7.185) Even if an Internet site has stringent and successful processing systems and data safeguards, it can be difficult to convince consumers that this is so.

8. Intranets Remain Security Problems. (Score = 7.073) Despite progress with Intranet firewall capabilities, a significant risk of penetration by outsiders remains.

11. Providing Data Privacy And Data Security To Customer Companies. (Score = 6.939) Company information provided through Extranets and other business-to-business sites is not fully protected from hackers and misuse by receiving companies.

12. Absence Of Adequate Firewalls. (Score = 6.914) Many companies are far behind with implementation of firewalls. Additionally, nearly all companies are potentially vulnerable to system shutdown from direct denial-of-service attacks launched against the companies or their ISPs.

15. Intellectual Property Rights Have Become A Major Concern. (Score = 6.854) The Internet has made it significantly more difficult to protect the intellectual property of companies, such as patents, copyrights, and confidential product and trade information.